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In the Matter of the

Darlington New Nuclear Project

Application to renew the nuclear power reactor site preparation licence for the Darlington New Nuclear Project

Commission Public Hearing

June 10, 2021

Exposé oral

Mémoire de Ontario Tech University

À l'égard de

Projet de nouvelle centrale nucléaire de Darlington

Demande de renouvellement du permis de préparation de l'emplacement d'une centrale nucléaire pour le projet de nouvelle centrale nucléaire de Darlington

Audience publique de la Commission

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Canada

Darlington New Nuclear Power Project - Public Hearing 2021-H-04

The Essential Role of Darlington New Power Project in Reducing Fossil Fuel Emissions

by Akira Tokuhiro,
Professor and Dean, Faculty of Energy Systems and Nuclear Science,
Ontario Tech University

Madam Chair, Members of the Panel,

My name is Akira Tokuhiro, I am the Dean of the Faculty of Energy Systems and Nuclear Science at the University of Ontario Institute of Technology. We are commonly known as Ontario Tech. I appear before the Commission to speak in support of OPG's application for renewal of the Site Preparation Licence for OPG's Darlington New Nuclear Project.

I have a Doctorate in Nuclear Engineering from Purdue University, and have extensive and diverse experience in academia and industry relating to nuclear power research and applications. I was a contributor to the American Nuclear Society President's Committee on the 2011 Fukushima Daiichi nuclear power plant accident in Japan, and a technical editor of a bestseller in translation on the event. Prior to joining Ontario Tech University, I was at NuScale Power LLC, a nuclear energy start-up company in Oregon, where I was senior Principal Engineer contributing to the design certification application of the NuScale Small Modular Reactor. From 2007 to 2014, I was Professor of Mechanical and Nuclear Engineering, and Director of Nuclear Engineering at the University of Idaho. Prior to 2007, I was a faculty member at Kansas State University and the University of Missouri – Rolla campus. At Missouri, I was also Director and U.S. NRC-licenced Senior Reactor Operator of the university's research reactor.

I believe that our governments and fellow citizens have come to increasingly acknowledge that the pace of climate change is accelerating, and that the threat of climate change is the defining challenge of the 21th century. There is recognition that the excessive accumulation of carbon dioxide in the earth's atmosphere is an extreme threat to us and the planet. We need to understand and act on the necessity and

urgency of bringing about rapid, decisive, and fundamental changes in the way we conduct ourselves personally, economically, and socially.

We must immediately find and expand low carbon solutions for everything that we do, such as:

- the transformation of raw materials into manufactured goods
- the transportation of raw materials, goods and people
- the transformation of energy resources into sustainable energy currencies such as electricity and hydrogen, and
- the transformation of these energy currencies into usable energy forms.
- mindful use of all resources, recycling and conservation

Efforts to electrify transportation systems, such as the use of electric cars and electrifying the commuter train systems, will significantly reduce carbon emissions, but only as long as the electricity used by these vehicles is generated without burning fossil fuels.

Ontario has implemented significant reductions in carbon dioxide emissions by the closure of all the coal-burning electric generating stations in the province, but as long as the replacement of this generation is from fossil fuel burning units, the addition of carbon to the atmosphere continues. Likewise, when the Pickering nuclear electric generating stations is taken out of service, much of that generation that is essentially free of atmospheric emissions, may be replaced by natural gas burning power plants.

The construction of new nuclear-electric generating units at OPG's Darlington site, for which the renewal of the Site Preparation Licence is being considered at these hearings, will be an essential contributor to minimizing the atmospheric carbon emissions in the generation of electricity from natural gas plants for use in Ontario.

While it is recognized that such alternative energy sources as solar and wind will also contribute to the generation of electricity in the province, their intermittent mode of

operation would need continued reliance on burning natural gas, or as yet, technically infeasible energy storage. Typically, due to their low operating costs, nuclear generation has been used to meet the base demand for electricity. However, CANDU units have already demonstrated their ability to cycle their outputs in response to changing electrical loads, and many of the new generation small modular reactors also have the capability to have their outputs scheduled to meet daily and seasonal changes in demand.

Although the recent introduction of carbon pricing in Canada is a step in recognizing that there are costs associated with using the atmosphere to disperse the waste CO and CO_2 bi-products of burning fossil fuels, the revenues generated by the application of carbon pricing is not being targeted to prevent these gases from entering the atmosphere, or to capture and sequester them after they have been emitted.

In contrast to the use of revenues gained from carbon pricing, funds collected from the sale of electricity produced by nuclear power plants are retained, and will be used to manage the safe storage, in both short and long term, the bi-products of nuclear-electric generation.

While opponents of nuclear power claim that the management of nuclear waste has not been solved, in fact the technology for deep underground storage of radioactive material is known, and the funds to construct and operate such facilities already exist. Furthermore, the fuel that has been used in the present and proposed nuclear reactors is currently in safe storage, and it still holds over 95% of the uranium atoms that are the potential sources of future energy generation. Not only is the used nuclear fuel incorrectly labelled as “waste”, the technology exists, although not yet cost-effective, to extract the very large amounts of energy that remain in the stored and only slightly used fuel.

Ontario is one of the few jurisdictions that has the means to ‘mix and match’ energy generation to optimize supply and maximize the benefits of the overall energy system. Nuclear power does well to support renewables, especially those that are intermittent. Considering life cycle assessment, nuclear power is safer than other options and is one

of the lowest overall for total carbon emissions. It remains an option that we have.

Members of the university had spoken, just ten years ago, in support of the original application by OPG for a nuclear power reactor site preparation licence at Darlington. The University of Ontario Institute of Technology offers Canada's only undergraduate nuclear engineering program. We also offer programming in health physics and radiation science within our Faculty of Energy Systems and Nuclear Science. Situated between Pickering and Darlington, our programs were developed to address the skills, knowledge, talent and innovation needs of the industry. Safety is both a priority and responsibility for us as we educate the next generation of engineers, health physicists and radiation science professionals. Whether it be in our undergraduate, Masters or PhD programs, our graduate certificate programs or our Advanced Operations Overview for Managers program, we upskill both the emerging and current workforce. Internationally recognized faculty members, many with industry experience, teach in these programs. Our faculty serve on national and international panels, associations and standards committees, and these national and international bodies recognize their expertise. Ontario Tech University as it is known in recent years, has received designation as Canada's first IAEA's Collaborating Centre to support small modular reactor and non-electrical applications of nuclear energy.

The university is fully engaged in nuclear safety through our senior and associate industrial research chairs in health physics and environmental safety. We connect to the local community through membership of the Durham Nuclear Health Committee, which meets quarterly and is chaired by the Region's Commissioner and Medical Officer of Health. The university's students are actively engaged in the sector, including participation in the North America Young Generation Nuclear, the Canadian Nuclear Society, and the Women in Nuclear chapters.

My faculty colleagues, our students and I are pleased to support the application for renewal of the Site Preparation Licence for OPG's Darlington New Nuclear Project.

Thank you for your kind attention.