



Canadian  
Environmental Law  
Association  
EQUITY. JUSTICE. HEALTH.

# Comments to the Minister of Environment and Climate Change on Ontario Power Generation's Response to the Minister's February 2016 Request for Additional Information on the Proposed Deep Geological Repository Project

*Prepared on behalf of the Canadian Environmental Law Association*

By: Tanya Markvart and Morten Siersbaek

February 2017

Publication #1099

Canadian Environmental Law Association

T 416 960-2284 • 1-844-755-1420 • F 416 960-9392 • 55 University Avenue, Suite 1500 Toronto, Ontario M5J 2H7 • [cela.ca](http://cela.ca)

---

## 1. Introduction

The Minister's decision on the DGR EA rests in part on the Minister's understanding of the environmental impacts, costs and risks of the proposed DGR at the Bruce site relative to the impacts, costs and risks of a DGR at alternative locations. In previous submissions (see Gaudreau, Markvart & Gibson, 2013; Markvart, 2014; Markvart, 2015), we emphasized the critical need for OPG to provide an adequate comparative assessment of alternative sites as per EA best practices and international standards for the siting of geological disposal facilities for radioactive waste.

We applaud the Minister for requesting additional information from OPG on alternative locations. An adequate response from OPG should enable the Minister to compare the options and give the public confidence that the Minister's decision is based on a comprehensive comparative evaluation of alternative locations, pursuant to sections 47 and 52 of the Canadian Environmental Assessment Act (CEAA) 2012.

Unfortunately, the methods used by OPG to identify and assess alternative locations do not provide an adequate basis upon which the Minister can make a decision as to whether the project is likely to cause significant adverse environmental effects, as required by section 52 of CEAA 2012, and approve the DGR EA or refer the matter to the Governor in Council.

OPG's methodology fails in three key ways:

- its regional-scale perspective,
- its distinction between a study and a site-selection process, and
- its consideration of sustainability concerns.

In Section 2, we provide a critique of OPG's rationale for adopting a regional-scale perspective in its *Study of Alternate Locations*. We show how OPG conflated the terms 'region' and 'location' and therefore misconstrued the Minister's 2016 request. We clarify the proper meaning of the words 'region' and 'location', and we give the Minister additional information from CEAA 2012 and the International Atomic Energy Agency to validate a decision to reject the DGR EA.

In Section 3, we critique OPG's distinction between a study and a site-selection process, which provides part of its rationale for adopting a regional-scale perspective. In Section 4, we devote attention to OPG's inadequate consideration of effects on progress towards sustainability, giving reference to sustainability-based EA best practices and the purposes of CEAA 2012. We note that the Minister's decision on the DGR EA must consider the possibility that the environmental impacts, costs and risks of an alternative location in crystalline or sedimentary rock may represent a better option relative to the high risks that accompany a DGR on the Bruce site in part due to its close proximity to Lake Huron.

We urge the Minister to reject the DGR EA on the basis of these and other points that we provide in this paper.

---

## 2. OPG's Regional-Scale Perspective

OPG's regional-scale perspective rests on a misleading interpretation of the Minister's February 2016 request for an additional study on alternative locations. The Minister's request states that OPG must make reference to 'actual locations'. The Minister, however, does not define the term 'location' in order to specify an appropriate scale for OPG's investigation (see McKenna, 2016).

OPG's April 2016 letter to the Canadian Environmental Assessment Agency (CEAA) states that OPG would interpret the Minister's request as follows, "...OPG will assess the environmental effects of two technically and economically feasible geological regions in Ontario for a new L&ILW disposal facility" (see Swami, 2016). In addition, OPG's letter asks CEAA for confirmation of the accuracy of its understanding of the Minister's request.

In response, CEAA's September 2016 letter notes OPG's regional perspective: "Ontario Power Generation has indicated that it intends to provide an assessment of the environmental effects of two technically and economically feasible geological regions in Ontario..." (see Smith, 2016). On this basis, OPG proceeded to adopt a regional-scale methodological approach that consistently conflates the terms 'region' and 'location'.

The fundamental issue with OPG's regional-scale approach to identify and assess alternative locations is that it provides the basis for a study that is too broad in scope and too vague on key details to enable the Minister to undertake a comprehensive comparative evaluation of alternative locations for the DGR. OPG's study should facilitate a thorough comparative evaluation of the environmental impacts, costs and risks associated with the main components of a DGR facility at each location.

