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RYERSON UNIVERSITY

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Toronto, ON

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Dear Graduate Admissions Committee,

Thermofluids and mechanical engineering were an important part of my childhood because my daily comfort and safety depended on one generator at the edge of a river.

I grew up in a small, remote community in the Amazon rainforest. Living in a house without insulation, only one air conditioned room, and glassless windows, I became familiar with the concepts of thermodynamics in an extreme environment. My father operated the diesel generator that powered our lives, and nearly every week I watched him race down the road in a storm to fix and coax the old, stinky machine back to life to keep our refrigerators and lights running through the rainforest heat.

Much like my father, I want to provide electricity to small communities – though, I am determined to do it in a sustainable, reliable way.

When we moved to Canada, I was enthralled by the different ways this more developed nation produced and used their electricity. Watching wind towers built in my rural high school town in Ontario showed me the first promise of a future more clean, quiet and sustainable. I could imagine their smooth white towers in place of the old generator in my amazon home, and see the potential of nature to create energy.

My Canadian home has introduced the added challenges of opposite seasons, precipitation and grouped populations. Embracing this complex model, I want to work with those leading the way to deliver power, comfort, safety and opportunity in Canada.

From my studies in thermofluids in my undergraduate Mechanical Engineering degree I have learned some of the technical knowledge required to develop the machinery for energy production, but most importantly I have seen the opportunities for growth in this field. My studies in geography and the natural environment, push me to further improve the flexibility of our systems to reflect the environment and social contexts in which they are built. I am pursuing a Master's of Applied Science degree in Mechanical Engineering to gain the in-depth knowledge of innovation in thermodynamics needed to fulfill my goals.

I am helped by my experience building a website for Holland Planning Innovations (an urban planning firm in BC), which has given me access to innovations in building design and government policy. They

focus on improving the sustainability of our homes and cities and show me the lack of interdisciplinary connection - and therefore the opportunity - for engineers to provide energy in closer partnership with the designers, architects, and communities who use it.

As well, my work as a teaching assistant in the final years of my undergrad has given me a clearer understanding of how scientific knowledge must be communicated in a way that will be understood by newcomers. I learned the gaps in perceptions that lead to limiting designs, or unexpected negative outcomes, and I worked hard to flex the course material into an accessible way for different students. I attended external training, created extra slides, computer simulations and video tutorials to attempt to improve my own skills as a science communicator – as well as the skills of the peers that I was teaching. I believe this experience will be hugely helpful in my master's studies as it has shown me how information must be cut through to deliver useable data.

A combination of my graphic design skills, strength in communication (from being a TA), and my knowledge in engineering contributed to my award-winning thesis project. We set out to deliver a working prototype of an autonomous, robotic, CNC machine within four months, and we achieved it beyond expectations. The project gave me real experience working with industry to find and manufacture custom components, as well as teaching me valuable realism about balancing cost and innovation. With my creativity focused on designing the machine, I achieved a balance of customizing structure while maintaining strength, safety, and aesthetics. The experience I gained from this project will help me in my future work designing new components for power generation systems.

Finally, by choosing the thermofluids stream in my undergraduate degree, I have achieved a base of knowledge about energy production and use that I successfully applied to develop steam power generation plants, trigeneration plants, and various thermal machines. This year, I was awarded the Canadian Congress of Applied Mechanics Award for my strength in thermofluids.

The synthesis of my passion for environment-compatible energy production, science communication, interdisciplinary collaboration and mechanical engineering harmonizes with Dr. Dworkin's research focus in sustainable engineering. I look forward to the challenges and learning opportunities sure to come with these master's studies, and I will continue to push change until even the small communities - such as the one I grew up in - are powered by more reliable, clean methods.

Thank you for your consideration,

A handwritten signature in black ink that reads "Sarah Nicholson". The signature is written in a cursive, slightly slanted style.

Sarah Nicholson, BEng