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An Assessment of the Financial Risks of the Nuclear
Refurbishment Plan
Media Statement

Good morning and welcome.

My name is David Wake. I am Ontario's Integrity Commissioner and am serving as Ontario's Financial Accountability Officer on a temporary basis.

Today, the FAO released a report that reviews the Province's plan to refurbish ten nuclear reactors at the Bruce and Darlington Nuclear Generating Stations and to extend the life of the Pickering Nuclear Generating Station.

Our report discusses how the nuclear refurbishment plan will impact electricity ratepayers and the Province, and identifies how financial risk is allocated among ratepayers, the Province, Ontario Power Generation (OPG) and Bruce Power.

Overall, the nuclear refurbishment plan is projected to provide electricity ratepayers with a long-term supply of relatively low-cost, low emissions electricity. The Province's fiscal position is also expected to benefit through its ownership of OPG and the expected financial return from its operation of the Darlington and Pickering Nuclear Generating Stations.

Lastly, the FAO analyzed the allocation to ratepayers and the Province of four key financial risks to the nuclear

refurbishment plan: refurbishment cost overruns, higher than anticipated station operating costs, lower than expected electricity demand, and the potential for a lower-cost, low emissions alternative generation option to emerge.

I will ask the FAO's Chief Financial Analyst, Jeffrey Novak, to provide more details on the report.

Thank you, Commissioner.

The Nuclear Refurbishment Plan consists of three initiatives:

- The refurbishment of six nuclear reactors at the Bruce Nuclear Generating Station and subsequent operation of the station until 2064;
- The refurbishment of four nuclear reactors at the Darlington Nuclear Generating Station and subsequent operation of the station until 2055; and
- The extension of the life of the Pickering Nuclear Generating Station to 2024.

The refurbishments are scheduled to take place from 2016 to 2033 and the total capital cost is estimated to be \$25 billion in 2017 dollars.

Based on the FAO's review, if the Nuclear Refurbishment Plan is executed as planned:

- The FAO projects the average price of nuclear generation from 2016 to 2064 would be approximately \$81 per MWh in 2017 dollars. For reference, this amount is higher than the current cost of nuclear generation at \$69 per MWh but below the residential price of electricity generation of \$115 per MWh. As well, nuclear prices will be higher than average in the near term, peaking by 2027, after which prices will gradually fall in real terms.
- The FAO also projects the average annual production of electricity from the nuclear generating stations to be 62 TWh. Nuclear production was 92 TWh in 2016 and is expected to drop to 57 TWh by 2025 due to multiple reactors being offline for refurbishment and the shutdown of the Pickering Nuclear Generating Station. Once the refurbishments are complete, annual production will be approximately 75 TWh, which is expected to represent between 38% and 56% of forecast electricity demand, based on the Province's planning outlook.

As mentioned by Commissioner Wake, the FAO analyzed the allocation of risk to ratepayers and the Province from four key financial risks to the nuclear refurbishment plan. The Bruce Nuclear Generating Station is operated by Bruce Power, a private sector organization. Darlington and Pickering Nuclear Generating Stations are operated by OPG, a utility wholly owned by the Province. The differences in ownership and price setting for the two

operators mean that the ratepayer's and Province's exposure differs with respect each generating station.

The first risk reviewed by the FAO, is the risk that the cost of refurbishing the reactors will be higher or lower than planned.

Ratepayers bear the risk of cost increases to Bruce Nuclear Generating Station refurbishments until 12 months before each reactor refurbishment begins. At that time, the risk of cost increases is transferred to Bruce Power.

Ratepayers bear the risk of Darlington Nuclear Generating Station refurbishment cost increases prudently incurred by OPG, as determined by the Ontario Energy Board. The Province bears the risk of cost overruns not prudently incurred as it would result in a reduction to OPG's net income, which would reduce provincial revenues.

To mitigate the risk of refurbishment cost overruns, the Province has options to terminate refurbishments known as off-ramps. The FAO concludes that these options to terminate refurbishments due to refurbishment cost increases have limited value to ratepayers due to economies of scale at nuclear generating stations and the current cost of low emissions alternative generation options.

The second risk reviewed by the FAO is station performance risk: the risk that the cost of operating the refurbished reactors will be higher or lower than planned. Bruce Power's contract to operate the Bruce Nuclear Generating Station transfers most station performance

risk to Bruce Power, thereby protecting ratepayers. Ratepayers and the Province combined bear all risk from higher or lower costs to operate the Pickering and Darlington Nuclear Generating Stations. The primary method of protection to ratepayers from increases in OPG operating costs is Ontario Energy Board oversight. The OPG Nuclear Price is set by the Ontario Energy Board every five years after a public regulatory proceeding. Once the OPG Nuclear Price is set, most station performance risk is transferred from ratepayers to the Province, through its ownership of OPG.

The third risk reviewed by the FAO is demand risk: the risk that there is insufficient electricity grid demand for nuclear generation. The Nuclear Refurbishment Plan requires a large upfront capital investment to produce a long-term and relatively inflexible supply of baseload electricity. If there is insufficient demand for this electricity, the Province could be forced to curtail nuclear generation, export surplus electricity at low or negative prices, or permanently shut down one or more reactors.

Forced exporting or curtailment of electricity negatively affects ratepayers because they compensate electricity generators for electricity they do not consume. If lower than expected electricity demand forces the shutdown of one or more reactors, both ratepayers and the Province could be impacted, through an increase in the Nuclear Price paid by ratepayers and lost OPG net income to the Province.

The FAO identified a number of demand-side and supply-side mitigations of demand risk, including the potential for

increased electrification through the Province's Climate Change Action Plan, actions that smooth out demand fluctuations, the planned shutdown of Pickering by 2024 and the staged shutdown of Bruce and Darlington reactors starting in 2043.

The fourth and final risk reviewed by the FAO is opportunity cost risk. This is the risk that the Province's commitment to nuclear generation will preclude it from taking advantage of alternative, lower cost, low emissions grid-scale electricity generation options.

Based on the FAO's review, there are currently no alternative generation portfolios that could provide the same supply of low emissions baseload electricity generation at a comparable price to the Nuclear Refurbishment Plan. To the extent that alternative generation options emerge over the life of the Plan, opportunity cost risk is mitigated somewhat by off-ramps in the Bruce Contract. The Province also has the ability to terminate any Darlington refurbishment at any time.

Thank you, we are happy to take questions.

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