The Minister, therefore, should have a sufficiently equivalent level of understanding of the specifications of each potential location, including the crystalline rock, sedimentary rock, and Bruce locations. This is essential both for a decision on significant adverse environmental effects by the Minister, and for an evaluation of the justifiability of such effects by the Governor in Council.

It is beyond the scope of this paper to list all of ways in which OPG's regional-scale approach fails to provide sufficient detail to permit a reasonably well-founded comparative assessment of the alternative locations. Notably, OPG did not appropriately undertake the following location-specific studies:

- location-specific geographic investigations that support the development and testing of hypotheses around specific attributes of the geology of the alternative locations in crystalline and sedimentary rock in order to confirm long-term suitability;
- location-specific engineering design specifications and safety analyses that together with location-specific geographic information provide the basis for understanding the long-term DGR safety at the alternative locations;
- location-specific investigations of DGR performance under normal/expected,

- 
- abnormal/disruptive and “what-if” future scenarios;
  - location-specific Valued Ecosystem Components to inform the assessment of effects for all project phases (site preparation and construction, operations, decommissioning, abandonment and long-term performance);
  - location-specific investigations of potential cumulative effects; and
  - location-specific investigations of potential climate change effects.

In its *Study of Alternate Locations*, OPG explicitly rests its rationale for taking a regional-scale approach partly on CEEA’s September 2016 response letter: “In its response in September 7, 2016, the Agency raised no objection to OPG’s approach...” (OPG, 2016, p.16). We urge the Minister to recognize that CEEA’s acknowledgement of OPG’s interpretation of the Minister’s request does not imply its approval of OPG’s regional-scale approach. Indeed, CEEA’s letter refrains from supporting OPG in this regard.

Later, however, CEEA’s September 2016 letter states that it expects OPG to provide an assessment of alternative *locations* and that it “...does not assume that alternate sites in the geologic formation would have the same geographic and hydrological characteristic of the preferred site” (see Smith, 2016). This clarification is significant because it addresses one of the most widespread criticisms of the proposed DGR on the Bruce site: it is irresponsible to place a DGR for long-lived radioactive wastes in close proximity to Lake Huron.

Secondly, CEEA consistently uses the terms ‘location’ and ‘site’ to describe its requirements. Use of these terms is clearly not compatible with OPG’s regional-scale perspective. Indeed, these requirements could not be met by applying a regional approach, at least not without simply making up characteristics of some hypothetical location. They could, however, clearly be met by reviewing actual locations as required by the Minister.

In sub-sections 2.1 to 2.3 below we provide the following additional information upon which the Minister can sensibly reject the DGR EA:

- We clarify the meaning of the words ‘location’ and ‘region’,
- We highlight a reference in CEEA 2012 that supports the need for an assessment of actual locations as opposed to regions, and
- We remind the Minister of the International Atomic Energy Agency’s safety standards for the siting of geological disposal facilities for solid (low-, intermediate-, and high-level) radioactive waste.

## **2.1 Definition of ‘Location’ vs. ‘Region’**

The Minister can reject the DGR EA on the basis of OPG’s regional-scale interpretation of the term ‘location’, which provided the basis for a study that is insufficient in scope and detail. To clarify, the Oxford online dictionary of British & World English defines “*location*” as “[a] *particular place or position*”, and lists the following synonyms, which do not include *region*:

---

1. **position**, place, situation, site, locality, locale, spot, whereabouts, point, placement; 2. **scene**, setting, area, environment; 3. **bearings**, orientation; 4. **venue**, address; 5. *technical locus*.

The Oxford dictionary defines “*region*” as “[a]n area, especially part of a country or the world having definable characteristics but not always fixed boundaries”, and lists the following synonyms, which do not include *location*:

1. **district**, province, territory, division, area, section, sector, zone, belt, tract, stretch, expanse, terrain, part, quarter, locality, locale.

Clearly, *location* and *region* are defined as distinct terms, with location being a particular place not simply defined by general characteristics, whereas a region can be defined by such general characteristics.

It is also clear that, while *location* and *region* share certain synonyms, a reading of the shared synonyms and those that are *not* shared strongly supports the view that these two terms are not interchangeable, but rather represent relative extremes on a scale ranging from precise to vague. While a location is a precise place and situated at one end of the scale, a region is a more vague area situated at the other end of the scale. The plain meaning of *region* and *location* thus provide no support for the approach taken by OPG.

