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White Paper: Certification of Small Solid Biomass Combustors (SSBC) in Canada



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i. Introduction – Adoption of Renewable/Carbon Neutral and Low Carbon Heating Technologies

Canada is recognized as a global leader and supplier of climate change mitigation products and solutions. Strong international commitments have led to the development and implementation of renewable/carbon neutral and low carbon electricity as well as renewable/carbon neutral and low carbon sources of process and space heating globally. Canada, like many European Nordic countries, is well positioned to focus on adopting renewable/carbon neutral and low carbon sources of heating to meet its greenhouse gas (GHG) reduction targets due to its colder northern climate representing close to 26% of its GHG footprint required for heating and powering homes.

European Nordic countries also share a similar energy strategy. In order to become less reliant on international imports for coal, oil and other fossil fuels, many turned to solid biofuels due to the strength of their forestry sector to source wood fibre from sustainably managed forests for space heating. While the price of fossil fuels has been highly volatile since the oil crisis in the late 1970s, international prices of wood fibre have generally trailed inflation. An analysis by FutureMetrics (https://www.futuremetrics.info/) demonstrated that since spring 2004, the cost to heat a home in the US Northeast can easily double due to fossil fuel price volatility, while the price of domestically produced and imported wood pellets remained stable and gradually increased by trailing inflation (. The price of oil has varied over the past 15 years more than once, with swings up to 300% due to international market disruptions related to hurricanes, floods, wildfires, earthquakes, COVID-19 pandemic, financial and credit market collapse, terrorism and armed conflict, while the price of wood pellets to heat a home in the US Northeast and Canada has been decoupled from high price instability and insecurity.

However, currently, Canada remains sensitive to fossil fuel supply and demand price insecurity and fluctuations for space heating. It primarily exports its most popular renewable/carbon neutral and low carbon heating solution to the Asian, British, European and American markets in forms of industrial and residential grade wood pellets. Over 40 Canadian wood pellet processing plants sourcing forest residues from sustainably managed forests collectively export 3.2 million tons of wood pellets each year (approximately 10 million barrels of oil equivalent per year) while Canada has very little domestic consumption of wood pellets. Domestic use of other forestry residues in energy generation systems, such as burning hog fuel and sawdust in large wood fired combustors and cogeneration plants, has been limited to large corporate owned forestry operations, such as sawmills and pulp and paper mills.

From the standpoint of international importers of sustainably sourced Canadian wood pellets, it's difficult to realize that Canada is so reliant on fossil fuels, such as natural gas, propane or fossil fueled electric power plants for space heating. They frequently remind us that Canada has over 36% of all independently certified forest land worldwide. This is the largest area of third-party certified forests in any country. Yet, in the past 15 years, only approximately 450 small solid biomass combustors (SSBC) have been installed in Canada for residential, commercial, institutional, and industrial applications. In contrast, Europe has installed approximately 425,000 SSBC for the residential sector alone, almost one thousand times more systems than Canada installed over the same time period.

ii. Problem Statement – Lack of Mutual Recognition for Technology Standards

European stakeholders supporting the adoption of renewable/carbon neutral and low carbon sources of heating have asked Canada to recognize the boiler and pressure vessel (BPV) component of EU standard of EN303-5:2021+A1:2022 for the regulation of SSBC. The SSBCs manufactured in the EU have a global reputation of being clean, efficient, safe, and reliable. For these reasons Canada has already accepted EN303-5:2012 in its air pollution management guideline recently published by the Canadian Council for Ministers of the Environment (CCME). For clarity, the CCME guideline was developed between 2018-2020 based on the 2012 version of EN303-5 that was available at the time, while it is acknowledged that a new amended edition of EN303-5 has since been published in 2022 to include new BPV parameters for high efficiency condensing boilers. It is important to note that the 2022 amendments to EN303-5 did not change the air pollution limits and they are the same as the 2012 version. Additionally, the EU is critical of Canada's lack of financial support of the technology in our climate change mitigation framework and that Canada has not embarked on similar initiatives to subsidize the gradual replacement of fossil fueled space heating appliances with SSBC appliances using our abundant supply of sustainably sourced wood fuels.

iii. Taking Action with Stakeholders – Technical Standards Harmonization

With the support of the European Commission, Austrian SSBC manufacturers built a relationship with the Wood Pellet Association of Canada (WPAC) representing Canadian wood pellet manufacturers. The WPAC and Austrian SSBC manufacturers discussed with early adopters of SSBC in various Canadian jurisdictions and immediately recognized that many technical and regulatory barriers existed in Canada that were not present in Europe or in other jurisdictions that support the adoption of renewable/carbon neutral and low carbon heating technologies. The WPAC approached both the Technical Committee for CSA B415.1 and CSA B51 in 2019 to seek harmonization of the European SSBC standard for environmental performance covered in CSA B415.1 and for the BPV certification framework covered under CSA B51.

iv. Environmental Performance – Positive Support

In 2020-21, the WPAC was joined by a group of subject matter experts supporting the adoption of SSBC during the harmonization of CSA B415.1 for environmental performance. CSA B415.1 covers emissions testing and certification of residential wood heating appliances under Section 6 of the Canadian Building Code. The support was due, in part, to the positive experience and regulatory changes brought to Ontario in 2017 to recognize environmental performance testing already conducted in European certified testing laboratories to meet the air emission limits of EN303-5:2012 for the multi-residential, commercial, institutional, and industrial sector of Ontario. Certain Canadian jurisdictions did not recognize or refused to allow the installation of certified CEN EN303-5:2012 wood heating appliances under CSA B415.1. Stakeholders with an interest in SSBC agreed to harmonize emissions and performance testing for residential size SSBC under the Technical Sub-Committee (TSC) for CSA B415.1 while the original members of the TSC were seeking to harmonize with the US EPA. Following discussions and public review of the standard, a revision of CSA B415.1 was published in February 2022 that includes a normative reference to the environmental testing already done in Europe under CEN EN303-5:2012 to allow its certification in Canada without duplicating costly emissions and performance laboratory testing and reducing technical trade to barriers.

v. Boiler and Pressure Vessel – Incompatible Technical and Regulatory Framework

The WPAC, along with many of the subject matter experts supporting the harmonization of environmental testing on SSBC in CSA B415.1 believed that similar efforts of knowledge transfer and extension to authority having jurisdiction would lead to the recognition and harmonization of the pressure vessel requirements of CEN EN303-5:2021+A1:2022 for European certified SSBC in CSA B51, Canada's national boiler and pressure vessel standard. During 2020, with the help of the Provincial-Territorial Advisory Committee (PTAC) of the Standards Council of Canada (SCC), WPAC referenced the progress made in Prince Edward Island (PEI) by their Chief Boiler Inspector to recognize the CEN EN303-5:2012 standard with certain technical deviations. In the following year, SCC's PTAC proceeded with the creation of a project team with various volunteer subject matter experts to further study the European SSBC standard and compare it with the current certification framework in Canada for BPV. The project team quickly realized that the European and Canadian frameworks for BPV were incompatible.

vi. Recommended Solution – Creation of a National Standard of Canada for SSBC

Amongst four (4) different options available to resolve the technical, administrative, and financial burden on European certified SSBC to comply with the regulatory framework of CSA B51 for BPV in Canada, this White Paper will demonstrate why the recommendation from the PTAC project team on SSBC is most beneficial to jurisdictions in Canada and to the European Union.

The project team is proposing to create a National Standard of Canada (NSC) that would harmonize with CEN EN303-5:2021+A1:2022 and consider any needed technical deviations that, once published as a national standard, can be adopted by provincial and territorial authorities having jurisdiction. This path forward is also supported by the representatives of the European manufacturers of SSBC and the consultant for the Wood Pellet Association of Canada.

