OVERVIEW OF REGULATED HYDROELECTRIC FACILITIES

1.0 PURPOSE

The purpose of this evidence is to provide a description of the regulated hydroelectric facilities, an overview of the hydroelectric mandate, objectives, organization, management framework, key performance targets, benchmarking, as well as a discussion of key regulations, agreements and programs.

2.0 DESCRIPTION OF REGULATED HYDROELECTRIC FACILITIES

OPG's regulated hydroelectric facilities consist of the Niagara Plant Group generating stations (Sir Adam Beck I, Sir Adam Beck II, Sir Adam Beck Pump Generating Station ["PGS"], DeCew Falls I and DeCew Falls II) and the R.H. Saunders Generating Station ("Saunders").

Chart 1 presents some basic facts about the regulated hydroelectric facilities.

Chart 1
Regulated Hydroelectric Facilities Basic Information

River System	Generating Station	Number of In-Service Units	Net In-Service Capacity (MW)	Original Unit In-Service Dates
Niagara Region	Sir Adam Beck I	9	447	1922 – 1930
	Sir Adam Beck II	16	1,499	1954 – 1958
	Sir Adam Beck PGS	6	174	1957 – 1958
	DeCew Falls I and II	6	167	1898 – 1948
St. Lawrence River	R.H. Saunders	16	1,045	1958 – 1959

The Niagara Plant Group facilities and Saunders are situated on two different drainage sub-basins within the Great Lakes/St. Lawrence River system. Sir Adam Beck and DeCew Falls operate on water from Lake Erie/Niagara River. R.H. Saunders utilizes water from the St. Lawrence River.

The Sir Adam Beck and DeCew Falls facilities form the Niagara Plant Group. They are controlled from a single control centre located at Sir Adam Beck I. R.H. Saunders is part of the Ottawa St. Lawrence Plant Group, which also includes nine unregulated OPG hydroelectric facilities on the Ottawa River and Madawaska River systems. It is operated from a control centre within the station (see photos of stations in Appendix A).

<u>Sir Adam Beck Facilities</u>

<u>Sir Adam Beck I Generating Station</u>

The Sir Adam Beck I Generating Station consists of ten hydroelectric generating units (seven in-service 60 Hz units, two in-service 25 Hz units, and one de-registered 25 Hz unit) and a frequency changer. The station receives water drawn from the upper Niagara River via the Welland River and through a man-made open-cut canal that travels through the City of Niagara Falls. Water is discharged from the station into the Lower Niagara River.

<u>Sir Adam Beck II Generating Station</u>

Sir Adam Beck II Generating Station consists of 16 hydroelectric generating units. The station receives water drawn from the Niagara River via two 14 metre diameter tunnels under the City of Niagara Falls. The tunnels travel for 9 km surfacing at outlet portals to a single 3.5 km long open cut canal which conveys the water to the Sir Adam Beck stations. The open cut canal crosses the open cut canal for Sir Adam Beck I Generating Station at a location known as the ‘cross-over’. Water downstream of the ‘cross-over’ is capable of reaching both the Sir Adam Beck I and the Sir Adam Beck II Generating Stations. Water is discharged from Sir Adam Beck II into the Lower Niagara River.

<u>Sir Adam Beck Pump Generating Station</u>

The Sir Adam Beck Pump Generating Station began operating in 1957. It consists of six mixed-flow variable-pitch reversible pump-turbines. The station was designed and built for integrated operation with the other two Sir Adam Beck plants and is generally used to pump/store water during off-peak periods for use during peak periods. During off-peak periods, the station pumps water from the cross-over location of the Sir Adam Beck open cut canals into a large man-made storage reservoir. During peak demand periods it generates electricity from water stored in the reservoir and discharges the water back into the Sir Adam Beck I and Sir Adam Beck II open-cut canals at the cross-over location. The water is then utilized by the Sir Adam Beck I and Sir Adam Beck II Generating Stations.

The station also assists in providing automatic generation control and operating reserve at the Beck complex, as well as controlling the amount of water diverted from the Niagara River to the Beck complex by controlling the cross-over elevation.

