Summary for public release

Name of the applicant: ISB Marketing

Project director: Marc-Antoine Cantin

Principal investigator: Guillaume Thibodeau-Fortin

Project title: Automated Wood Stove UFEC23

Objectives of the project: The objective of this project is to create a self-regulating wood stove ready to market. We want to make a small production of 26 self-regulating wood stoves in mid-2022 that would have a PM emissions rate below 1.2g/h and offer an overall efficiency of more than 75% (HHV). We want to field test and monitor 25 units during the 2022-2023 winter season.

Description of the project: Our team participated in the 2018 Edition of the Wood Stove Design Challenge held at National Mall, Washington, DC. It won the Innovation Award and obtained 2nd place for Automated Stove. Our goal was to create a clean, automated stove with a firebox shape that offered an exceptional fire-viewing area while minimizing the appliance's footprint. Our team is proposing to upgrade its award-winning automated wood stove prototype in order to achieve the following keys objectives: cleanliness, efficiency, user-friendliness, reliability, safety, cost-effectiveness and aesthetic appeal.

More specifically, our goal is to develop a Machine Learning algorithm that will learn how each specific user heats his/her stove. The stove will then adjust its combustion parameters to compensate for any "bad" human behavior that tends to increase particulate matter (PM) emissions and reduce efficiency. A home-designed real-time PM monitoring system will be developed to obtain a better understanding of the stove's behavior. We intend to use on our CFD experience (computational fluid dynamics) to significantly improve the stove's performance.

The companies teaming up for this project have deep expertise in the design, marketing, sale and production of wood heaters. Together, they own over 1 million square feet of manufacturing and distribution capacity, out of which over half is located in the United States. Empire Comfort Systems (ECS) is the largest of all three team members. ECS was founded 85 years ago. The project will be conducted in one of ECS's facilities with the support of SBI and ISB Marketing. SBI's roots in wood stove design go back to 1978 and SBI is now a leader in wood-combustion technology in Canada. ISB Marketing is a Delaware Corporation that operates as the sales and distribution arm of SBI in the United States. ISB Marketing was selected as the main recipient under this grant since it will oversee the work of both ECS and SBI as well as provide market research and project coordination.

If clean, efficient, reliable, user-friendly, cost-effective, aesthetically pleasing and safe automated wood stoves are available for sale to the general public, the result will be a real and significant reduction in PM emissions. The US population will benefit from cleaner air, less consumption of natural resources and greater savings in energy costs. Governments will mainly benefit from lower health costs associated with air pollution in general.