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SnowBigDeal

Final Executive Summary

This report details the development and design of the Sno2Go, a water bottle with the capacity to melt snow and provide drinking water to athletes in winter condition backcountry areas where water is scarce.

The problem that we are addressing is the threat of severe dehydration from insufficient water in the backcountry. Individuals at risk are skiers and mountaineers on single to multi-day trips in the mountains who are at increased risk of dehydration due to strenuous activity in a cold, dry environment. In these conditions, both increased metabolism to maintain normal body temperatures and faster loss of moisture from heavy breathing in dry air accelerates dehydration. Affects range from dizziness to seizures, hypovolemic shock, or even death.

Current responses to this problem include using a camping stove to melt snow, which requires extra equipment and significant time, or eating snow itself, which is dangerous and wastes body heat. Considering products themselves, the only existing solution to this problem is the H2Snow bottle: a one-liter water bottle that melts snow with the heat created through friction generated by turning a crank to spin a blade inside the bottle. In contrast, our solution can be used passively rather than requiring 20 minutes of manual work from the user. When preheated, our design can provide up to 30% more drinkable water than the H2Snow, and it is portable and ready to use with the flick of a switch.

The most important decision we made was choosing a heat source to melt the snow. While fuel, chemical heating, and body heat were all considered, electrical heat powered by batteries rose above the rest of the alternatives as the preferred method of heating. Battery power would be easy and quick to use, reusable and safe. Our bottle holds four rechargeable Li-ion batteries at the base of the cylinder, wired with an on-off switch and connected to two electrical resistors which dissipate electric power and transfer heat to the snow packed in a copper tube. The batteries are removable and rechargeable, and are calculated to last 133 minutes on a full charge.This translates to around 4.5 uses under a full charge.

Our potential purchaser will likely be outdoor retail stores like REI and EMS whose popularity among our customer pool will provide shelf exposure for the Sno2Go. We envision our user as someone who frequents trips into the backcountry for skiing or mountaineering. They will spend continuous periods without access to water, and would prefer a lighter and smaller solution than 3-4 full water bottles. Primarily, our company's stakeholders will be backcountry ski and outdoor companies, as well as companies that lead outdoor expeditions, similar to NOLS. Reusable bottle companies may be negatively impacted by the new development in the market if the Sno2Go becomes the preferred option for outdoor athletes.

Our team is a dynamic and complementary group with experience in a diverse range of fields. Carson worked at a CAD modeling and design internship, and is comfortable with tools and hands-on jobs from time spent working in a hardware store. Pía also has experience with CAD, as well as with circuitry and thermodynamics. She is also familiar with the design process from previous projects. Julian has experience with circuitry and testing from previous courses. Additionally, he completed the TuckLABS program, which provided him with a unique understanding of the entrepreneurship process. Sam has a large background in hand tools, as well as a sound understanding of physics concepts important for this project. The whole team shares a

passion for skiing and the great outdoors. Furthermore, we are all currently enrolled in Physics 14, which has allowed us to apply many of the E&M concepts and equations we've learned directly to our project!

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