<u>Sir Adam Beck Joint Works</u>

The use of Niagara River water for power production is governed by international treaties between Canada and the United States as detailed later in this exhibit (see section 8.1). In the 1950s, the International Niagara Control Works structure (also know as International Control Dam) was constructed to control the volume and distribution of water flow over Niagara Falls and the elevation of the upstream storage area known as the Grass Island Pool. The International Niagara Control Works structure is operated and maintained by Niagara Plant Group under Memorandum of Understanding ("Niagara MOU") between OPG and the New York Power Authority ("NYPA"). OPG and NYPA equally share the costs associated with Joint Works (as defined in the Niagara MOU) which includes the International Niagara Control Works. Details of the Niagara MOU are provided later in this exhibit (section 8.2). Operation of the International Niagara Control Works structure is monitored by the International Niagara Board of Control.

<u>DeCew Falls I and II Generating Stations</u>

The DeCew Falls Generating Stations produce power with water from Lake Erie diverted through the Welland Ship Canal, which is owned and operated by the St. Lawrence Seaway

Management Corporation. Water flow from the Welland Ship Canal is controlled by two intake structures. Intake #2 is a control dam used to control water flow into Lake Gibson and subsequently into both DeCew stations through a series of waterways. Intake #1 is a smaller control structure that provides water to Lake Gibson and to a Region of Niagara water treatment plant. The conveyance of water is governed under an agreement between OPG and the St. Lawrence Seaway Management Corporation and through an agreement signed in 1903 between the predecessors of OPG and the Region of Niagara. Water is discharged by both DeCew Falls stations into 12 Mile Creek, which travels through the City of St. Catharines and discharges into Lake Ontario.

DeCew Falls I is a six-unit hydroelectric station (four in-service units, two decommissioned units) that began operation in 1898. DeCew Falls II is a two-unit hydroelectric station that began operation in 1943.

<u>R.H. Saunders Generating Station</u>

R.H. Saunders Generating Station is a 16-unit hydroelectric station spanning half the width of the St. Lawrence River at Cornwall, Ontario. R.H. Saunders is connected to the 16-unit St. Lawrence - Franklin D. Roosevelt Generating Station, which is owned and operated by New York Power Authority. Together, the two stations span the entire St. Lawrence River. The sixteen R. H. Saunders units were placed in-service between July 1958 and December 1959 and are operated from a control room located within the station.

<u>R.H. Saunders Joint Works</u>

Many of the associated structures and dams which operate in conjunction with R.H. Saunders and NYPA’s Franklin D. Roosevelt station are operated and maintained pursuant to Memorandum of Understanding (“St. Lawrence MOU”) between OPG and NYPA. Under the St. Lawrence MOU, OPG and NYPA share equally in the costs associated with the operation and maintenance of the Joint Works (as defined in the St. Lawrence MOU). The St. Lawrence Joint Works consist of all the structures associated with the R.H. Saunders and Franklin D. Roosevelt Generating Stations including dams, headworks, dykes, Barnhart Island bridge and the ice booms, with the exception of the powerhouses.

3.0 MAJOR SUPPLY PROJECTS

OPG has initiated two major projects at the regulated hydroelectric facilities to increase the output from the Sir Adam Beck facilities. Further information on these projects is provided in Ex. D1-T1-S1.

Niagara Tunnel Project

The total flow of water available to the Sir Adam Beck Generating Stations pursuant to treaties between Canada and the United States exceeds the combined capacities of the existing water diversion facilities (i.e., the Sir Adam Beck power canal and two tunnels) that serve these stations about 65 percent of the time. To capitalize on this potential, a third tunnel has been approved by the OPG Board of Directors and is being constructed to divert the additional water from the Niagara River to the Sir Adam Beck generating stations (the "Niagara Tunnel Project"). The additional water provided by the Niagara Tunnel Project will increase the efficient utilization of the existing capacity of the stations at the Sir Adam Beck complex, thereby increasing energy production by an average of 1.6 TWh per year. Based on information provided by the contractor, the in-service date of the tunnel will be delayed from the original project completion schedule of June 2010 (see Ex. D1-T1-S1).

Sir Adam Beck I Unit 7 Frequency Conversion/Rehabilitation

At present, one of the ten units at Sir Adam Beck I (Unit G7 – 25 Hz), is decommissioned and has been deregistered with the IESO. There is an economic opportunity to rehabilitate and convert this unit from 25 Hz to 60 Hz. The additional capacity and energy from this project will be 61.5 MW and 100 GWh/year, respectively. This project has been approved by the OPG Board of Directors in 2007 is expected to be completed in 2009.