## 2.2 Purpose of the Canadian Environmental Assessment Act

The CEAA 2012 uses the term “place” in S. 90, which deals with the authority to “*enter a place in which they have reasonable grounds to believe a designated project is being carried out*”.

According to S. 4 (1) (a) part of the purpose of the Act is to protect the environment against significant environmental effects caused by such designated projects. It can be deduced from this provision – and other provisions – in the Act, that designated projects such as the DGR are presumed to be carried out in distinct places.

## 2.3 International Standards for Siting Geological Disposal Facilities

To remind the Minister, the International Atomic Energy Agency’s (IAEA) safety standards for siting a geological disposal facility for solid radioactive waste (low-, medium-, and high-level) recommend a step-wise approach that could take place over several decades. Moreover, as we will show, IAEA distinguishes between regional-scale and location- or site-scale investigations leading up to final site selection.

IAEA recommends beginning with an ‘area survey stage’ in order to identify ‘regions of interest’. This area survey stage generally involves two phases: a regional mapping phase to identify areas with potentially suitable sites and a screening stage to select one or more potential sites for further and more detailed evaluation. During the regional mapping phase it may be

---

appropriate to consider whole territories defined by natural or political boundaries (see IAEA, 2011, p. 57).

The subsequent screening stage should focus on successively smaller and increasingly more suitable areas in order to permit the selection of one or more potential sites. This stage should be guided by relevant criteria not necessarily used in the regional mapping phase (e.g., sociopolitical, hydrogeological, presence of national parks, etc.). Finally, detailed studies should be undertaken of one or more potential sites, particularly from a safety perspective, in order to generate the necessary information to develop a site-specific design:

“The site investigation stage requires more detailed studies than in the regional mapping stage, in order to obtain site specific information to establish the characteristics and the ranges of the parameters of a site with respect to the location of the intended disposal facility. This will require site reconnaissance and investigations to obtain evidence on actual geological, hydrogeological and environmental conditions at the site” (IAEA, 2011, p. 58).

OPG’s study of alternative locations clearly took ‘area survey’ steps to determine two regions of interest, one in the crystalline rock of the Canadian Shield in central to northern Ontario and one in sedimentary rock in southern Ontario. But OPG did not take the necessary subsequent steps to obtain more focused and detailed information in order to establish the characteristics of one or more potential locations or sites within these large regions.

Here, it is important to note that IAEA clearly distinguishes between a regional-scale investigation phase and a location- or site-scale investigation phase that concentrates on the geographic and hydrological characteristic of one or more potential sites. Indeed, IAEA equates the term ‘location’ with the term ‘site’ in that the location of an intended disposal facility is in fact the facility’s specific site. This is consistent with the Minister’s use of the term *location* in her February 2016 request for additional information.

Finally, OPG’s insufficient regional-scale approach is partly rooted in its misleading distinction between a study and a site-selection process. We discuss this false distinction in the section that follows.

### **3. OPG’s Distinction between a Study and a Site Selection Process**

OPG’s rationale for adopting a regional-scale perspective in its *Study of Alternate Locations* rests in part on the idea that doing otherwise would equate with starting over in the EA process. In OPG’s discussion of the current EA context for the study it quotes one of the principles that the Federal government has set out to guide its review of the existing federal EA process, “No project will be asked to return to the starting line...” (OPG, 2016, p. 14).

Resting partly on this foundation, OPG distinguishes between a study and a site selection process, stating that “Since this is a study – and not a site selection process – OPG has not sought, nor has it obtained, consent of a willing host or Indigenous community for any of the

---

alternate locations discussion below” (OPG, 2016, p. 15). Indeed, as OPG states, a multi-year, consent-based process would essentially mean starting over.

In other words, OPG incorrectly equates an appropriately detailed (location-scale) study with a site-selection process; it equates a site-selection process with a multi-year, consent-based process; and it equates a consent-based process with returning to the starting line in the EA. On these grounds, OPG adopted a regional-scale, early-screening-level methodology. Unfortunately, the resulting study does not provide sufficient detail to enable the Minister to compare the options and decide on the DGR EA.

OPG’s dichotomous distinction between a regional-scale, early-screening phase *study* and a multi-year, consent-based, *site-selection* process ignores a spectrum of appropriately scoped and scaled options between these perceived opposites. In that spectrum lies the possibility for OPG to undertake a study that identifies broad regions of interest *and* provides more specific information to establish the characteristics of one or more potential actual locations as the basis for a comparative evaluation of alternative locations.

