

NON-ENERGY REVENUES – NUCLEAR

1.0 PURPOSE

This evidence describes OPG's nuclear operations that generate non-energy revenue and the proposed treatment of those revenues in this Application. It also presents the forecast of non-energy revenues for the test period.

2.0 OVERVIEW

The forecast of nuclear non-energy revenues (less costs) for the test period is \$29.0M and \$20.9M in 2011 and 2012, respectively. Nuclear non-energy revenues for the period 2007 - 2012 are presented in Ex. G2-T1-S1 Table 1.

OPG proposes that revenues (less costs) from the following non-energy related businesses be applied as an offset to the nuclear revenue requirement:

- Heavy water services
- Isotope sales (cobalt 60; tritium)
- Inspection and maintenance services
- Nuclear ancillary service revenues (discussed at Ex. G1-T1-S1 Other Revenues – Regulated Hydroelectric)

OPG plans on exiting the provision of external inspection and maintenance services to Bruce Power and others as of June 2011. OPG is also proposing that the revenues and related costs from the sale of surplus heavy water be excluded from determination of the revenue requirement as discussed in section 4.1.

This evidence describes the particular sources of the nuclear non-energy revenues in sections 3 and their operating costs in section 4. Section 5 provides the proposed regulatory treatment of these revenues.

1 **3.0 NUCLEAR NON-ENERGY REVENUE SOURCES**

2 **3.1 Heavy Water**

3 3.1.1 Heavy Water Inventory

4 Heavy water is a manufactured product required for CANDU (Canadian Deuterium Uranium)
5 reactor operations. Heavy water is required as a moderator for sustaining a nuclear reaction
6 and as a heat transport medium in a CANDU nuclear reactor.

7

8 As of December 31, 2008 OPG owned 14,309 tonnes of heavy water, of which 13,359
9 tonnes is reactor-grade (radioactive), and 950 tonnes is virgin (non-radioactive) heavy water.
10 Of the 14,309 tonnes of heavy water, 12,234 tonnes are in-service within OPG's ten
11 operating CANDU nuclear units (6,209 tonnes) and within the reactors at the leased Bruce
12 site (6,025 tonnes). The remaining 2,075 tonnes, primarily reactor-grade radioactive heavy
13 water from the out-of-service Pickering A Units 2 and 3, is inventory and is stored in OPG-
14 owned storage facilities or on loan/lease to other nuclear facilities (Atomic Energy of Canada,
15 New Brunswick Power). OPG's inventory of virgin heavy water is stored in two OPG-owned
16 storage facilities, one on the Bruce Power site and the other at Darlington.

17

Chart 1

Heavy Water (Tonnes)

as of December 31, 2008

	TOTAL
IN-SERVICE OPG 10 UNITS	6,209
IN-SERVICE BRUCE SITE	6,025
HEAVY WATER INVENTORY	2,075
TOTAL HEAVY WATER	14,309

18

1 3.1.2 Heavy Water Sales

2 OPG seeks opportunities to sell surplus quantities of heavy water from its heavy water
3 inventory. Surplus quantities are defined as those quantities of heavy water not required to
4 meet OPG's current and future needs. OPG's current and future needs for heavy water
5 include 570 tonnes of heavy water inventory required to replenish heavy water, at a rate of
6 three tonnes per year per reactor, required at the existing OPG and Bruce Power facilities
7 (i.e., the Bruce Lease Agreement includes an obligation for OPG to provide 18 tonnes per
8 year of heavy water to Bruce Power to replenish heavy water over the term of the lease).
9 OPG also retains 900 tonnes of the heavy water inventory to meet OPG's future needs
10 arising out of potential plant life extensions, restart (at Bruce Power) or new build decisions.
11 OPG is also able to use these quantities for short term loan/lease to other nuclear facilities.

12
13 During 2009 and 2010, OPG expects to sell approximately 68 tonnes of surplus heavy water.

14
15 As of December 2010, the amount of heavy water held in inventory that is surplus to OPG's
16 current and future needs is forecast to be 537 tonnes as set out in Chart 2 below.

17
Chart 2
Derivation Of Surplus Heavy Water(Tonnes)
as of December 31, 2010

	TOTAL
Heavy Water Inventory as of Dec 31, 2008	2,075
Heavy Water Sales 2009, 2010	68
Subtotal	2,007
Provision for Future Heavy Water Losses (OPG and Bruce Power)	(570)
Provision For Future Needs, e.g., Refurb, New Build	(900)
Surplus Heavy Water	537

1 OPG proposes to exclude any revenues (and costs) associated with the future disposition of
2 537 tonnes of surplus heavy water assets from nuclear non-energy revenues, effective
3 March 1, 2011.