4.0 HYDROELECTRIC ORGANIZATION AND MANAGEMENT FRAMEWORK

All OPG hydroelectric facilities, including the regulated facilities are under the organizational authority of the Executive Vice President ("EVP") Hydroelectric and form part of the Hydroelectric Business Unit (subsequently referred to as Hydroelectric).

Hydroelectric utilizes a decentralized organizational model based on five plant groups – including the Niagara Plant Group and the Ottawa/St. Lawrence Plant Group of which R. H. Saunders is a part. The Plant Groups operate with a high degree of autonomy. This organizational structure includes a technical and support presence located at the plants wherever practical. The local technical and support resources in the plant groups are augmented by central support/services organizations offering specialized expertise and oversight in critical areas. Organizational charts are provided in Ex. A1-T5-S1.

The Hydroelectric Business Unit was created January 1, 2006 to strengthen the efficient and cost effective operation of the existing hydroelectric facilities, and to carry out its new mandate with respect to new hydroelectric developments, such as the Niagara Tunnel Project. Before 2006, Hydroelectric was part of OPG's Electricity Production Business Unit, which included both hydroelectric and fossil generating facilities. As part of Electricity Production, Hydroelectric shared central support functions with Fossil. These Electricity Production central support functions were unbundled and allocated to Hydroelectric and Fossil in 2006. The Plant Group structure and accountabilities did not otherwise change.

The Hydroelectric central support groups perform a dual role. First, they provide oversight and due diligence support to the EVP - Hydroelectric by setting direction through high level programs and other requirements (e.g., corporate policies). Secondly, they provide the specialized support necessary for the plant groups to make effective operational and business decisions and to achieve corporate alignment. The central support groups assist the plant groups in following corporate governance obligations in areas such as planning, asset management, engineering, environment and dam and public safety, supply chain/procurement and finance. Descriptions of the key functions and activities of Hydroelectric's central support groups are provided in Ex. F1-T2-S1 Section 2.4.

Each plant group is managed by a Plant Group Manager, who reports to the EVP - Hydroelectric. Plant Group management establishes local governance to follow the above direction and to ensure that due diligence requirements are met. They are responsible for managing all aspects of the facilities assigned to them including:

- Operations
- Maintenance
- Water management
- Asset management
- Engineering
- Project management
- Employee health and safety
- Dam and waterways public safety
- Environment
- Local public affairs/relations
- Security
- Materials management

Within this decentralized organizational model, “lead” plant groups are designated and given the accountability to champion certain common business issues, processes, special projects and/or to co-ordinate matters on behalf of Hydroelectric. Plant Groups lead in maintaining and communicating certain governing documents, procedures, and drafting documentation. This “lead” plant group model is both effective and efficient, in that it leverages the existing expertise of plant group staff in certain areas, and allows for a leaner central support organization by reducing duplication and overlap.

4.1 Hydroelectric Planning and Asset/Investment Management

Hydroelectric follows an annual business planning and budgeting process that feeds into OPG’s corporate process (see Ex. A2-T2-S1). The approaches used to identify investment and base work program requirements in support of Hydroelectric’s objectives are described below.

4.1.1 Portfolio Approach to Investment Management

Hydroelectric uses a structured portfolio approach to identify and prioritize projects for its investment program. Annual engineering reviews and plant condition assessments (conducted on a cycle of approximately five to ten years) are performed to determine shortterm and long-term expenditure requirements to sustain or improve each facility. These may be followed by the preparation of a facility life cycle plan, which is performed on an as-needed basis for marginal assets or assets requiring significant expenditures relative to the value of the facility. This planning approach is designed to identify necessary capital, operating and maintenance expenditures for each facility, and direct limited corporate funds at the facilities that can best maintain or enhance the value of the hydroelectric business and OPG. The cornerstone of this approach is that safety, environmental, and other regulatory programs are of the highest priority.

4.1.2 Streamlined Reliability Centred Maintenance

Hydroelectric utilizes a process known as streamlined reliability-centred maintenance to optimize the preventive maintenance program at its facilities. The streamlined reliability-centred maintenance process provides a consistent method of identifying, scheduling and executing maintenance activities at its facilities. This is an improvement over the cyclical maintenance approach used before streamlined reliability-centred maintenance was introduced.