We recognize the need for a consent-based process in the siting of any facility for the disposal of long-lived radioactive waste. At this point in the DGR EA, however, the Minister must have an appropriately detailed study to undertake a comprehensive comparative evaluation of the location options for a DGR. This need does not oblige OPG to obtain the ‘willing host’ criterion. Rather, the task before the Minister is to decide on the DGR EA in part on the basis of the quality of OPG’s *Study of Alternate Locations*.

Furthermore, the question of alternative means of carrying out the DGR project has always been a matter of site selection. One of the most contentious issues facing the Minister is whether to approve or reject the DGR EA in light of OPG’s continued reluctance to adequately investigate alternative locations for a DGR site. In this EA, there are three potential location options: the Bruce site location and two other site locations – which remain unknown – somewhere within the crystalline and sedimentary rock regions of Ontario, which are insufficiently investigated in OPG’s regional-scale study.

OPG’s motivation for falsely distinguishing between a study and site-selection process is partly rooted in its argument that a site selection process at an alternative location would take more time:

“The current in-service date for the DGR Project at the Bruce Nuclear site is 2026. The addition of a site selection phase, along with the time required for construction would make the Alternate Project in-service dates at least 20-30 years later than the in-service date of the DGR Project at the Bruce Nuclear site. The in-service date would be approximately 2045 for a sedimentary location and 2055 for a crystalline location...” (OPG, 2016, p. 23).

Indeed, OPG has invested much time and money in the Bruce site location for a DGR. But it has done so to the detriment of the Minister’s and public’s understanding of alternative locations.

---

OPG's misleading distinction between a study and site-selection process thus directs attention away from other actual locations that exist within the crystalline and sedimentary rock regions of Ontario. These other actual locations may offer siting attributes equal to or superior to those of the Bruce site. The additional time and resources necessary to undertake an additional site-selection process should thus be viewed as a minor inconvenience relative to the long-term health and environmental risks associated with situating a DGR on the Bruce site in such close proximity to Lake Huron, and should be considered in the context of wastes that will need to remain shielded from all biota for hundreds of thousands of years.

#### 4. OPG's Consideration of Sustainability

Section 4(1) (a) and (b) of CEAA 2012 frame the purposes of the Act in terms of precaution and contributions to sustainability. In previous submissions we explained how OPG should have incorporated sustainability-based criteria, including the precautionary principle, in its EA (see Gaudreau, Markvart & Gibson, 2013). Below, we draw from sustainability-based EA best practices to reiterate for the Minister how OPG should have considered these criteria in its *Study of Alternate Locations*, its *Environmental Effects of Alternate Locations* and the entire EA process.

OPG applied two criteria (economic and technical feasibility) in its methodology for identifying two alternative regions as opposed to actual locations for a DGR. OPG subsequently investigated conceptual construction and use of a DGR in each of these two regions for potential effects on the environment of the DGR. OPG, however, does not define and apply a set of sustainability-based criteria in its assessment. Nor does OPG provide an assessment that is comparable in scope and detail to its assessment of the DGR at the Bruce site in order to enable a fair comparative evaluation of the options in light of their relative contributions to sustainability.

Following Gibson et al.'s (2005) and Gibson's (2017) sustainability-based EA best practices, OPG should have incorporated sustainability criteria from the outset of the EA process in order to justify the purpose and rationale for the project and comparatively evaluate and select the most promising option for and means of carrying out a waste management facility for radioactive waste. In its *Study of Alternate Locations* and *Environmental Effects of Alternate Locations*, therefore, OPG should have

- set out a comprehensive set of sustainability evaluation criteria that combine the generic requirements for progress towards sustainability with particular attention to the key characteristics of the undertaking and the actual location options for best management of L&IL radioactive wastes;
- shown how these criteria were applied in the comparative evaluation of the actual location options throughout the decision-making process, in relation to all project components and phases, mitigation of adverse effects, and potential impacts;
- identified and evaluated the positive and adverse effects (including risks) of carrying out the undertaking at the potentially reasonable alternative sites;
- determined the extent to which carrying out the undertaking at each individual site would contribute net benefits to all areas of sustainability concerns, and avoid

- 
- potentially significant adverse effects, considering all project components and phase; and
  - shown how the preferred alternative location was selected, in light of the criteria, and with clear justifications for any trade-offs among the criteria that may be entailed by proceeding with the proposed location.