4
5 Surplus heavy water assets are the property of OPG and its shareholder. They are fully
6 depreciated and were not within the prescribed asset rate base when regulation of the
7 prescribed facilities commenced on April 1, 2005. OPG earns no regulated rate of return on
8 these assets.

9
10 In EB-2007-0905, OPG proposed to include the net margin from the sale of surplus heavy
11 water assets as an offset to the nuclear revenue requirement, consistent with the proposed
12 treatment of these revenues in the information provided to the Province for the establishment
13 of the interim regulated rate as of April 1, 2005. However, OPG noted in its evidence that in
14 future it would consider other regulatory treatments for its nuclear non-energy revenues.
15 There is no requirement under O. Reg. 53/05 to use the revenues from these non-regulated
16 surplus heavy water assets as an offset to the nuclear revenue requirement.

17
18 The sale of these surplus heavy water assets will not impact the provision of OPG's
19 regulated services to ratepayers as OPG has conservatively set aside sufficient quantities of
20 heavy water to serve the future needs of OPG, including its contractual obligations to Bruce
21 Power. The administration and sale of the surplus heavy water assets requires minimal
22 business support. OPG has identified the direct and other support costs associated with the
23 sale of the surplus heavy water and these have been removed from the nuclear revenue
24 requirement as discussed below in section 4.0.

25
26 Surplus heavy water is not, and never has been, included in the prescribed facility rate base,
27 is not required for the provision of regulated services and does not rely on the prescribed
28 facilities for its production or management. For these reasons, effective March 1, 2011, OPG
29 proposes to exclude the revenues (and costs) from surplus heavy water sales from the offset
30 to the nuclear revenue requirement for non-energy revenues.

1 Total revenues for heavy water sales over the period 2007 - 2012 are summarized in Ex. G2-
2 T1-S1 Table 1. Direct costs and other support costs are described in section 4 below.

3
4 **3.1.3 Heavy Water Services**

5 The heavy water service business consists of the provision of tritium removal (detrition)
6 services by processing heavy water through the Darlington Tritium Removal Facility ("TRF").
7 The bulk of the heavy water service revenue is from the provision of detrition services to
8 Bruce Power. Opportunities for providing detrition services to others are limited. There is
9 little market demand for this service because there are storage and capacity restrictions at
10 the TRF processing facility. In addition, OPG is able to lease/loan some small quantities of
11 heavy water inventories to third parties and these revenues are included under heavy water
12 services.

13
14 Total revenues for heavy water services over the period 2007 - 2012 are summarized in Ex.
15 G2-T1-S1 Table 1. Cost of goods sold and other support costs are described in section 4
16 below.

17
18 **3.2 Isotope Sales**

19 **3.2.1 Cobalt-60**

20 Cobalt-60 produced by OPG is used primarily in the health industry to sterilize surgical and
21 medical supplies.

22
23 In Canada, the Canadian Nuclear Safety Commission ("CNSC") has the responsibility for
24 setting and enforcing the regulations and standards for all activities involving the use of
25 radioactive materials. In producing and handling cobalt, OPG works diligently to ensure
26 compliance with such requirements.

27
28 Cobalt-60 is produced at Pickering B (Units 6, 7, and 8) by inserting adjuster rods containing
29 cobalt-59 in the reactor core (the rods are used to adjust power levels). Over time the cobalt-
30 59 absorbs a neutron and becomes cobalt-60. About every 24 months, in line with a planned
31 outage, the adjuster rods containing cobalt-60 are replaced. The removed rods are cut up

1 and safely stored before shipping to a licensed end-user. OPG sells cobalt-60 under an
2 exclusive long-term agreement to a third party.

3
4 Total revenues from cobalt-60 sales over the period 2007 - 2012 are shown in Ex. G2-T1-S1
5 Table 1. Yearly revenue variations are generally driven by timing of the cobalt harvest (tied to
6 outage schedule of the Pickering units). The potential for revenue growth is limited, as sale
7 volumes are constrained by the ability to produce cobalt-60. The direct costs and other
8 support costs for this activity are discussed in section 4 below.

9
10 **3.2.2 Tritium Sales**

11 Tritium is a by-product of electricity generation using CANDU technology. It is produced by
12 the irradiation of heavy water. Concentration limits of tritium in reactor heavy water
13 inventories have been established by the CNSC for each nuclear station. In order to lower
14 worker radiation dose levels, improve environmental performance, and reduce risk of
15 generation impact due to reaching these limits, tritium is removed from the heavy water via
16 the Darlington TRF (see Ex. F2-T2-S1).

17
18 OPG has entered into short-term contracts to sell the tritium to government approved and
19 licensed organizations. Commercial use of tritium includes safety and security products like
20 land-mine markers and emergency exit signs, tritium labeled chemicals for medical research
21 and research into future power sources.