The concept of streamlined reliability-centred maintenance dictates that the type and frequency of preventive maintenance applied to an individual component is determined based on the nature and consequences of failure (i.e., balance of cost versus risk). Streamlined reliability-centred maintenance is based on the characteristics/criticality and history of the equipment, as well as knowledge and experience of maintenance and technical personnel. Streamlined reliability-centred maintenance also provides a structured process for transferring knowledge from experienced workers to the next generation of workers (e.g., trades apprentices), thereby reducing the future demographic risks associated with the retirement of experienced staff. This experience and knowledge, as well as equipment history, characteristics and maintenance programs, are captured in a maintenance management system. By focusing maintenance and associated support resources to the right areas, the business has been able to accomplish more of its base work program (including additional regulatory requirements), thereby minimizing the need for additional resources.

5.0 HYDROELECTRIC MANDATE AND OBJECTIVES

The Memorandum of Agreement between OPG and its shareholder provides that OPG's core mandate is electricity generation. It further provides that OPG will "operate its existing nuclear, hydroelectric, and fossil generation assets as efficiently and cost-effectively as possible, within the legislative and regulatory framework of the Province of Ontario and the Government of Canada." The Memorandum of Agreement also states that "OPG will operate these assets in a manner that mitigates the Province's financial and operational risk".

With respect to investment in new generation capacity, the Memorandum of Agreement provides that "OPG's priority will be hydroelectric generation capacity" and that "OPG will seek to expand, develop and/or improve its hydro-electric generation capacity." It further states that "this will include expansion and redevelopment on its existing sites as well as the pursuit of new projects where feasible." The Niagara Tunnel Project and Sir Adam Beck I G7 conversion from 25 Hz to 60 Hz, which are considered in Ex. D1-T1-S1, were undertaken in response to this mandate from the shareholder.

Consistent with the mandate and OPG's corporate objectives, the Hydroelectric Business Unit has the following objectives:

- Sustain and improve the existing hydroelectric assets for the long term.
- Operate and maintain hydroelectric facilities in an efficient and cost effective manner.
- Maintain and improve reliability performance where practical and economic.
- Maintain existing excellent employee safety record (top quartile performance).
- Strive for continuous improvement in the areas of dam and waterways public safety and environmental performance.
- Seek to expand, develop, and/or improve existing hydroelectric generation where feasible.

6.0 HYDROELECTRIC KEY PERFORMANCE TARGETS

Hydroelectric establishes performance targets to support its business objectives and generally benchmarks its performance against these targets. Performance targets are described below and benchmarking information is presented in section 7.0.

Availability

Availability is a measure of the reliability of a generating unit represented by the percentage of time the unit is capable of providing service, whether or not it is actually in-service, relative to the total hours for the period in question (typically 8,760 hours). It is determined by the following equation: Availability = 100% – Incapability Factor, where incapability factor is a measure of the incapability of a unit to generate over the period in question. Incapability factor is defined as the ratio of scheduled and unscheduled outage hours and adjusted derating hours to the total hours in the period.

Equivalent Forced Outage Rate ("EFOR")

EFOR is an index of the reliability of the generating unit measured by the ratio of time a generating unit is forced out of service, including any forced deratings, compared to the amount of time the generating unit was available to operate.

OM&A Unit Energy Cost

OM&A unit energy cost is used to measure the cost effectiveness of the hydroelectric generating stations. It is defined as total hydroelectric OM&A expense plus allocated central hydroelectric costs, divided by hydroelectric electricity generation. The gross revenue charge is excluded as this cost is not within the direct control of OPG. The gross revenue charge is dictated and determined by O. Reg. 124/02 under the *Electricity Act, 1998.*

Safety – Accident Severity Rate

OPG and the Hydroelectric Business Unit spend a significant amount of time and effort in training and awareness to ensure the safety of its employees. The accident severity rate is used as a key measure of safety performance both within Hydroelectric and across OPG. It is defined as the number of days lost by employees injured on the job divided by 200,000 hours worked. This measure is used by other electric utilities and is benchmarked by the Canadian Electrical Association ("CEA").

Environmental Performance

An environmental performance index is utilized by Hydroelectric to measure the environmental performance of the regulated facilities. The environmental performance index consists of three main categories:

- Spills
- Regulatory compliance (e.g., regulatory infractions)
- Energy efficiency

Hydroelectric performance targets are established on the basis of the following factors:

- Historical performance trends.
- Age and condition of facility.
- Major outages and OM&A project investments plans for the current year.
- Recent major investments to improve reliability.
- Comparison with external benchmarking.
- Continuous improvement considerations.