Of note, nine (9) benefits have surfaced for this option to develop a NSC compared to two (2) or three (3) advantages present in the other options described in this White Paper:

1. Removes Technical Barriers to Trade under Canada-European Union Comprehensive Economic and Trade Agreement (CETA) via a bi-national joint initiative to prevent future potential trade and conformity assessment irritants between Canada and EU
2. Improves the position of Canadian firms by providing export opportunities to manufacture SSBC by creating a one-window market system for potential two-way trade, such as, for example, with the European SSBC market
3. Facilitates the implementation and recognition in each province and territory's authority having jurisdiction of the proposed National Standard of Canada.
4. Facilitates trade between each province and territory by reducing regulatory and financial burdens on businesses by not having to comply with different rules in different provinces in territories.
5. Increases the potential of GDP growth in the Canadian BPV market sector for Canadian firms by having a one-window access to the EU SSBC market.
6. Increases the potential of GDP growth in the Canadian wood pellet market by increasing the consumption of domestically produced wood pellets and other forestry residues by newly installed SSBC in Canada.
7. Contributes to Canada's climate action plan to reduce GHG emissions, create more jobs, and support a healthier economy and environment, such as stated under the Pan-Canadian Framework on Clean Growth and Climate Change.
8. Aligns with the recently published Canadian Council of the Minsters of Environment (CCME) guidance document "Managing Air Emissions from Small Solid Biomass Combustors" that was agreed to by all Canadian provinces and territories, for the implementation of air emission and thermal efficiency standards for SSBC, including a direct reference to EN303-5:2012 and its air emission limits (which did not change in the 2022 amended version of the standard).

9. Provides equal access to renewable/carbon neutral and low carbon heating technologies for rural and remote communities across Canada, such as northern and First Nation communities that rely on imported diesel, fuel oil or propane for space heating but have local access to sustainably sourced forestry residues from roadside and wildfire risk management operations.

vii. Conclusion – Working Forward in Harmonizing Technical Standards for SSBC

Harmonization of technical standards and the reduction of technical barriers to trade has been frequently shown to improve the economic growth, environmental quality, safety, and trading relationships of jurisdiction involved in a joint effort. For these reasons, this White Paper will demonstrate in more details the benefits of working towards the development of a National Standard of Canada to further reduce the technical barriers for the adoption of low carbon heating technologies in Canada such as SSBC.

White Paper: Certification of Small Solid Biomass Combustor (SSBC) pressure vessels in Canada using an international market established standard

I. Introduction - Issue Overview

Small solid biomass combustors (SSBC) built in the European Union (EU) conform to the European Committee for Standardization's (CEN) harmonized design standard EN 303-5 (recently amended in 2022). The standard provides a maximum size limit of 500 kW of thermal output, but often Original Equipment Manufacturers (OEM) test their SSBC that are over 500 kW thermal output using the same methodology for applications where CEN EN 303-5 conformance is accepted as equivalent.

However, SSBCs sold in Canada are required to meet the Canadian fabrication and certification requirements set out in the boiler, pressure vessel, and pressure piping code (CSA B51:2019 standard) developed by the CSA Group (formerly the Canadian Standards Association). CSA B51 is based on an American standard and allows for efficient two-way trade with America for boilers and pressure vessels (BPV).

The CSA B51 standard, which has been adopted by all provinces and territories, is a broad standard used for all boilers with combustion chambers. However, because of the broad application of the standard, it creates requirements applicable to boilers that operate at higher pressures and temperatures than the typical operating range of SSBCs covered by the EU standard CEN EN 303-5:2021+A1:2022.

The EU has stated that it is cost prohibitive for EU manufacturers to meet the Canadian national code/standard, estimating that on average the manufacturing cost for each SSBC would be an additional 20 to 30% (approximately $20,000 to $30,000 for a 100 kW nominal heat output SSBC), thereby making these SSBC unaffordable for sale in Canada. In June 2019, the European Commission made a request to Canada to consider regulatory acceptance of the CEN EN 303-5:2021+A1:2022 standard in Canada to facilitate trade between Canada and the EU.

This White Paper sets out a framework to develop a new appliance standard that would allow for the certification and permitting of European SSBC in Canada. Once the White Paper has been finalized, it will need to be endorsed by the PTAC committee before next steps can be determined. A possible next step is SCC can bring this request to the attention of SCC-accredited SDOs, who may decide to take on the development of a new standard or consider this within the context of another standards-development process. This would require the support of an SCC accredited SDO, list found here: https://www.scc.ca/en/accreditation/standards/directory-of-accredited-standards-development-organizations

This White Paper describes the advantages and co-benefits of addressing technical trade barriers, such as the boiler and pressure vessel requirements in CSA B51, that would increase the uptake and adoption of EU certified SSBC allowing additional options for low carbon heating technologies in Canada. A summary of the higher level discussions under the title of "Certification of Small Solid Biomass Boilers in Canada" can be found here: https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/2021-11-26-biomass-biomasse.aspx?lang=eng

II. Alignment with international, national, and regional priorities & policies

This White Paper describes a proposal to harmonize with the European SSBC standard for boilers and pressure vessels as it is aligned with other international agreements, national and regional and priorities and policies, including the following:

i. The Canadian Council of the Minsters of Environment (CCME) guidance document "Managing Air Emissions from Small Solid Biomass Combustors" from 2021 and align with SSBC legislation and associated guideline from 2017 concerning emissions for the province of Ontario:

The CCME technical guidance document includes a summary of best available technologies for managing air emissions from SSBC and was modelled after the recently published technical Guideline A-14 for the control of air emissions from SSBC in Ontario. The guidelines published by both CCME and Ontario recognize the air emission limits imposed by EN 303-5:2012 (which did not change in the 2022 amended version of the standard) as the current industry benchmark but neither include any references to BPV as that is beyond their mandate or jurisdiction. This new CCME guidance document for Canada is based on four principles:

- Minimize impact of air emissions from solid biomass on human health and the environment.
- Enable consistent Canada-wide use of cleaner small solid biomass combustion technology.
- Support the implementation of standards for solid biomass fuels and small solid biomass combustors.
- Enable reductions in GHG emissions.

The CCME guidance document is readily available to be adopted into federal, provincial and/or territorial legislative frameworks for non-residential automatically fueled hydronic heaters and automatic forced air furnaces using CEN EN 303-5:2012 (which are the same as the 2022 amended version) air emission limits as well as the CAN/CSA-ISO 17225 standard for graded wood chips or wood pellets. For more information on the different options available to adopt the guideline, please download a direct copy here: https://ccme.ca/en/res/guidancemanualonmanagingairemissionsfromssbcs_en.pdf

In Ontario, the use of forest residues from forestry operations is also highlighted as a priority under the Forest Biomass Action Plan set out by the Ministry of Northern Development, Mines, Natural Resources and Forestry. The new 5-year action plan encourages the use of low-grade biomass resources to secure jobs, support economic development and encourage sustainability in Ontario's forest sector. Of note, the action plan points out commitments to develop modern wood heating and community & district energy systems as well as supporting Combined Heating and Power (CHP) plants providing low carbon intensity energy to forestry operations and neighbouring communities.

ii. Alignment with the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) – "Canadian Statement on Implementation, Chapter 4" to reduce technical barriers to Trade (TBT):

While Canada and the EU share similar goals with respect to protecting public health and safety, they have different approaches or requirements when it comes to product testing, labelling and certification, and therefore the results of a conformity assessment process in one may not be recognized in another. This can impose additional costs and delays for manufacturers and producers who wish to export or for contractors who wish to import, such as having a product being tested twice using two different testing protocols for the same purpose. Based on the feedback collected from stakeholders importing SSBC that have to be manufactured under ASME Part IV and to obtain a Canadian Registration Number (CRN#) under CSA B51, costs can be 25% higher for larger models and up to 40% price increase for smaller SSBC below 100 kW heat output. Notably, heating system design requires in some instances cascading, which requires two smaller SSBC rather than a larger appliance to meet minimum turndown ratios of 30% and to minimize idling conditions to meet environmental air quality requirements. The Canada-European Union Comprehensive Economic and Trade Agreement (CETA) contains a Protocol on the mutual acceptance of the results of conformity assessment, which includes a product category on "Hot-water boilers, including related appliances". This protocol is designed to allow Canadian products in certain agreed product categories to be tested and certified to EU requirements in Canada and vice versa. In other words, this protocol only affects where products can be certified to the other party's requirements. As such, this protocol does not harmonize

regulatory requirements between Canada and the European Union, nor does it allow for the mutual recognition of conformity assessment results.

iii. Global Energy Supply Insecurity & Support for Diverse Energy Sources

There are various motivations for diversifying and decentralising the energy markets in North America to de-risk the supply chains. The traditional global supply chains for fossil fuels have been shown to be fragile. With the current political crisis in Eastern Europe due to the Russian invasion of Ukraine, the integrity of the global energy supply has been shaken.