22
23 While tritium sales have been relatively small and stable over time, OPG is increasingly
24 facing price competition from international suppliers, primarily Russia. The value of the
25 Canadian dollar (relative to the U.S. dollar) has also affected OPG's competitiveness in this
26 market. OPG is seeking new business opportunities for the sale of tritium, including the joint
27 International Fusion Research project in France and opportunities related to Helium 3, an
28 isotope of Helium which can be extracted as a byproduct of tritium decay.

29
30 Total revenue from tritium sales over the period 2007 - 2012 is shown in Ex. G2-T1-S1 Table
31 1. The direct costs and other support costs are described in section 4 below.

1 **3.3 Inspection and Maintenance Services**

2 OPG's inspection and maintenance services function ("IMS"), within the Inspection,
3 Maintenance and Commercial Services Division, provides inspection, maintenance and
4 technical services to nuclear and non-nuclear power generation facilities for both OPG and
5 external customers. The core areas where IMS provides services are:

- 6 • Fuel channel and reactor vault inspection and maintenance
7 • Steam generator and heat exchangers inspection and maintenance
8 • Balance of plant inspections
9 • Development of inspection and maintenance tooling

10
11 IMS supports OPG's internal work program needs for fuel channel, steam generator, and
12 balance of plant inspections and specialized maintenance at Pickering A, Pickering B, and
13 Darlington. If resources are available, IMS may provide limited inspection services for other
14 OPG divisions and Nuclear Waste Management. Costs associated with the provision of IMS
15 work activities for all OPG facilities are discussed under Base OM&A (Ex. F2-T2-S1) and
16 Outage OM&A (Ex. F2-T4-S1).

17
18 IMS's primary external customer is Bruce Power. In conjunction with the Bruce Lease, IMS
19 has two service agreements with Bruce Power (i.e., the Reactor Fuel Channel Inspection and
20 Maintenance Services Agreement and the Steam Generator and Special Inspection and
21 Maintenance Services Agreement) for the provision of inspection and maintenance services
22 on a commercial basis. The two service agreements are subject to unilateral termination
23 upon due notice.

24
25 In the spring of 2008, OPG and Bruce Power entered in discussions concerning the future of
26 these service agreements. Both parties wanted to obtain self-sufficiency for the provision of
27 these specialized services. Bruce Power did not want to continue indefinitely with a sole
28 source supply arrangement with OPG. OPG wanted to exit the provision of this non-core
29 business in order to focus on improving outage performance at its stations. OPG's Pickering
30 B Continued Operations initiative will also require extensive inspection and maintenance
31 support. OPG also perceived increased risks and costs related to being able to co-ordinate

1 outage schedules between OPG and Bruce, given the refurbishment of additional units at
2 Bruce.

3
4 In mid 2009, the parties agreed that they would rely upon existing contractual provisions in
5 the service agreements to process the transition of the service capability from OPG to Bruce
6 Power, and on June 5, 2009, OPG provided notice to Bruce Power to terminate the service
7 agreements as of June 6, 2011. OPG and Bruce Power are continuing to work together with
8 the intent of ensuring an orderly transition. OPG is planning to provide inspection and
9 maintenance services and termination assistance to Bruce Power under a jointly developed
10 transition plan up until the first half of 2011.

11
12 While OPG has from time to time, entered into short-term agreements with other external
13 clients besides Bruce Power for the provision of inspection and maintenance services, OPG
14 intends to effectively wind-up all of these external business activities in order to focus on
15 internal work programs.

16
17 Total revenues from IMS third party sales over the period 2007 - 2012 are shown in Ex. G2-
18 T1-S1 Table 1. The direct costs and other support costs are discussed in section 4 below.

19 20 **4.0 OPERATING COSTS OF NUCLEAR NON-ENERGY BUSINESSES**

21 The operating costs of the nuclear non-energy business are made up of direct costs (costs
22 directly associated with producing or generating the product or service) and other support
23 costs (costs associated with sales, administration and other overheads). The direct costs of
24 the nuclear non-energy business are shown in Ex. G2-T1-S1 Table 1 on an aggregated
25 basis. Other support costs are included in Base OM&A (Ex. F2-T2-S1 Table 1 Nuclear
26 Support Divisions either under Inspection and Maintenance Services or under Commercial
27 Services).

28 29 **4.1 Heavy Water Sales**

30 The direct costs for heavy water sales include labour involved in arranging for handling,
31 testing, loading, unloading, packaging, cost of containers, and transportation costs. With

1 OPG's proposal to exclude the revenue (less costs) from the sale of surplus heavy water
2 from the determination of the nuclear revenue requirement, OPG has removed the direct
3 costs related to the sale of surplus heavy water from the revenue requirement. This reduces
4 nuclear costs by \$0.8M in 2011 and \$1.0 M in 2012.