Targets are monitored and compared to actual data as the year progresses.

Availability and Equivalent Forced Outage Rate - History and Targets

Chart 2 shows reliability targets and actuals from 2004 to 2007 for each regulated plant and for the regulated plants grouped together. Chart 3a and 3b show availability and EFOR targets, respectively for 2008 and 2009. The EFOR targets for 2008 and 2009 are similar to 2007, and better than the CEA and Electric Utility Cost Group ("EUCG") averages. It should be noted that availability targets fluctuate based on the planned outage program, as well as forced outages which cannot be predicted. In 2009, availability will decline due to overlapping planned outages at Sir Adam Beck I for the rehabilitation and/or conversion of each unit at the station. Overall, availability is expected to improve in the long run as the major outages for conversions/rehabilitation of Sir Adam Beck 1 are completed.

Chart 2

Regulated Hydroelectric Facilities - History and Targets for Availability and EFOR

Measure	Name of Station/Grouping	2004 Target	2004 Actual	2005 Target	2005 Actual	2006 Target	2006 Actual	2007 Target	2007 Actual	Notes
Availability Factor (%)	DeCew Falls II	96.4	97.7	80.4	84.3	65.3	64.4	75.1	77.6	major outages and overhauls in 2006 & 2007
	SAB I	91.9	85.4	88.2	87.4	90.3	91.8	93.9	92.3	Major outages starting in 2008
	SAB II	89.5	89.5	92	94.6	96.9	97.3	96.0	96.9	Station rehabilitated and upgraded from 1996 to 2005
	SAB PGS	86.6	79.9	90.8	90.2	90.2	90.7	89.7	86.1	
	Saunders	95.3	96.4	95.7	95.9	96.6	97.4	95.3	97.3	Station rehabilitated and upgraded from 1992 to 2001
	Aggregate of all 5 regulated plants (excl. DeCew Falls I)	n/a	90.1	91.8	92.7	93.5	94.2	93.8	94.1	2007 actual is better than CEA, EUCG and NERC averages
EFOR (%) (Reliability)	DeCew Falls II	1.1	0.3	1.6	1.5	1	17.0	1.1	1.0	
	SAB I	1.7	5.1	1.6	1.7	1.9	3.2	2.0	3.7	Unit 9 on a permanent derating until rehab in 2009
	SAB II	0.7	0.02	0.70	0.2	0.5	0.1	0.5	0.4	
	SAB PGS	2.8	12.5	2.7	2.2	3.3	2.0	3.5	9.7	
	Saunders	0.7	0.1	0.7	1.6	0.5	0.0	0.6	0.0	
	Aggregate of all 5 regulated plants (excl. DeCew Falls I)	n/a	2.1	1.1	1.2	1.0	1.5	1.1	1.8	2007 actual is better than CEA, EUCG and NERC averages

Note: The availability and EFOR of DeCew Falls I is not tracked since this station basically utilizes the available water that is in excess of what can be utilized by the newer, more efficient DeCew Falls II station.

EUCG – Electric Utility Cost Group   CEA – Canadian Electrical Association

Chart 3a

Availability Targets (%)

	SAB I	SAB II	SAB PGS	DeCew Falls I	DeCew Falls II	Total Niagara	Saunders	Total
2008	95.3	96.9	81.1	n/a	93.4	93.4	96.4	94.4
2009	88.6	98.0	92.3	n/a	96.8	94.2	95.2	94.6

Chart 3b

EFOR Targets (%)

	SAB I	SAB II	SAB PGS	DeCew Falls I	DeCew Falls II	Total Niagara	Saunders	Total
2008	2.0	0.5	3.5	n/a	1.1	1.5	0.6	1.1
2009	2.0	0.5	3.5	n/a	1.1	1.5	0.6	1.1

OM&A Unit Energy Cost - History and Targets

Chart 3c shows OM&A unit energy cost targets for 2007 through 2009. These targets are based on planned OM&A expenditures divided by the energy forecast for each year. OM&A unit energy costs were not tracked in 2005 for the regulated facilities. In 2006, the actuals were better than target for both Niagara (target of 3.89 $/MWh versus actual of 3.65 $/MWh) and Saunders (target of 2.14 $/MWh versus actual of 2.06 $/MWh). In 2007, the actuals were also better than targets.