In addition to political issues, many regions have become more susceptible to extreme weather events. For example, New Mexico and Texas have experienced cold weather events in February 2011 and in February 2021, that left large areas without access to electricity or natural gas for more than 2 weeks. Recently, Ontario has experienced a similar event where certain portions of the province were weeks without power. Events such as these have pushed some jurisdictions to diversify and increase their use of alternative and distributed sources of energy, such as renewable electricity, renewable natural gas, and on few occasions, renewable heat.

Of note for First Nation and remote communities, spills of fossil fuels used for heating and power do occur and can cause large spread contamination issues for thousands of citizens. More recent incidents in Hawaii at US Navy Base in the community of Pearl Harbor and a similar leak of diesel in the remote community of Iqaluit in Nunavut are both incidents which lead to severe ground water and drinking water contamination issues for thousands of people. It is obvious that wood pellets or wood chips “spills” are much easily cleaned up and do not pose a direct and immediate health issue to soil, air or surface and groundwater contamination or endangering the local wildlife.

Eastern Canada is also familiar with temporary shortages in fossil fuels, like the liquefied propane (LP) shortage in late 2019 triggered by a strike of Canadian National Railway employees. The dependence on rail infrastructure has been amplified by the low capacity of storing LP in railcars at distribution centers. It has been especially difficult for farmers in Eastern Canada, as they were unable to find enough LP to dry their crops and, as a result, incurred financial losses by having to divert their wet grain to handling and drying processing facilities connected to the natural gas grid. In turn, these processing facilities also temporarily suffered from their inability to move across the supply chain larger volumes of dried grain and were also severely disrupted by the shortage of LP. Even for natural gas, certain areas of southwestern Ontario are notably short of access to sufficient capacity and some of the larger greenhouse producers have opted to primary or backup sources of heating using either Bunker C oil or wood residues. Approximately 20 greenhouses have the infrastructure onsite that enables them to operate on wood residues diverted from construction and demolition waste that are otherwise typically disposed of in local landfills. Their storage capacity can vary from

2 days to a full week of wood residues stored on site to protect them from weather events and allow backup heating systems to be brought online, adding to the energy resiliency and stability to these operations.

iv. Price Stability of Wood based fuels compared to fossil fuels

European Nordic countries also share a similar energy strategy. To become less reliant on international imports of oil and other fossil fuels or domestic extraction for coal, many have turned to solid biofuels, due to the strength of their forestry sector to source wood fibre from sustainably managed forests, for space heating. While the price of fossil fuels has been highly volatile since the oil crisis in the late 1970s, international prices of wood fibre have generally trailed inflation. An analysis by FutureMetrics demonstrated that since spring 2004, the cost to heat a home in the US Northeast can easily double due to fossil fuel price volatility, while the price of domestically produced and imported wood pellets remained stable and gradually increased by trailing inflation. The price of oil has varied over the past 15 years more than once, with swings up to 300% due to international market disruptions related to hurricanes, floods, wildfires, earthquakes, COVID-19 pandemic, financial and credit market collapse, terrorism, and armed conflict, while the price of wood pellets to heat a home in the US Northeast and Canada has been decoupled from high price instability and insecurity.

v. Adoption of Renewable/Carbon Neutral and Low Carbon Heating Technologies for Rural and Remote Communities Across Canada

Various jurisdictions in Canada have already officially recognized the potential of automatic wood heating appliances as one of the best available technologies to provide renewable and low carbon heating and to a lesser degree, electric power. Government energy efficiency retrofit funding and regulatory changes have already occurred in British Columbia, Prince-Edward Island, Nova Scotia, New Brunswick, Northwest-Territories, Ontario, and Québec for automatic wood fueled hydronic heating appliances. As identified by the annual bioheat survey of the commercial and institutional sector carried out by Natural Resource Canada in 2020, there are over 426 automatic wood chip and wood pellet heating systems installed and operated across the country (*Updating of the Canadian Bioheat Database*, prepared for Natural Resources Canada Contract # 3000699198, March 31st, 2020. Jean Blair, PhD.). However, electric power generation and cogeneration wood biomass energy systems tend to be larger, at the industrial and utility scale. In more recent years, remote communities have had some access to financial and technical support through the federal initiative to "Reducing diesel energy in rural and remote communities" under the Pan-Canadian Framework (PCF) on Clean Growth and Climate Change (URL -

https://www.nrcan.gc.ca/climate-change/green-infrastructure-programs/reducing-diesel-energy-rural-and-remote-communities/20542). This initiative has committed to reduce GHG emissions by supporting rural and remote communities in their transition toward more secure, affordable, clean energy and allow the development of net-zero carbon communities.

The Pan-Canadian Framework is strategically aligned with other international, federal and regional initiatives such as the implementation of Environment, Climate Change Canada's (ECCC) *Strategy on Short Lived Climate Pollutants* focusing on black carbon emissions, the collective goal adopted by Arctic Council Ministers in 2017 to reduce black carbon emissions by at least 25 to 33 percent below 2013 levels by 2025 and ratified international commitments under the United Nations Framework Convention on Climate Change (UNFCCC - Paris Agreement), the United Nations Economic Commission for Europe (UNECE - Convention on Long-range Transboundary Air Pollution), and many of the United Nations Sustainable Development Goals (UNSDG). Creating a National Standard of Canada for SSBC is important for Canada to meet the United Nation Sustainable Development Goals (UNSDG). Canada has an obligation to meet UN SDG's when developing legislation. The SDG's are the blueprint to achieve a better and more sustainable future for everyone and they address global challenges we all face, including poverty, inequality, climate change, environmental degradation, peace and justice. With the creation of a new national standard in Canada we will meet several of the 17 UN SDG's including:

- Goal 7, Ensure access to affordable, reliable, sustainable, and modern energy
- Goal 10: Reduce inequality within and among countries
- Goal 17: Revitalize the global partnership for sustainable development
- Goal 12: Ensure sustainable consumption and production patterns, and the most important
- Goal 13: Take urgent action to combat climate change and its impacts.

The goals and their details can be found at https://www.un.org/sustainabledevelopment/sustainable-development-goals/ .

Unfortunately, previous and actual Prime Minister's Mandate Letters to Minister of Environment and Climate Change and to the Minister of Natural Resources Canada do not mention space heating decarbonization using solid biofuels. For the most part, the focus is on energy retrofits, carbon capture and sequestration demonstration and electrification of space heating and transportation. These are not always viable options for First Nations and remote communities surrounded by forests or tundra which would be more suited for end-use fuel switching for wood pellets and wood chip heating fabricated from forest residues, roadside management, or forest wildfire management plans. Similarly, the *Greening Government Strategy: A Government of Canada Directive* issued by Treasury Board of Canada also misses the opportunity to use SSBC appliances in their decarbonisation targets for 2025 and 2050, focusing solely on electrification of their buildings, which is only applicable where the grid has a low carbon intensity or is otherwise supplied with renewable electricity. While this is generally relevant to locations inside Ontario, Manitoba, Quebec and Labrador, low carbon

intensity electricity is not always available (such as when natural gas peaking power plants are used during the winter months during peak loads on cold days), and SSBC would be another viable and safer source of energy for space heating of government and remote National Defense infrastructure.