Gibson et al. (2005) and Gibson (2017) define and illustrate how to apply the following generic, core requirements for progress towards sustainability in EA as well as in planning and decision-making more generally:

- long-term socio-ecological system integrity;
- livelihood sufficiency and opportunity for everyone;
- intragenerational equity;
- intergenerational equity;
- resource maintenance and efficiency;
- socio-ecological civility and democratic governance;
- precaution and adaptation; and
- immediate and long-term integration.

OPG's study and narrative assessment of environmental effects touches on some sustainability matters (e.g., air quality, noise levels, wildlife, etc.); it lists some DGR-related works and activities at a hypothetical alternative location; and it compares the potential environmental effects at the alternative regions to those predicted for the DGR project at the Bruce site. OPG's technical and economic feasibility criteria and narrow focus on VECs, however, clearly overlook key matters related to the interrelated concerns of long-term human wellbeing and biophysical system integrity.

In addition, OPG's regional-scale, early-screening methodology does not provide location-specific descriptions that link site characteristics with specific DGR components in order to clearly illustrate to the Minister and the public the relative potential environmental effects, sustainability impacts, and sustainability contributions of the location options for a DGR.

One important sustainability-related discussion missing from OPG's study and assessment of environmental effects is about the substantive trade-offs among the location options, considering the relative anticipated effects of these options, and in light of the Minister's decision to approve the DGR EA or refer the matter to the Governor in Council. In sub-section 4.1 below we dedicate attention to OPG's consideration of trade-offs in its study and assessment of environmental effects.

#### **4.1 OPG's Consideration of Trade-Offs**

Gibson (2005, 2013) and others (see Morrison-Saunders and Pope, 2013) provide an in-depth explanation of trade-offs and guidelines for dealing with them in EA decision making. As Gibson (2013) explains, substantive trade-offs

---

“...involve choices about what purposes to serve, what alternatives to favour, what design features to incorporate, what enhancements and mitigations to consider adequate and what undertakings to approve with what conditions and implementation controls, etc. Most significantly, substantive trade-offs are about the anticipated effects resulting from these choices. They centre on what predicted damages and risks are accepted as the price to pay for what expected benefits” (p.2).

This central rule about responsible assessment of trade-offs underlines the importance of comparative assessment of alternatives that are described at a reasonably similar level of specificity. In EA the main implication is that trade-offs must be avoided if they entail backward steps or block enhancements in any sustainability category – unless all other options are worse.

Here, it is important to note that CEAA 2012 S. 52(4)(a) and (b) gives the Governor in Council authority to decide in part on the basis of trade-offs:

“(4) When a matter has been referred to the Governor in Council, the Governor in Council may decide

(a) that the significant adverse environmental effects that the designated project is likely to cause are justified in the circumstances; or

(b) that the significant adverse environmental effects that the designated project is likely to cause are not justified in the circumstances.”

At this point in the EA process, a key consideration for the Minister is whether or not to refer the decision on the DGR EA to the Governor in Council on the basis of the potential significant adverse environmental effects associated with situating a DGR on the Bruce site in close proximity to Lake Huron. These effects were emphasized by numerous previous submissions to the Joint Review Panel (e.g., Duinker, 2013a; Duinker, 2013b; Greening, 2014a; Greening, 2014b; Lloyd, 2014).

In OPG’s study, OPG states that

“...the DGR Project at the Bruce Nuclear site remains the preferred location based on a relative consideration of environmental effects, transportation risks, transportation and other project-related costs and uncertainties; and the absence of any guarantee of improved safety or environmental quality at an alternate location” (OPG, 2016, p.6).

OPG, however, does not explicitly discuss how it considered trade-offs in leading up to this claim. Indeed, OPG’s assessment indicates that there are important trade-offs for the Minister or Governor in Council to weigh in the decision to approve or reject the DGR EA.

Specifically, OPG’s summary of likely environmental effects of alternative regions as compared to the DGR project at the Bruce site lists increased risk of environmental effects in the

atmospheric, surface water, aquatic, terrestrial, radiation and radioactivity, and land and resource use environment components (see Golder Associates, 2016, pp. 62-64). In addition, OPG provides information about the costs and risks associated with packaging and transporting the inventory of L&ILW at the WWMF to the alternative regions as well as off-loading the packages at the alternative regions (see Energy Solutions Canada, 2016). This information begs important trade-off questions, which OPG does not address.