Chart 3c

OM&A Unit Energy Cost Targets ($/MWh)

	SAB I	SAB II	SAB PGS	DeCew Falls I	DeCew Falls II	Total Niagara	Saunders	Total
2007	n/a	n/a	n/a	n/a	n/a	4.4	2.5	3.7
2007 Actuals	n/a	n/a	n/a	n/a	n/a	3.9	2.1	3.2
2008	n/a	n/a	n/a	n/a	n/a	4.7	2.7	4.0
2009	n/a	n/a	n/a	n/a	n/a	4.5	2.6	3.8

Safety - Accident Severity Rate - History and Targets

Chart 3d shows accident severity rate accident severity rate targets for 2007 through 2009. These targets are based on CEA and other benchmarking, as well as OPG's overall targets.

It is important to note that the accident severity rate has been zero days lost/200,000 hours worked at Niagara Plant Group for the past four years and zero days lost/200,000 hours worked at Saunders for the past nine years. This is considered excellent by any standard.

Chart 3d

Accident Severity Rate Targets (number of days lost/200,000 hours worked)

	SAB I	SAB II	SAB PGS	DeCew Falls I	DeCew Falls II	Total Niagara	Saunders	Total
2007	<5	<5	<5	<5	<5	<5	<5	<5
2008 through 2009	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5

In 2007, the regulated hydroelectric facilities maintained their excellent safety record. The accident severity rate remained at zero days lost/200,000 hours.

<u>Environmental Performance Index – History and Targets</u>

Hydroelectric has a very good track record with regard to environmental performance. Environmental management systems have been in place since 2000 and are registered under the International Organization of Standardization (“ISO”) 14001. The ISO 14001 registration ensures compliance with legal requirements and continual improvement of the environmental management system. Hydroelectric also has a number of environmental programs in place to manage priority environmental issues and risks in the business.

The environmental performance index for the regulated facilities has been better than the target of 100 percent from 2004 to 2007. The environmental performance index target for 2008 to 2009 is 100 percent or greater.

7.0 REGULATED HYDROELECTRIC FACILITIES BENCHMARKING

Hydroelectric benchmarks reliability, cost and safety performance with comparable businesses to assess and understand the performance of its stations, as well as to identify opportunities for improvement.

Benchmarking data provides a useful starting point to compare the costs and reliability of Hydroelectric's regulated assets to those of other hydroelectric facility owners. Because of the differing geographic locations and distribution of the plants, as well as differences in regulatory regimes, direct comparisons cannot be readily made between Hydroelectric's regulated station costs and those of other utilities. In addition, specifics of a station's design, site configuration, the number of, type of and physical dimensions of its dams, the way the station has historically been operated and maintained, and its equipment age/condition can result in its costs and reliability performance deviating, positively or negatively, on some of the benchmarking indicators. Water conditions (i.e., flows and water levels) also impact the relative benchmarking results for any particular year because they affect the amount of energy generated and ultimately have an impact on the unit energy cost ($/MWh), which are not driven by changes in costs. Thus, benchmarking results for individual plants are not definitive, and should only be used as a guide in making comparisons.

Hydroelectric uses three sources for benchmarking:

- EUCG Inc. (formerly known as Electric Utility Cost Group)
- Canadian Electrical Association ("CEA")
- Haddon Jackson Associates (acquired by Navigant Consulting in 2007)

<u>EUCG and CEA Reliability Benchmarking</u>

Hydroelectric has participated in the Generation Equipment Reliability Information System benchmarking programs carried out by the EUCG Inc. and the CEA since the mid 1990s. EUCG benchmarking includes participation by Canadian and American utilities, including Manitoba Hydro, BC Hydro, Pacific Gas & Electric, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation and Bonneville Power Authority. For this benchmarking the data are not aggregated, thus individual OPG plants can be compared to the individual plants in the entire group (i.e., "quartile" analysis can be done). Nine Canadian utilities participate in the CEA benchmarking, including Hydro-Quebec, Manitoba Hydro, BC Hydro, Churchill Falls, Newfoundland and Labrador Hydro, Nova Scotia Power, Saskatchewan Power, Alcan and Aquila. The CEA benchmarking is done on an aggregate basis. OPG plants (aggregated) are compared to the aggregate of the plants in the entire group of utilities.

Benchmarking results for reliability, cost and safety are presented below.