III. Potential benefits of domestic manufacturing on mutually recognizing and harmonizing SSBC standards in Canada with EU countries?

During the discussions surrounding the recognition of EN 303-5 in Canada for performance and emissions at the technical subcommittee of CSA B415.1, the impact on domestic manufacturing of automatic hydronic heaters for the residential market was also studied. There is currently no known domestic manufacturing in Canada for SSBC that have a certificate for CSA B415.1 emissions and performance testing for the residential sector or for automatic SSBC listed in the US EPA NSPS 2020 Step 2 database. Two manufacturers of large industrial wood fired combustors are active in Canada, KMW in Ontario and Wellons FEI in Québec. For smaller SSBC, two companies in Manitoba offered non-certified models using dated technology for coal burning and have been repurposed for solid biofuels with a varying degree of success.

In June 2021, a letter by two domestic manufacturers of wood heating appliances in Québec stated their disagreement with recognizing EN 303-5 certified SSBC appliances for the residential market in Canada. They recognized this change as unfair competition, where European SSBC appliance manufacturers can export products into the Canadian market without additional testing or product certification while the same holds untrue for a Canadian SSBC or a wood stove that would be certified for sale in Europe. The changes in CSA B415.1 were also perceived by the two manufactures in Québec as an additional hurdle to develop their prototypes of SSBC. It was further explained that this harmonization of emission and performance standard could turn into a potential export opportunity rather than a barrier to adoption because both the original CSA B415.1 test method and the proposed recognition of CEN EN 303-5:2021 test method would both be available for the development of their prototype.

In light of this discussion of CSA B415.1, a similar certification approach would be proposed for domestic manufacturers of BPV in Canada. Both the current CSA B51 certification and a potential new SSBC certification pathway to harmonize the many CEN EN 303-5:2012+A1:2022 standards requirements could be drafted nationally and made available to interested jurisdictions. This could potentially increase economic development and export opportunity for domestic manufacturing and retailing if a proposed National Standard of Canada for SSBC and the European standard CEN EN 303-5:2021+A1:2022 would be harmonized in Canada for BPV. It is also foreseeable that when a significant local market develops in Canada due to its advantages as a low carbon source of space heating in an already hard to decarbonize sector and other

technical barriers to trade are mitigated and addressed, European manufacturers would establish businesses or partnerships with local firms in Canada to partially assemble, manufacture and distribute automatic wood hydronic heating appliances for both the European and North American market. In the past 10 years, this has already occurred through business agreements to some varying level of success with companies such as, Compte-Fournier (France), Combustion Expert Plus (Switzerland), ProMétal Plus / Säätötuli Canada (Finland) Econoburn (Germany), EVO World (Austria), OKÖFen (Austria), Heizomat Canada (Germany). Some of these companies have approached various stakeholders that support this initiative and have a strong interest in establishing a foothold in Canada for manufacturing. Harmonizing could potentially turn into a large foreign investment opportunity for Canada while remaining first in line to benefit by having a significantly lower cost access to SSBC appliances.

There is no current Canadian manufacturing of SSBC, so creating a new standard in Canada will support Canadian manufacturing to develop EU designed SSBC BPVs. As of 2015, the installed capacity of biomass is 2,408 MW, approximately 1.7% of Canada's overall capacity.[1] It is estimated that the domestic market for BPVs will be valued at approximately $1.8 billion by 2027[2] and the global market valued at $300 billion by 2027.[3] These markets also have upward compound annual growth rate projections of 4-5%, ensuring that there are long-term returns on investment through an expanding market. Comparatively, EU jurisdictions have spearheaded the development of biomass BPVs, as solid biofuels account for almost 50% of all renewable energy production in the EU. The biomass BPV industry is booming in Europe, with "year-over-year growth in sales at more than 40 per cent" in 2020,[4] showing that the market for Canadian biomass BPVs have strong potential in the global market. Global energy demand is set to increase by 30% by 2040.[5] Overall, the domestic market for biomass BPVs in Canada is underdeveloped and ripe for market entry and growth.

Currently, BC is the largest market for domestic biomass energy, with 6.4% of electricity produced from biomass sources.[6] Europe accounts for 36% of global market share of biomass.

[1] https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/2017-canadian-adoption-renewable-power/canadas-adoption-renewable-power-sources-energy-market-analysis-biomass.html.
[2] https://www.ibisworld.com/canada/market-size/boiler-heat-exchanger-manufacturing/.
[3] https://www.grandviewresearch.com/press-release/global-pressure-vessel-market.
[4] https://www.canadianbiomassmagazine.ca/residential-use-of-wood-pellets-a-missed-opportunity-in-canada/.
[5] Building Canada's Energy Future Together (nrcan.gc.ca).
[6] Electricity facts (nrcan.gc.ca).

IV. Response by the private sector and trade association for Canadian wood pellet exports

i. Wood Pellet Association of Canada (WPAC)

For approximately 5 years, the Wood Pellet Association of Canada (WPAC) has recognized the potential for Canadians to benefit from the use of wood pellets for domestic central heating and has been working to eliminate barriers to trade that prevent its widespread adoption. This sector has seen large growth and uptake by several jurisdictions across the world that recognize the potential of utilizing forestry residues and who rely on Canada's sustainable forest management third-party certification to offset fossil fuel consumption. WPAC's internal data showed that from only 1.2 million tonnes of wood pellets produced in 30 sites in 2011, ten years later, more than 40 sites exported 3.2 million tons of wood pellets to supply international power and heating markets while Canada remained with very little domestic consumption of wood pellets, less than 10% of its total production (FutureMetrics Sankey map, 2021 statistics https://www.futuremetrics.info/global-trade-sankey-map/). Many jurisdictions in Europe utilize wood pellets to generate renewable electricity through large scale coal power plants retrofitted to burn wood pellets and to provide renewable heat in homes and businesses using small solid biomass combustors (SSBC) or wood pellet stoves. In Europe, a large fraction of the wood pellets used in the residential sector are consumed in approximately 425,000 automatic central heating combustors that have been installed in the past 15 years.

After discussions with domestic heating contractors and European manufacturers of SSBC, the WPAC approached various authorities having jurisdiction in Canada to understand and remove the technical barriers that face this sector. Initially, the WPAC approached the Canadian Standard Association's CSA B51 Technical Subcommittee for boiler and pressure vessels and various BPV regulators across Canada regarding the certification of EU SSBC certified under CEN EN 303-5 and the Pressure Equipment Directive (PED). WPAC stressed that pressure vessel redesign and fabrication to North American standards are cost prohibitive, and that not recognizing the European certification of SSBC appliances in the Canadian marketplace deprives end-user access to a technology that can reduce their carbon footprint. Lack of recognition of the European standard further deprives Canadian importers and manufacturers cross-market manufacturing opportunities in a green economy that is booming in Europe.

ii. Standards Council of Canada's (SCC) Provincial-Territorial Advisory Committee (PTAC)

PTAC was approached by the Regulatory Reconciliation and Cooperation Table (RCT) chair in 2019 after it was raised by the EU at the CETA Regulatory Cooperation Forum (RCF). The EU was interested in seeing regulatory acceptance of the CEN EN 303-5:2021+A1:2022 standard in Canada. In presentations to PTAC, WPAC referenced the progress made in Prince Edward Island (PEI) whose Chief Boiler Inspector and government recognized the PED (Pressure Equipment Directive in EU) and deviations in construction and control mechanisms for CEN EN 303-5 SSBC recognized under the EU Machinery Directive in 2012. In June 2020, based on his experience with many installed small-scale solid biomass combustors, Steven Townsend, Chief Boiler Inspector for the province of PEI, presented his progress and challenges to the PTAC and CSA B51 technical committee members in support of efforts to consider recognizing the EU standards for use in Canada. In summer of 2021, SCC's PTAC gave approval to proceed with the creation of this project team to further study the European standards and Machinery Directive.

