

- (1) OPG has not shown that there is any need to refurbish all or any of the four Darlington reactors
- (2) OPG has not demonstrated that there is a need to employ four of the Pickering reactors until 2022 or the remaining two reactors until 2024
- (3) OPG's planned expenditures (and hence its payment rate request) may not be needed in the light of the availability of much less expensive energy supply alternatives
- (4) Ontario cabinet directives do not definitively state that OPG must refurbish the four Darlington reactors
- (5) The 2013 LTEP did not define how Ontario could meet the government's stated objectives
- (6) OPG has not allowed for the potential for local, non-regulated energy sources to displace the reliance on centralized, regulated power sources
- (7) Neither OPG nor the CNRC has shown that the cumulative hazards related to the multi-unit use of nuclear reactors are reasonable
- (8) The OPG plan would block the potential for Ontario to meet its obligations under the Paris Climate Change Agreement
- (9) Under the recently signed CETA agreement Canada and Europe will need to reconcile their standards. The older CANDU reactors are not likely to meet those new standards

(1) Refurbishing the four Darlington reactors Ontario presently consumes about 154 TWh of electricity per year but nearly half of that is used for thermal application that could readily be met using local thermal sources. That leaves an average supply requirement of about 8,800 MW if energy storage is used to flatten the power load, or to provide some moving value between that and the current capacity (estimated by IESO to be about 39,000 MW) as the storage capacity is ramped up. That leaves a lot of room for power capacity reductions.

(2) Extending the Pickering licence If the CNRC does not approve the Pickering licence extension then Ontario will need to scramble to provide an alternative. While OPG is not the sole supplier of electricity in Ontario and hence has only a part of the responsibility to meet that situation the Board itself has a basic responsibility to ensure that power is provided in a way that responds to the various public needs so it should be willing to hear arguments for appropriate solutions. Even if the CNRC does approve the licence extension those alternative solutions might reduce the reliance on the extension and lead to less expensive, safer and more sustainable power generation. That choice might be implemented at the mid term (2019) review. That implies that the Board should not at this time approve the refurbishment of Darlington Units 1, 3 and 4.

(3) OPG's planned expenditures OPG's planning is predicated on the assumption that the Board will rule that Ontario will continue to rely primarily on nuclear power for the next 40 years. The plans go into extreme detail in considering those costs and the level of uncertainty in predicting the costs based on the cited assumption but neglect to consider the more likely prospect that Ontario could get along without three of the Darlington reactors (and could reasonably plan to eventually phase out all of its nuclear reactors). That would reduce the capital costs by about $\frac{3}{4} \times 12.8$ \$billion = \$9.6 billion and in consequence would greatly reduce the projected payment rates. Those calculations are missing from the OPG presentation.

(4) Cabinet directives The cabinet directives provide for "off-ramps" for the Darlington refurbishments. OPG has effectively taken the decision with respect to Unit 2 out of the Board's hands by proceeding with that unit before getting the Board's approval. Since it does currently not have

cabinet approval to proceed with refurbishments of Units 1, 3 and 4 OPG should have based its payment projections on the basis of refurbishing Unit 2, but not Units 1, 3 and 4 (a procedure that meets the requirements of Regs. 53/05 and 353/15).

(5) The 2013 LTEP The Environmental Commissioner of Ontario has just issued a review of the long term energy planning (Climate Change) that makes many highly critical comments about the failure of Environment and Energy Ministry planners to provide adequate evidence in support of their recommendations. That problem is compounded by the misrepresentation by both ministries re. the amounts of greenhouse gases that are being produced from upstream releases of methane. They cite the federal "GHG inventory" reports that are based on the methane that is released by Ontario gas wells, which is nearly zero because Ontario does not produce natural gas.

(6) Unregulated power generation OPG has based its plans on the assumption that a consortium of government-controlled organizations will continue to control the energy supply in the province. Over the 40 years of future planning that is covered there is a high probability that the dominant source of energy supply will switch to local sources that will displace both nuclear power and the use of natural gas (for both heating and peaking power). Even over the coming five years this shift will almost certainly be sufficient to cover the reduction in generation if the second Darlington unit is not refurbished (i.e., the only one beyond Unit 2 that might fall into the time window of this OEB review).

(7) Hazards of nuclear power OPG appears to be relying on the assumption that an approval from the CNRC relieves the OEB from the duty to ensure that the nuclear plants do not present a public hazard. However the CNRC does not see it that way. When the CNRC approves a unit as being adequate to meet an acceptable standard they do not take into account the fact that there may be many such units in a station. If there are 10 units then from the public's point of view the various nuclear hazards are multiplied by a factor of 10 and it is up to the OEB (not the CNRC) to take that into account.

(8) The Paris Climate Change Agreement Although this agreement has been ratified by the Canadian government the provincial government has not yet issued regulations that reflect the substantial changes that will be required in Ontario. OPG argues that since nuclear power stations do not directly produce GHG's they will contribute to the Paris agreement objectives but that is not true. In Ontario the GHG's are primarily produced by heating applications that could be eliminated by employing dual function (heat+power) energy systems like exergy storage systems. That option would be crippled if residents are forced to use nuclear power instead. Moreover, nearly all of the "clean" alternatives to the dual-function systems rely on electricity, for example to drive heat pumps, and those alternatives are already suffering badly from the excessive Ontario electricity prices.

(9) The CETA agreement The primary thrust of the CETA agreement is to establish common standards rather than to reduce tariffs. That means that either Ontario will need to adopt the 100 Bq/L EU standard for tritium in water or Europe will have to adopt the Canadian standard of 7000 Bq/L (which is extremely unlikely to happen). Conceptually Ontario could require that the tritium be extracted from the heavy water that is used for both neutron moderation and cooling in CANDU reactors but that does not reduce the production of tritium and such extraction was notably not utilized in the recent Point Lepreau refurbishment.

These are all issues for which data and discussions are missing in the OPG application before the Board.

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