7.1 Equivalent Forced Outage Rate and Availability

Hydroelectric benchmarks the reliability indicators of EFOR and availability using data from the EUCG and CEA.

The results of the 2003 to 2006 reliability benchmarking of the regulated hydroelectric facilities are presented in the two charts below.

Chart 4a

EUCG Reliability Benchmarking

Measure	Name of Station/Grouping	Value In 2003 & Quartile	Value In 2004 & Quartile	Value In 2005 & Quartile	Value In 2006 & Quartile
Availability Factor (%)	DeCew Falls II	97.6 (Q1)	97.7 (Q1)	84.3 (Q4)	64.4 (Q4)
	SAB I	93.9 (Q2)	85.4 (Q4)	87.4 (Q4)	91.8 (Q2)
	SAB II	91.5 (Q3)	89.5 (Q3)	94.6 (Q2)	97.3 (Q1)
	SAB PGS	92.5 (Q3)	79.9 (Q4)	90.2 (Q3)	90.7 (Q3)
	Saunders	97 (Q1)	96.4 (Q2)	95.9 (Q2)	97.4 (Q1)
Equivalent Forced Outage Rate (Reliability) (%)	DeCew Falls II	1 (Q3)	1.1 (Q2)	1.5 (Q2)	17.2 (Q4)
	SAB I	0.5 (Q3)	5.6 (Q4)	1.7 (Q2)	3.2 (Q3)
	SAB II	0.14 (Q1)	0.02 (Q1)	0.2 (Q1)	0.1 (Q1)
	SAB PGS	5.9 (Q4)	12.5 (Q4)	2.17 (Q3)	2.0 (Q3)
	Saunders	0.08 (Q1)	0.07 (Q1)	1.6 (Q2)	0.0 (Q1)

Notes: 1) EUCG includes 670 units; 2) High availability is good. Low forced outage rate is good.
3) Q1 means that a station is in the top/best quartile of the benchmarked EUCG stations.

Chart 4b

CEA Reliability Benchmarking

Measure	Name of Station/Grouping	Value In 2003	Value In 2004	Value In 2005	Comparison Details/Notes
Availability Factor (%)	Availability CEA (excluding OPG)	90.9	90.8	89.4	
	Aggregate of all 5 OPG large plants (including Beck PGS)	94.1	90.5	92.7	CEA does not provide quartile comparisons. Data is provided on aggregate basis.
Equivalent Forced Outage Rate (Reliability) (%)	Forced Outage Rate CEA (excluding OPG)	1.9	2.0	2.5	
	Aggregate of all 5 OPG large plants (including Beck PGS)	0.7	2.1	1.2	CEA does not provide quartile comparisons. Data is provided on aggregate basis.

Note: CEA benchmarking includes 692 generating units. 2006 CEA benchmarking information is not available.

The above data demonstrates that the availability and reliability for the individual and/or grouping of regulated plants, is generally better than, or comparable, to the EUCG and CEA benchmarks. It should be noted that Sir Adam Beck PGS is included in the OPG data for completeness. This station is generally inherently less reliable than conventional hydroelectric stations due to its technically complex “reversible pump turbine” design and its multi-faceted role in the electricity system (e.g., pumping, generation, automatic generation control, and water diversion control). To accomplish this role, more frequent stops and starts are required than conventional stations, leading to more wear and tear on equipment.

The two largest plants, Sir Adam Beck II and Saunders, were generally in the upper two quartiles for both availability and EFOR from 2003 to 2006. In fact the availability and EFOR of both SAB II and Saunders improved in 2006 to the point that they both attained first quartile status in the EUCG benchmarking. The availability of Sir Adam Beck II was lower in 2003 and 2004 compared to 2005 due to the planned outages to install upgraded runners and rehabilitate the units. All Sir Adam Beck II units have now been rehabilitated and upgraded (completed in 2005). As such, availability improved to 97.3 percent in 2006. The equivalent forced outage rate was .05 percent in 2006 which is in the top quartile. This is considered to be excellent performance.