Currently a proposal is in development by the PTAC SSBC project team to analyze the technical content of the EN 303-5:2021+A1:2022 standard while addressing four differences between Canadian approved fossil fuel systems and EU approved SSBCs. The favored approach is to create a National Standard of Canada (NSC). The four differences being drafted to scope the harmonization and certification to lower the risk for EU approved SSBC until more field experience is gained in Canada are:

- Design pressure: limiting the pressure of operation (e.g., 30 psi or 2 bar) and its related burst pressure test (compared to operation at 160 psi @ 250F in CSA B51)
- Design temperature: limiting the operating temperature (e.g., below 115 degrees Celsius) to prevent flash steam formation in pressure vessel and connected piping (compared to 121C / 250F in OE O. Reg. 219/01)
- Maximum power output: limiting the maximum nominal thermal heat output (proposed 1.5 MW) for certified appliances (compared to 1471 kW / 150 BHP in OE Regulation 219/01 for Class 4 OE for Low Temp hot water boilers – Table 2.)
- Scope of approval: Extending the scope of approval for EU SSBC above 500 kW nominal heat output up to a maximum of 1.5 MW nominal heat output that comply with the EN 303-5 standard, the Pressure Equipment Directive, and the CE Machinery Directive

To address concerns with qualifications of the personnel designing, installing, and operating the SSBC, the PTAC project team is also reviewing the training model used by multiple European manufacturers, vendors, and HVAC contractors. In Canada, many jurisdictions require an operator certificate specific to the size and model of boiler or pressure vessel. In many European jurisdictions the manufacturers offer in-house training at the factory or a distribution center to the various stakeholders involved in SSBC, and include tie-in product warranty, technical monitoring, and support plans.

In the USA, there is a dual approach. One approach is mimicking the European knowledge and technology transfer by offering factory or distribution center training. The second approach has been to certify designers and HVAC contractors through a state funded training initiative. To date, the State of New York, sponsored by the New York State Energy Research and Development Authority (NYSERDA), offers at least once, if not twice a year, training with the aim of establishing a network of certified installers. In turn, to access State funding for residential and commercial SSBC, HVAC contractors must hold a valid training certificate. For the European training model, Biothermic (Fröling), Hargassner Canada and Heizomat Canada offer in-house training at their Canadian distribution centers, and in the USA, training is offered by Maine Energy Systems (Oköfen) for both US and Canadian service personnel.

iii. Canadian National Standard for CSA B415.1 Emissions and Performance of Solid Fuel Heating Appliances

In March 2020, WPAC wrote to the Technical Subcommittee of an SDO responsible for emissions and performance of solid fuels indicating that the recognition of EN 303-5 test standard for emissions and performance yields the same environmental outcomes compared to the US EPA NSPS 2020 Subpart QQQQ Step 2 emission limits for hydronic heaters. In fact, during discussions in summer of 2021, the US EPA's central heater web database only listed EN 303-5 appliances that have passed the latest US EPA emissions test method for hydronic heaters. None of the thirteen units manufactured in North America that were previously listed for Subpart QQQQ 2015 Step 1 received approval for the Subpart QQQQ 2020 Step 2 limits (i.e., they didn't seek approval or didn't meet the NSPS Step 2 emissions or certification requirements – currently no such models are listed in spring 2022).

It was decided through consensus at the technical subcommittee of CSA B415.1 that although EU and USA have different certification, testing, and rating methods, both yielded very similar environmental outcomes for automatic hydronic heaters in Canada. It was pointed out by stakeholders supportive of recognizing EN 303-5 that the emissions testing was a barrier to Canadian market adoption and a source of confusion for authorities in different jurisdictions when trying to compare emissions and performance metrics from the two test methods. Many non-EU countries have already recognized EN 303-5, such as United Kingdom, Northern Ireland, Ireland and Scotland through their newly established third-party certification standard Microgeneration Certification Scheme (MCS)0010 in support of the Renewable Heat Incentive program.

V. Concerns over Market Surveillance vs Third-Party Certification of EU manufactured SSBC sold in Canada

The ability of Canada to enforce the quality assurance, quality control and market surveillance of a European manufactured SSBC sold into the Canadian market has been discussed during the revision of CSA B415.1 regarding air emissions and thermal performance. This is still a contentious topic for the wood stove manufacturing market in the USA for certified systems by the US Environmental Protection Agency (USEPA) and to Canadian manufacturers for the USA and EU market. Some technical subcommittee members active in advocacy for wood stove manufacturers and laboratories involved in testing and certification for the residential USA wood stove market have raised concerns on recognizing a European appliance without further testing in Canada. Additionally, wood stoves manufactured in Canada and exported to the European market must be tested to European wood stove standards to be certified and sold in the EU and constitutes a technical barrier to trade for Canadian manufactured wood heating appliances in the EU. These North American laboratories are still subject to auditing and reporting requirements in Canada under Standards Council of Canada requirements for conformity assessment body while this is not the case for European manufactured and certified wood stoves and hydronic heaters (called a Notified Body in EU). There are currently no specific discussions regarding Conformity Assessment Body (CAB) recognition for wood stoves between Canada and the EU, but it would be important for Canadian manufacturers to obtain it while the PTAC project team works on SSBC.

One Canadian wood stove manufacturer stated that they have regularly passed the EU emissions test method with ease, but still must incur the costs of testing both for USA & EU market emissions test. In the EU, auditing by conformity assessment bodies for emission and performance tests for wood heating appliances (wood stoves and SSBC) has not been assessed as required under the Ecodesign regulation. Instead, Market Surveillance has been adopted by Member States under Article 3(2) of Directive 2009/125/EC (link: “Commission Regulation (EU) 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers”, OJ L 193, 21.7.2015, p. 100–114 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.193.01.0100.01.ENG). More background information is also available here about the Market Surveillance of SSBC in EU: *Assessment of 3rd party certification for solid fuel boilers and solid fuel local space heaters* (https://www.3rdpartysolidfuel.eu/).

Only a few European SSBC manufacturers conduct third-party product certification under the Machinery Directive for EN 303-5, and it is the intent of this White Paper to highlight that most Canadian stakeholders would only support the development of a third-party certification system for EU manufactured products for BPV to be sold on the Canadian market. It was clear from past discussions on CSA B415.1 that interested

stakeholders would not support the self-declaration of SSBC appliances under the EU Machinery Directive 2006/42/EC for the Canadian market due to lack of enforcement and follow-up between both jurisdictions for non-compliance issues.

VI. Proposal for Harmonization of Canadian and European Standards for SSBC

This White Paper is intended to be used as the framework to develop a new standard that would allow for the use of certified European SSBC in Canada (Terrence Sauve, Engineer, Farmstead Optimization & Safety, Ontario Ministry of Agriculture, Food, and Rural Affairs will lead this task). See appendix for economic data that supports a new standard in Canada.

The White Paper - is based on current information such as the use of SSBC in PEI and the Canadian Council of Ministers of the Environment (CCME) recently published "Guidance Manual on Managing Air Emissions from Small Solid Biomass Combustors" which adopted EN 303-5:2012 for air emissions and efficiency parameters in 2021 (based on the leading work done in Ontario that first adopted EN 303-5:2012 for air emissions and thermal efficiency in their Guideline A-14 published back in 2017).

When the White Paper has been finalized, this recommendation will need to be endorsed by the full PTAC committee before next steps can be determined. It is anticipated that the creation of a national biomass hydronic heater standard would allow for the adoption of EU small biomass combustors in Canada. The standard would be based on the framework laid out in this document and would be developed by an SCC-approved SDO (e.g., CSA, AHRI, ULc), as described in *Section 1: Introduction - Issue Overview* .

The new standard is proposed to incorporate CCME's guidance document, Canadian standard CSA B415, and EU standard EN 303-5:2021+A1:2022, to facilitate a two-way trade with the EU. This envisioned standard would eliminate the need for regional standards, regulatory exemptions, or exclusion clauses (created by provinces and Territories). The proposed standard could create a single market window in Canada under the principles of the Canadian Free Trade Agreement for provinces and territories that choose to adopt it in regulatory measures.