5
6 Other support costs in Nuclear Base OM&A (i.e., Commercial Services see Ex. F2-T2-S1
7 Table 1) were reduced by \$0.4M per year in the test period related to sales and
8 administration of surplus heavy water.

9 10 **4.2 Heavy Water Services**

11 Direct costs for heavy water services relate to the estimated incremental direct labour cost
12 attached to the processing of Bruce Power Heavy Water at the TRF and direct labour (e.g.,
13 handling, testing, packaging) and other costs (shipping, fees) attached to the provision of
14 other services (loans, swaps, upgrading) to third parties.

15
16 Other support costs for heavy water detritiation services relate to sales and support staff
17 dedicated to serving this market, all of which is included in Nuclear Base OM&A (i.e.,
18 Commercial Services see Ex. F2-T2-S1 Table 1).

19 20 **4.3 Cobalt-60**

21 The direct costs for this product include installation, removal, processing, storage, and
22 packaging of cobalt. Direct costs also include a cost item for the long-term storage of the
23 spent (but still radioactive) cobalt, as the third party agreement provides for the return of the
24 spent cobalt to OPG for storage as nuclear waste. Also, under the Used Fuel Waste and
25 Cobalt-60 Agreement, OPG has accepted liability for the interim storage and future disposal
26 of Bruce Power's spent cobalt-60, and in return OPG receives payments from Bruce Power.
27 The associated revenues are set out in Ex. G2-T2-S1, section 4.

28
29 Other support costs for Cobalt-60 are included in Nuclear Base OM&A (i.e., Commercial
30 Services function see Ex. F2-T2-S1 Table 1) and represent an allocation of the Isotopes

1 Sales Group support costs including a portion of labour costs related to sales and
2 administration.

3

4 **4.4 Tritium Sales**

5 The direct costs for the tritium sales program are primarily Atomic Energy of Canada Limited
6 laboratory and dispensing fees, packaging, and shipping costs. The product itself is a pure
7 by-product of the detritiation process that is required to reduce employee radiation exposure
8 and no production cost is attached to what is sold.

9

10 Other support costs for the tritium sales program are included as Nuclear Base OM&A (i.e.,
11 Commercial Services Ex. F2-T2-S1 Table 1) and represent an allocation of the Isotopes
12 Sales Group support costs including a portion of labour costs related to sales and
13 administration.

14

15 **4.5 Inspection and Maintenance Services**

16 The IMS direct costs are comprised of internal and augmented labor, materials and
17 expenses for executing the external work programs, primarily to Bruce Power. IMS direct
18 costs will be eliminated when OPG is no longer providing services under the Bruce Power
19 service level agreements.

20

21 Other support costs of the Inspection and Maintenance are budgeted within Nuclear Base
22 OM&A (i.e., Inspection and Maintenance Services Ex. F2-2-1 Table 1) and represent an
23 allocation of administrative overheads, unallocated time (e.g., labour costs for staff time
24 spent offsite on training, sick leave, tool preparation, etc) and sick, accident, vacation and
25 holidays ("SAVH") related to IMS provision of services to both internal and external
26 customers. These costs are attributable to external customers and for OPG's own internal
27 requirements. OPG is forecasting a reduction in other support costs of \$1.8M in 2010, \$3.0M
28 in 2011 and \$3.9M in 2012 related to OPG no longer providing services under the Bruce
29 Power service agreements (see Ex F2-T2-S1).

1 **5.0 NUCLEAR NON-ENERGY REVENUES AND PROPOSED REGULATORY**
2 **TREATMENT**

3 The derivation of the interim payment amount for nuclear commencing April 1, 2005 included
4 all revenues (and associated direct costs as well as other support costs as part of base
5 OM&A) with respect to nuclear non-energy activities. This regulatory treatment was also
6 approved in EB-2007-0905. OPG is proposing in this Application that all forecasted third
7 party revenues (net of direct costs and other support costs budgeted within base OM&A)
8 related to tritium removal services, isotope sales and IMS in the test period be recorded as
9 an offset to the determination of the regulated payments amounts. However, OPG is
10 proposing that effective March 1, 2011 all revenues and costs associated with the sale of
11 surplus heavy water be excluded from being an offset to the determination of the regulated
12 payment amounts.

13
14 As shown in Ex. G2-T1-S1 Table 1, the proposed regulatory treatment represents a net
15 contribution (before other support costs) that reduces the prescribed payment amount by
16 \$29.0M in 2011 and \$20.9M in 2012. Overall the nuclear non-energy businesses are
17 profitable enterprises, inclusive of all costs.