NEWS RELEASE

Renewal of the Research Chair in Industrial Energy Efficiency at the Université de Sherbrooke

Cooling needs will exceed heating needs by 2060

Sherbrooke, June 22, 2020 – In Canada, the industrial sector is responsible for approximately 37% of total energy consumption, and 38% of this consumption goes to heating and air conditioning. With global warming and the emergence of new demand such as for data centre cooling, experts agree that needs for cooling will exceed needs for heating by 2060.

By adopting thermal systems that represent true technological breakthroughs, companies in primary and manufacturing sectors of the industry could realize significant gains in energy efficiency. This could in turn narrow Canada's energy intensity gap with most European countries. National initiatives generally target the regulation of greenhouse gas emissions and the adoption of coolants with a low environmental impact.

Ambitious goals

With the renewal of the NSERC/Hydro-Québec-Natural Resources Canada-Emerson Industrial Research Chair in Energy Efficiency, Professor Sébastien Poncet, from the Department of Mechanical Engineering at the Université de Sherbrooke, is working with his team to increase the performance of energy systems by improving component design and optimizing underlying thermodynamic cycles. The idea is to reduce fossil fuel consumption and contribute to sustainable development by replacing conventional coolants, such as hydrofluorocarbons (HFCs), with options that have a lower environmental impact. Industries will also benefit from predictive numerical tools that will let them model their future processes, which was one of the developments from the Chair's first five-year term.

Companies often have an initial reflex of boosting productivity instead of prioritizing actions to increase energy efficiency. But what if they could improve production specifically by addressing their energy consumption? The goal of this second five-year term of the NSERC Industrial Research Chair in Energy Efficiency is precisely to demonstrate this possibility with the help of the Chair's current partners: Hydro-Québec's energy technology laboratory (LTE), Natural Resources Canada's CanmetENERGY research centre in Varennes, and Emerson. The Chair's research program mainly focuses on the development of industrial components and systems for the production and storage of thermal energy. Overall, this investment represents nearly $2.77 million. About 20 undergraduate to postdoctoral students will be trained in this strategic area over the next five years.

To meet these research goals and as a continuation of the Chair's previous research, the Chair and his team will focus on developing industrial heating and cooling components and systems, such as heat pumps and ejector refrigeration systems. The Chair will optimize these components and systems through combined experimental and numerical studies. "Systems that use low-temperature phase change materials, for example, can replace the cooling systems usually found in trucks that transport frozen products and that consume large amounts of fossil fuels, says Professor Sébastien Poncet. The heating and air-conditioning of industrial buildings is another example of a concrete application of our work."

Building on solid foundations

The Department of Mechanical Engineering hosted the NSERC Chair's first five-year term from 2014 to 2019. The Chair has trained 30 students from the bachelor's to doctoral levels, which has significantly contributed to reinforcing the critical mass of energy efficiency experts in Quebec. The Chair's research results have been published in over 100 journal and conference papers, and the excellence of its student research has been recognized with 24 awards. The Chair has also produced scientific breakthroughs in the understanding of physical mechanisms and the development of advanced numerical tools and has had direct benefits for the industry when it comes to the transportation of high-concentration ice slurry, droplet injection in ejection systems, or the design of regenerators for magnetocaloric refrigeration. The Chair's renewal has reinforced this partnership and will help the industry exploit the full potential of its research, explore new avenues for energy optimization, and train about 20 highly qualified students who will make up the next generation of scientists in Canada's and Quebec's industries or research centres of tomorrow.

A pole of attraction that extends beyond the province

The Chair's first five-year term attracted many projects related to energy efficiency with various Quebec SMEs that totalled nearly $1.5 million. This appeal should continue, as the province is teeming with companies that are developing thermal systems and that are very interested in doing research and developing partnerships. The Chair also organized four scientific conferences that attracted researchers and engineers from Quebec, Canada, and around the world. Other events are already being planned between now and 2024 to let students meet national and world experts in the sector and share their advances in the field of energy.

"The University wants to have a direct impact on the energy efficiency of Quebec and Canadian companies in the short and medium term, and we are advocating for these types of research and development contributions that meet needs identified by our society. Training specialized staff in this field will definitely contribute to this orientation in many ways. The unifying theme of climate change and the environment directly relates to the goals of this Industrial Research Chair," explains Jean-Pierre Perreault, Vice-President, Research and Graduate Studies, Université de Sherbrooke.

"This research program is ambitious and meets two major goals from Hydro-Québec's strategic plan: 1) contribute to the reduction of GHG emissions in all our markets and 2) power Quebec's economic development," says Jean Matte, Senior Director of Hydro-Québec's research institute.

"Natural Resources Canada's CanmetENERGY is proud to participate in the Université de Sherbrooke's Research Chair in Industrial Energy Efficiency and to collaborate with the university, Hydro-Québec and Emerson Canada. Our Centre has established a successful collaboration with the Université de Sherbrooke over the past several years. The themes and projects tackled by this Chair fall within the Department's mandate and will contribute to Canada's development, responsible use and competitiveness in the natural resources field. They will also help to train qualified personnel in an area with a known lack of resources," adds Sophie Hosatte-Ducassy, Buildings Group, CanmetENERGY in Varennes.

"Emerson is excited to continue working with Quebec's vibrant academic, R&D, and innovation ecosystem to deliver new products that allow our customers to be more sustainable," said Ryan Garrah, President, Emerson Canada.

- NSERC/Hydro-Québec-Natural Resources Canada-Emerson Industrial Research Chair in Energy Efficiency
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Hydro-Québec
- Emerson Canada
- Natural Resources Canada's CanmetENERGY

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