WPAC consultant, Harry "Dutch" Dresser, is leading the EN 303-5 Acceptance Project for the WPAC. Dr Dresser has regular interactions with EU Commission members and leaders of EU BPV trade association for manufacturers. Dr Dresser has indicated support for the development of a new standard in Canada if it eliminates barriers to trade that prevent widespread adoption of SSBC.

VII. Why Creating a National Standard of Canada for SSBC BPV is beneficial to Canada?

Creating a national standard for SSBC that would be used in provincial/territorial regulations provides many benefits including the following:

- Easy entry into and two-way trade with foreign markets as it would align national and foreign certificates of conformity (i.e., alignment of regulatory and compliance regimes, recognition of foreign certificates, issues of competence and of confidence in national laboratories abroad and in their tests/certificates, etc.).
- Meets WTO and principles of good standardization, regulatory and conformity assessment practices (technical barriers to trade, international standards in the WTO context, international competition and standards, mutual recognition agreements (MRAs), trade facilitation, etc.).
- Supports trade agreements for international accreditation and confidence building (regional and international cooperation on accreditation).
- Harmonization and alignment of standards, regulations, and conformity assessment procedures in Canada while improving both domestic and global trade position of Canadian manufacturing.
- Contributes to lower domestic trade differences between provinces and territories, in the spirit of the Canadian Free Trade Agreement (CFTA).
- Supports the growth of multi-nationals and deployment of low carbon heating systems across Canada by reducing costs when only one standard is utilized regardless of what jurisdiction you operate in which in turn will reduce GHG emissions.
- Facilitates development of training curriculum for colleges and enforcement by authority having jurisdiction. Also facilitates the mobility of qualified personnel to install, service and operate the equipment.
- Supports collaboration between Canada and the EU under the CETA Regulatory Cooperation Forum.

VIII. Conclusion

We hope that interested stakeholders, such as Chief Boiler Inspectors, Chief Building Officials, rural and remote communities, municipalities, and policy makers would recognize the similarities and intent of both Canadian and EU jurisdictions to have clean and safe SSBC appliances available in the Canadian market.

This White Paper demonstrates the alignment of various national and provincial priorities and policies to support recognizing SSBC appliances manufactured under EN 303-5:2021+A1:2022 and collaborate to develop a certification pathway for Conformity Assessment Bodies in Canada and EU. Canada can follow many non-European countries in recognizing the EN 303-5 standard for air emissions, performance and BPV standards to allow the replacement of outdated fossil fuel hydronic heating or diesel generated electrical baseboard heating used in Indigenous communities with low carbon SSBC heating systems. It is evident that the North American wood heating appliance and international wood pellet export markets have undergone significant technology changes in the past 15 years and that more efforts are required to harmonize test methods and reduce technical barriers to trade for all wood heating appliances in both jurisdictions.

IX. Appendix:

i. CETA Regulatory Cooperation Forum (RCF) & WTO Obligations:

- The RCF is outlined in Chapter 21 of CETA and has a mandate to address issues of regulatory cooperation between Canada and the EU, including through information-sharing and, where appropriate, regulatory alignment, harmonization, or mutual recognition. Issues that arise in the RCF that fall within provincial/territorial jurisdiction may be brought to the provincial equivalent forum, the Regulatory Reconciliation and Cooperation Table (RCT), established under the Canadian Free Trade Agreement (CFTA).
- In terms of WTO obligations, to note, "technical regulation" within this Agreement can also refer to any voluntary standards incorporated by reference in that regulation (and therefore made mandatory).
- Article 2.2: "Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, taking account of the risks non-fulfilment would create…."
- Article 2.3: "Technical regulations shall not be maintained if the circumstances or objectives giving rise to their adoption no longer exist or if the changed circumstances or objectives can be addressed in a less trade-restrictive manner."
- Article 2.7: "Members shall give positive consideration to accepting as equivalent technical regulations of other Members, even if these regulations differ from their own, provided they are satisfied that these regulations adequately fulfil the objectives of their own regulations."
- Article 5.1.2: "Conformity assessment procedures are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means, inter alia, that conformity assessment procedures shall not be stricter or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform with the applicable technical regulations or standards, taking account of the risks non-conformity would create."

ii. Economic Data that supports the need of a new standard in Canada:

- Canadian market for BPVs will be valued at $1.8 billion by 2027, compound annual growth rate of 3.9%.
- Global market for PVs will be valued at $300 billion by 2027, compound annual growth rate of 5.2%.
- The BPV industry in Europe is booming- 40% year-over-year growth rate in sales in 2020, accounts for 36% of global market share.

- Global energy demand is estimated to increase by 30% by 2040- biomass BPVs can capitalize on growing energy needs.
- The Canadian wood pellet industry is directly tied to the BPV market- annual market value of $700 million, 90% of wood pellets are exported.
- The market for biomass-based combined heat and power (CHP) systems is rapidly growing- primarily in Europe. European CHP systems are set to nearly double its generation of energy by 2030.
    - Current market for CHP system installations is USD $9.4 billion, compound annual growth rate of 3.1%.
- Decommissioned coal power plants can be converted to biomass production- 65 jobs were created at a plant in Atikokan, Ontario with $175 million invested to repurpose the plant.
- Biomass BPVs and CHP systems can service remote and Indigenous communities that are not connected to the North American energy grid or natural gas pipelines- NRCan provides $55 million in funding for the installation of biomass projects that displace diesel fuel in these communities.
- Biomass energy is carbon-neutral- GHG emissions during production is offset by carbon capture during the lifespan of bioproducts.
- Biomass energy is aligned with the goals of current Canadian governments
    - Federal Budget 2021 and PM Mandate Letters
    - 2015 Paris Agreement
    - Made-in-Ontario Environment Plan & Ontario Forest Biomass Action Plan

iii. Key Benefits to Canada

- Consumers (increased competition, lower fuel and boiler costs)
- Boiler distributors/manufacturers
- Pellet mills (increased demand)
- Immediate opportunities for importers
- New technologies available to consumers
- Substantial marketing energy from manufacturers
- New opportunities for Canadian manufacturers to produce biomass boiler equipment for the EU market
- Potential for utilization of Canadian produced fuel, reduction of oil importation
- Global reputation that Canada is internationally cooperative and ready for innovation
- Decarbonization of space heating in Canada

iv. Reducing diesel dependence in Canada for remote communities

- Investing in clean energy solutions to reduce reliance on diesel is a small but vitally important link to energy security, reconciliation, and self-determination for Indigenous people.
- Indigenous communities could harness and use energy in a way that is more compatible with traditional values. A partnership with Europe will help build stronger, positive relationships between Indigenous communities.

v. Energy Efficiency and Cost Effectiveness

- Cheap to run (cost/benefit analysis compared to other fossil fueled hot water heaters)
    - The cost of producing electricity from wood waste in BC falls between $107 and $134/MWh.[7]
- At production, biomass is about 12x less CO_2 emitting than coal and about 7x less emitting than natural gas.[8] The resulting CO_2 is previously captured by the plants being combusted during their lifespans (carbon neutral).
- Combined heat and power, the total efficiency may reach 85-90%.
- The combined heat and power market is highly competitive, allowing Canadian producers to break into the market. CAGR of approximately 6%.[9]
- CHP market size is currently USD 9.4 billion, compound annual growth rate at 3.1%.[10]
- Market is growing rapidly in Europe. Combined heat and power is set to nearly double its generation of energy by 2030 in Europe.[11]
- Biomass-based BPVs operate independently of fluctuating global oil prices.
- Ability to provide base-load generation of electricity, unlike other renewables that generate power intermittently.[12]
- Biomass heat and electricity production helps solidify Canada's energy self-sufficiency.[13]