For example, in the above mentioned summary OPG indicates that a DGR situated somewhere within the sedimentary and crystalline regions may cause increased effects on

- air quality at both alternative locations as a result of shipments of waste packages;
- noise levels at both alternative locations due to lower background noise levels;
- surface water quantity at the crystalline location as there may be more water to manage;
- aquatic habitat at the crystalline location due to construction of supporting infrastructure;
- vegetation communities at both alternative locations due to vegetation removal for the construction of additional surface facilities; and
- radiation and radioactivity related to handling, packaging and transporting waste; and
- land and resource use at both alternative locations.

Here, it is important to note that OPG's investigation of likely environmental effects does not provide detailed, local-scale information to enable a comparative evaluation of alternative sites. In addition, OPG does not adequately investigate some of these effects (e.g., transportation of radioactive wastes) at the Bruce site itself. Finally, the likely environmental effects OPG identifies cannot be considered significant adverse environmental effects. Indeed, some of them are short-term (e.g., due to construction) as opposed to long-term with potentially significant cumulative effects. The Minister or Governor in Council, therefore, must decide whether these insignificant, primarily short-term environmental effects are justified in light of the high risks associated with situating a DGR on the Bruce site in close proximity to Lake Huron.

## 5. Summary

In this paper, we explained how the methods used by OPG to identify and assess alternative locations fail in three key ways:

- its regional-scale perspective,
- its distinction between a study and a site-selection process, and
- its consideration of sustainability concerns.

In Section 2, we critiqued OPG's rationale for adopting a regional-scale perspective in its *Study of Alternate Locations*. In summary, OPG's rationale rests on a misleading interpretation of

- (a) the Minister's February 2016 request for an additional study on alternative locations (see McKenna, 2016), and

---

(b) CEAA's 2016 response to OPG's April 2016 request for confirmation of the accuracy of its understanding of this request (see Smith, 2016; Swami, 2016).

The critical failure in OPG's regional-scale methodology is that it provides the basis for a study that is too broad in scope and too vague on key details to enable the Minister to undertake a comprehensive comparative evaluation of alternative locations for the DGR. OPG's study should facilitate a thorough comparative evaluation of the environmental impacts, costs and risks associated with the main components of a DGR facility at each location.

Indeed, the Minister should have a sufficiently equivalent level of understanding of the specifications of each potential location. This is essential both for a decision on significant adverse environmental effects by the Minister and for an evaluation of the justifiability of such effects by the Governor in Council. See Section 2 for an incomplete list of critical location-specific information that OPG's regional-scale methodology fails to generate.

In support of our critique, we clarified the proper meaning of the words 'region' and 'location' (see sub-section 2.1); we highlighted supportive sections in CEAA 2012 with respect to how OPG should interpret the term 'location' (see sub-section 2.2); and we underscored IAEA's safety standards for siting a geological disposal facility for solid radioactive waste (see sub-section 2.3).

In Section 3, we analysed OPG's false distinction between a study and a site selection process, which provides part of its rationale for adopting a regional-scale perspective. Briefly, OPG's dichotomous distinction ignores a spectrum of appropriately scoped and scaled options between these perceived opposites. In that spectrum lies the possibility for OPG to undertake a study that identifies broad regions of interest and provides more specific information to establish the characteristics of one or more potential actual locations as the basis for a comparative evaluation of alternative locations.

In Section 4, we described how OPG's methodology fails to adequately consider important sustainability matters. With reference to EA best practices, we explained how OPG should have incorporated sustainability criteria in order to comparatively evaluate and select the most promising means of carrying out a waste management facility for radioactive waste.

One important sustainability-related discussion missing from OPG's study and assessment of environmental effects is about the substantive trade-offs among the location options. In sub-section 4.1, we defined trade-offs and explained how they should be considered in EA, especially in light of CEAA 2012 S. 52(4)(a) and (b).

OPG does not explicitly discuss how it considered trade-offs leading up to its claim that the DGR Project at the Bruce Nuclear site remains the preferred location. But OPG's summary of likely environmental effects of alternative regions reveals that these effects are insignificant and primarily short-term as opposed to long-term with potentially significant cumulative effects.

The Minister or Governor in Council must decide whether these insignificant, primarily short-

---

term environmental effects are justified in light of the high risks associated with situating a DGR on the Bruce site in close proximity to Lake Huron.