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[7] https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/2017-canadian-adoption-renewable-power/canadas-adoption-renewable-power-sources-energy-market-analysis-biomass.html.
[8] CMFN_BioEnergyGuide_En.pdf (modelforest.net).
[9] Combined Heat and Power Market | 2020-2027 | Industry Report | Covid Insights (mordorintelligence.com).
[10] Combined Heat & Power Installation Market Report 2020-2027 (grandviewresearch.com).
[11] Europe Combined Heat and Power Market | Growth, Trends, and Forecast (2020 - 2025) (mordorintelligence.com).
[12] https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/2017-canadian-adoption-renewable-power/canadas-adoption-renewable-power-sources-energy-market-analysis-biomass.html.
[13] https://www.enr.gov.nt.ca/sites/enr/files/resources/nwt_biomass_energy_strategy_2010.pdf.

vi. Other Key Economic Benefits for Canada

There are numerous economic benefits for the adoption of EU biomass BPVs in Canada. Canada is a global leader in renewable energy development and innovation, so this presents another opportunity to further that global image. Once domestic manufacturing begins, exporting biomass BPVs to international markets will add significant value to the Canadian economy. This is a cutting-edge industry that generates significant export revenue, globally promoting Canada's excellence in manufacturing, innovation, and technology. Through free-trade agreements, Canadian manufacturers can experience tariff-free shipping to Canadian trading partners, particularly the EU, United States, South Korea, Japan, and Australia. Exporting biomass BPVs to international markets diversifies supply to harness the peaks of differentiated business cycles.

There will be economic growth and job creation in BPV, wood pellet, forestry and agricultural industries, providing market access for farmers, private and Crown forest owners, and energy companies. Biomass materials are sourced mainly from the region in which the establishment was located,[14] strengthening supply-chains located in Northern, remote, and Indigenous communities, and helping the wood pellet industry and connected transportation sectors achieve economies of scale.[15] Marginal or surplus land that is not economically productive or environmentally sensitive can be used for growing biomass materials, giving farmers and forest landowners additional income.[16]

- Job creation of:
  - Decommissioned coal power plants can be converted to biomass production, retaining jobs from the coal production phase-out. The first plant is in Atikokan, ON, creating 65 jobs. If demand for electricity increases in Thunder Bay area, the second plant also owned by OPG, can be reopened to combust torrefied wood pellets.[17]
  - Forestry sector
  - BPV manufacturing sector, leveraging our capacity from the aerospace, auto and farm equipment manufacturing sector

vii. Energy Security for Indigenous Peoples and Remote Communities

Biomass BPVs can provide a source of electricity and heat generation for communities that do not have the infrastructure to connect to the North American power grid or

[14] https://www150.statcan.gc.ca/n1/pub/18-001-x/18-001-x2017001-eng.htm.
[15] https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/2018/en/BuildingCanadas_EnergyFutureTogether_en.pdf
[16] https://www.nrcan.gc.ca/our-natural-resources/forests-forestry/forest-industry-trade/forest-bioeconomy-bioenergy-biop/bioenergy-biomass/13323.
[17] https://www.canadianbiomassmagazine.ca/from-pellets-to-power/.

access oil and natural gas pipelines. Biomass can use localized sources of energy and displace high emitting and expensive diesel fuel that is common in remote and Indigenous communities.[18] Diesel fuel also may contribute to local health problems, is prone to spills and leaks, and is a noise pollutant. For these reasons, biomass BPVs are generally preferred amongst Indigenous communities, when compared to coal, natural gas, and diesel fuel sources of energy.[19] The homegrown production of biomass fuel supply reduces dependency on other jurisdictions to supply energy to Indigenous and remote communities. Natural Resources Canada (NRCan) has committed to a Clean Energy for Rural and Remote Communities program, currently providing $55 million in funding for feasibility studies and installation of biomass projects that displace diesel fuel.[20] Wood pellet producers are also entering into long-term supply contracts with Indigenous forest companies, like Groupe ADL in Quebec.[21]Combined heat and power can be useful for these communities as it can fully displace diesel fuel that produced electricity and heat as well. Solid biofuels from forestry residues are readily available.

viii. Achieving Political Goals: Paris Agreement, Federal Budget 2021, and Made-in-Ontario Environment Plan

Biomass BPVs are a viable tool to help Canada achieve its international climate goals, due to their carbon neutrality. Specifically, Canada has committed to reduce annual GHG emissions by 30% relative to 2005 levels by 2030 (220 Mt CO_2e/yr) through the 2015 Paris Agreement. Comparatively, EU jurisdictions place biomass BPVs at the core of their decarbonization strategies, with an 84% share of the renewable heating and cooling market and almost 50% of all renewable energy in the EU- responsible for over 210 Mt CO_2e/yr reduction.[22] There are numerous benefits for meeting the Paris Agreement targets. The Bank of Canada states that without any measures to reach climate targets, “physical effects on the macroeconomy between now and the end of the century indicate a risk of potentially large negative effects, ranging from 1.5 to 23 percent of global annual gross domestic product (GDP) per capita.”[23]
Growing the economy through clean energy innovation aligns industries to long-run economically and environmentally sustainable operations, while also reflecting the goals of current Canadian governments. The federal government has committed to a post-COVID economic recovery plan that creates opportunity for innovation, investment, and green economic growth. Budget 2021 “builds a net-zero economy by investing in world-leading technologies that make industry cleaner.”[24] Biomass BPVs also reflect a private-

[18] https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2020/canada-energy-futures-2020.pdf.
[19] http://dx.doi.org/10.3390/su12156050.
[20] Clean Energy for Rural and Remote Communities (CERRC) Program (nrcan.gc.ca).
[21] Canada's Indigenous communities: a key part of sustainable biomass energy - Canadian Biomass Magazine.
[22] https://www.pellet.org/images/solidfuels.pdf.
[23] https://www.bankofcanada.ca/2019/11/researching-economic-impacts-climate-change/.
[24] https://www.canada.ca/en/department-finance/news/2021/04/budget-2021-a-recovery-plan-for-jobs-growth-and-resilience.html.

sector led Made-in-Ontario Environment Plan,[25] while “fostering innovation, markets and talent” in accordance with Ontario’s Ministry of Natural Resources and Forestry (MNRF) Forest Sector Strategy and newly published Forest Biomass Action Plan.[26]

In general, biomass can be used as an energy feedstock to generate electricity, heat, and biofuels through both traditional systems and combined heat and power (CHP) systems. The demand for biomass energy has been relatively slow to develop in Canada due lower oil and gas prices but expected to be a more discussed topic with the price increase due to the carbon tax.

On the other hand, there is significant government support for biomass projects and energy prices are high in Europe, ensuring biomass is economically and politically feasible. Biomass energy within Canada is most prominent in BC, composing of 6.2% of the province’s electricity generation.

The United States is unlikely to have high demand for biomass energy, especially due to recent developments in natural gas fracking technology and low prices of natural gas. For these reasons, the United States is also unlikely to become a close competitor of Canada in the manufacturing of biomass BPVs. The main export markets of Canadian manufactured biomass BPVs will be in Europe, East Asia, and Australia, as high energy costs and climate commitments ensure that biomass energy is appealing in these jurisdictions.

Canada’s forestry sector is integral to the Canadian economy. As demand has been shifting away from traditional forestry commodities, the forestry industry is experiencing economic challenges. Growing interest in biomass energy presents an opportunity for industry diversification and job creation.

Indigenous communities are seeking mechanisms to reduce energy costs, develop their local economies through the forestry sector, and minimize dependencies on high-emitting fossil fuels like coal and diesel fuel. Combined heat and power systems are around 50% more efficient than traditional centralised systems of electricity generation.[27]

[25] https://prod-environmental-registry.s3.amazonaws.com/2018-11/EnvironmentPlan.pdf.
[26] https://files.ontario.ca/mnrf-fid-forest-sector-strategy-en-2020-08-20.pdf.
[27] Combined Heat and Power Basics | Department of Energy.

X. Glossary

a. Small Solid Biomass Combustor (SSBC)

Heating appliances using solid biomass as a fuel to generate heat or steam.

b. Boiler and Pressure Vessel (BPV)

A vessel in which the pressure is obtained from an indirect source or by the application of heat from an indirect source or a direct source.

c. Conformity Assessment Body (CAB)

Body recognized by regulating authority or non-regulated designated authority to perform the following activities for product, processes and services: testing, inspection, validation, verification, certification, or accreditation.

d. Combustor

Appliance or part of the assembly of an appliance designed to burn a fuel to either produce heat, steam or other forms of usable work.

e. Carbon Neutral

Nomenclature used when describing a form of energy or material used in a process that is not releasing more carbon dioxide to the atmosphere than the carbon dioxide that it used to produce the energy or material.

f. Canadian Council of the Minsters of Environment (CCME)

The Canadian Council of Ministers of the Environment is an inter-governmental organization in Canada with members from the federal government, ten provincial governments and three territorial governments.

g. Canadian Free Trade Agreement (CFTA)

The Canadian Free Trade Agreement (CFTA) is an intergovernmental trade agreement signed by Canadian Ministers that entered into force on July 1st, 2017. Federal, provincial, and territorial governments began negotiations in 2014 to strengthen and modernize the Agreement on Internal Trade (AIT). They were guided by direction from premiers and the federal government to secure an ambitious, balanced, and equitable agreement that would level the playing field for trade and investment in Canada.

h. European Committee for Standardisation (CEN)

CEN, the European Committee for Standardization, is an association that brings together the National Standardization Bodies of 34 European countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom. CEN provides a platform for the development of European Standards and other technical documents in relation to various kinds of products, materials, services and processes for sectors including air and space, chemicals, construction, consumer products, defence and security, energy, the environment, food

and feed, health and safety, healthcare, ICT, machinery, materials, pressure equipment, services, smart living, transport and packaging.

i. Low carbon heating technologies

Technologies designed to provide heating using fuels that release significantly less greenhouse gas emissions compared to traditional forms of fossil energy, such as coal, natural gas, diesel or propane.

j. National Standard of Canada (NSC)

Standards are developed by Canada's standards development organizations (SDO) and submitted to the SCC to see if they meet the criteria to become a National Standard of Canada (NSC). These criteria state the standard must: be developed by consensus of a balanced committee of stakeholders, undergo public scrutiny, be published in both official languages, be consistent with or incorporate existing international and pertinent foreign standards. Also, National Standards must not act as a barrier for trade.

k. Mutual Recognition Agreements/Arrangements (MRA)

Agreements or Arrangements between Regulatory Authorities or non-regulated designated authority to recognize Conformity Assessment Bodies (CAB) across two or more jurisdictions. Through MRAs, products that are tested and certified before exportation can enter the importing parties' territories directly without having to undergo similar conformity assessment procedures once they arrive. This is done by providing for the mutual recognition by the importing parties of conformity assessment bodies and the acceptance of their test reports, of which the result shows that a product conforms to the requirements of the importing party.

l. Wood Pellet Association of Canada (WPAC)

The Wood Pellet Association of Canada is a member-driven organization advancing the interests of Canadian wood pellet producers. Our goal is to help members grow through promoting the role of wood pellets in the Canadian and global markets, supporting market and technical research, and encouraging fair and open energy trade.

m. World Trade Organisation (WTO)

The World Trade Organization is an intergovernmental organization of 164 members that operates a global system of trade rules, provides a forum for its members to negotiate trade agreements and to resolve the trade problems they face with each other.

n. Technical Barriers to Trade (TBT) Agreement

The WTO Technical Barriers to Trade (TBT) agreement aims to ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade between jurisdictions.

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Additional Resources and Q&A

The additional resources provided below are aligned with the ongoing efforts to develop a new National Standard of Canada (NSC) for Small Solid Biomass Combustor (SSBC) appliances. The proposed NSC will cover boiler and pressure vessel and other safety requirements and align with the EU standard: CEN EN303-5, which has already been adopted for managing air emissions by the Province of Ontario into provincial guidance and by the Canadian Council of Ministers of Environment (CCME) into Canadian national guidance as well as the CSA B415.1:2022 (Performance testing of solid-fuel-burning heating appliances) for provinces to adopt. The proposed NSC would allow for two-way trade between Canada and the EU for SSBC.

- Global Affairs 2021 update on SSBC
  https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/2021-11-26-biomass-biomasse.aspx?lang=eng

General questions can be addressed by consulting the FPInnovations Bioheat Guide published in 2020. The Government of Ontario and Natural Resources Canada supported FPInnovations in the development of A Solid Wood Bioheat Guide for Rural and Remote Communities in Ontario, released in February 2020 in collaboration with national partners.

- FP Innovation Bioheat Guide
  https://cribe.ca/resources/bioheat-guide-brochure-en-fr/
- Bioheat Webinar Series, 2021, 6 sessions
  https://cribe.ca/resources/bioheat-webinar-series/
- Small Pellet boiler
  https://www.youtube.com/watch?v=nIYNbH-DVjA
- Small wood chip boiler
  https://www.youtube.com/watch?v=r9JlmfCPHzo

Q&A

Environmental impacts

- CCME 2021 Guideline (references EN303-5 for managing air emissions)
  https://ccme.ca/en/res/guidancemanualonmanagingairemissionsfromssbcs_en.pdf
- Ontario Guideline A-14 (references EN303-5 for managing air emissions)
  https://www.ontario.ca/page/controlling-air-emissions-small-wood-fired-combustors#:~:text=The%20purpose%20of%20Guideline%20A,megawatts%20(%20MW%20)%20in%20Ontario
- CSA B415.1:2022 Performance testing of solid-biofuel-burning heating appliances
  https://www.csagroup.org/store/product/2701332/

Wood Based Biofuels

For questions relating to the provenance of biofuels used in SSBC, such as pellets, chips or firewood, consult the NRCan bulletins on the grading standards adopted in Canada. NRCan

bulletins on ISO wood fuel standards: https://www.nrcan.gc.ca/energy/energy-sources-distribution/renewables/bioenergy-systems/biofuels/solid-biofuels/7399

Forest Management and Laws in Canada

- NRCan https://www.nrcan.gc.ca/our-natural-resources/forests/sustainable-forest-management/canadas-forest-laws/17497

Business models and case studies in Canada

Session 6 “Canadian Success Stories” of the Solid Wood Bioheat Webinar Series offered in early 2021 demonstrates examples of successful implementation of SSBC appliances in Canada. The presentations and YouTube Videos are available here: https://cribe.ca/resources/bioheat-webinar-series/

YT playlist: https://youtube.com/playlist?list=PLfhHM2RshiBV76fOeWoSQD0u-_vwY_3gj

Safety of European Wood Boilers

May 7th 2021. Wood Pellets Association of Canada webinar “Modernizing Canada's Biomass Boiler Standards: An Opportunity for Change”. Henrik Persson, RISE Research Institutes of Sweden AB (RISE), “Wood Pellet Boiler Standards”: https://www.youtube.com/watch?v=vOhU_OIEsos&t=1010s

Funding in Canada for Modern SSBC

- NRCan Clean Energy for Rural and Remote Communities (CERRC) (said on call it was an additional $30 million in the budget, its $300 million until 2027) https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/reduce-emissions/reducing-reliance-diesel.html

Jobs and environmental impact in forest-based economies heating with SSBC

Forest-based regions in EU:
https://www.youtube.com/watch?v=vuk3ZhuJa2g&list=FLyygbEyqoAhfM4jooiZSVzQ&index=17

Bioheat sector in EU

Bioenergy Europe is the voice of the European bioenergy industry. It aims to develop a sustainable bioenergy market based on fair business conditions. Founded in 1990, Bioenergy Europe is a non-profit, Brussels-based international organization bringing together more than 40 associations and more than 150 companies, as well as academia and research institutes from across Europe.

For the EU-27 states (in 2020), buildings account for 40% of the energy consumed in the EU and 36% of its GHG emissions, most of it coming from heating needs. Renewables account for almost 27% of the total space heating consumption, with bioheat supplying the vast majority (84%).
Resource: https://bioenergyeurope.org/component/attachments/?task=download&id=2342