Finally, the question of alternative means of carrying out the DGR project has always been a matter of site selection. One of the most contentious issues facing the Minister is whether to approve or reject the DGR EA in light of OPG's continued reluctance to adequately investigate alternative locations for a DGR site. In this EA, there are three potential location options: the Bruce site location and two other site locations – which remain unknown – somewhere within the crystalline and sedimentary rock regions of Ontario, which remain insufficiently investigated in OPG's regional-scale study.

We urge the Minister to reject the DGR EA on the basis of these and other points that we provided in this paper.

### References

Duinker, P. (2013a). Written submission to the Joint Review Panel in the matter of OPG's Deep Geological Repository for Low and Intermediate Level Radioactive Waste. Document #1538 (or PMD 13-P1.175).

Duinker, P. (2013b). Response to undertaking 52 (U-052): Provide guidance regarding how the cumulative effects assessment could have included an ecosystem-based conceptual model showing linkages among existing future activities, etc. Document #1710.

Energy Solutions Canada. (2016). Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations. Ontario Power Generation, Pickering.

Gaudreau, K., Markvart, T., & Gibson, R.B. (2013). Final comments to the Joint Review Panel for the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Project – Environmental Impact Statement and Licence to Prepare Site and Construct Application. Comments prepared on behalf of the Canadian Environmental Law Association.

Gibson, R.B. (2013). Avoiding sustainability trade-offs in environmental assessment. *Impact Assessment and Project Appraisal*, 31(1), 2-12.

Gibson, R.B. (2017). (Ed.). *Sustainability Assessment: Applications and Opportunities*. London: Routledge/Taylor & Francis.

Gibson, R.B., Hassan, S., Holtz, S., Tansey, J., & Whitelaw, G. (2005). *Sustainability Assessment: Criteria and Processes*. London, Sterling: Earthscan.

Golder Associates Ltd. (2016). Environmental Effects of Alternate Locations. Ontario Power Generation, Pickering.

Greening, F. (2014a). Written submission to the Joint Review Panel in the matter of OPG's Deep Geological Repository for Low and Intermediate Level Radioactive Waste. Document #1895.

---

Greening, F. (2014b). Submission from Dr. F.R. Greening to the Joint Review Panel concerning the published radionuclide inventory data for certain types of CANDU waste. Document #1777.

International Atomic Energy Agency. (2011). Geological Disposal Facilities for Radioactive Waste Specific Safety Guide No. SSG-14. International Atomic Energy Agency, Vienna, Austria.

Markvart, T. (2014). Comments to the Joint Review Panel for the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste – Ontario Power Generation’s Response to Information Request EIS 12-513. Comments prepared on behalf of the Canadian Environmental Law Association.

Markvart, T. (2015). Comments to the Canadian Environmental Assessment Agency – Potential Conditions for the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Project. Comments prepared on behalf of the Canadian Environmental Law Association.

McKenna, C. (2016). A letter from the Honourable Catherine McKenna, Minister of Environment and Climate Change, to Ms. Laurie Swami, Vice President, Nuclear Services, Ontario Power Generation. Minister of the Environment, Ottawa.

Morrison-Saunders, A., & Pope, J. (2013). Conceptualising and managing trade-offs in sustainability assessment. *Environmental Impact Assessment Review*, 38, 54–63.

Lloyd, B. (2014). Northwatch’s general written submission in support of oral testimony resumed public hearing on Ontario Power Generation’s proposed Deep Geologic Repository for Low and Intermediate Level Radioactive Waste. Prepared for Northwatch. Document #1931.

Ontario Power Generation. (2016). OPG’s Deep Geologic Repository Project for Low & Intermediate Level Waste: Study of Alternate Locations Main Submission. Ontario Power Generation, Pickering.

Smith, H. (2016). A letter from Heather Smith, Vice-President, Operations, Canadian Environmental Assessment Agency, to Ms. Laurie Swami, Senior Vice President, Decommissioning and Nuclear Waste Management, Ontario Power Generation. Canadian Environmental Assessment Agency, Ottawa.

Swami, L. (2016). A letter from Laurie Swami, Senior Vice President, Decommissioning and Nuclear Waste Management, Ontario Power Generation, to Mr. Ron Hallman, President, Canadian Environmental Assessment Agency. Ontario Power Generation, Pickering.