The availability of DeCew Falls II in 2003 and 2004 was very good, but its EFOR was deteriorating due to the age of the units, the fact that the last major overhaul was performed over 25 years ago, as well as emerging operational problems caused by unit misalignment. Before 2003, the EFOR for this station had consistently been in the upper two quartiles. As such, major overhauls were planned to ensure continued long term reliability and performance of the station. From 2005 to 2007, DeCew Falls II has had below average availability performance due to long major planned outages to rehabilitate the two units. The outage program started in 2005 and was completed in 2007. The reliability of this station is expected to improve in 2008, as both units have now been overhauled. The operational problems, which have been prevalent since 2002, are expected to be resolved after completion of the overhauls in 2007.

With regard to Sir Adam Beck I, performance is below average for its peer group due to the age and poor condition of most of the units. One of the units (Unit 9) is derated until the unit is rehabilitated in 2008/2009. Sir Adam Beck I is slated for a full station rehabilitation starting in late 2007, including the conversion of one or more of the 25 cycle units to 60 cycle. This is expected to improve reliability at the station in the long term.

With regard to Sir Adam Beck PGS, availability and reliability has generally been in the third and fourth quartiles between 2003 and 2005. Since the station is unique in its technical design, vintage and role, there are no real comparators in the EUCG database for PGS. The reliability comparisons with the rest of the EUCG stations have been put in the above chart for information purposes only. In 2004 the rotor frame on several units exhibited unexpected severe cracking, which had to be repaired. This contributed to the very poor reliability value in 2004. Reliability in 2005 and 2006 has improved to reasonable levels. Availability was 90.1 percent in 2005 and 90.7 percent in 2006. The EFOR was 2.2 percent in 2005 and 2 percent in 2006. This is considered to be very good for this station.

7.2 OM&A Unit Energy Cost

Haddon Jackson Associates Benchmarking (now Navigant Consulting)

Hydroelectric benchmarks OM&A cost performance of its regulated stations by participating in the Hydroelectric Generation Benchmarking Program that is carried out by Haddon Jackson Associates.

Haddon Jackson Associates' benchmarking program includes over 330 stations, comprised of about 1,255 units that represents about 87,000 MW of installed capacity. The participants are predominantly in Canada (i.e., BC Hydro, Hydro-Quebec, Nova Scotia Power, Great Lakes Power, Newfoundland and Labrador Hydro) and the United States (i.e., New York Power Authority, Tennessee Valley Authority, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, Southern California Edison). The group of participating stations is diverse in size, type of facility and age, and includes a mix of run-of-the-river, reservoir, and pumped storage.

Costs included in the Haddon Jackson Associates' benchmarking are operations, plant maintenance, waterways and dam and other maintenance, support (i.e., engineering, finance, corporate support) and public affairs and regulatory. Public affairs and regulatory costs include items such as water rentals and usage fees, gross revenue charge, major environmental costs such as fish/wildlife operations and studies, as well as special licensing fees (e.g., FERC re-licencing in the U.S.).

The study results are generally segmented into various peer groupings. Drivers used to determine peer groupings include unit/station sizes, number of units, and age.

The cost benchmarking data presented is for OM&A costs only (referred to as "Partial Function Costs" in the Haddon Jackson Associates Benchmarking Program). Haddon Jackson Associates also performs a Total Cost Analysis which includes public affairs and regulatory costs, such as gross revenue charge. Public affairs and regulatory costs such as gross revenue charge are not within the control of a utility (i.e., externally dictated), thus they are not relevant when assessing and benchmarking operations, maintenance and administration costs (which are generally within management control).

For the years 2005 and 2006, all six regulated facilities were included in the Haddon Jackson Associates program. For the year 2004, Sir Adam Beck I and DeCew Falls I and II were included in the Haddon Jackson Associates' benchmarking program, and for 2003, Sir Adam Beck II and Saunders, were included in the Haddon Jackson Associates' benchmarking program.

The results of the Haddon Jackson Associates' OM&A unit energy cost benchmarking are summarized in the chart below.

Chart 5

Hydroelectric Benchmarking Results

Name of Station/Grouping	Value In 2003 & Quartile	Value In 2004 & Quartile	Value In 2005 & Quartile	Value In 2006 & Quartile	Comparison Details/Note for 2006	Source and Peer Group
DeCew Falls I	n/a	n/a	26.1 (Q3)	47.7 (Q4)	Q4 from 29.6 to 78.4	Haddon Jackson Associates (HJA): 22 micro plants (< 30 MW)
DeCew Falls II	n/a	3 (Q2)	4.8 (Q3)	7.7 (Q3)	Q3 from 4.8 to 7.7	HJA: 41 medium plants (150 to 400 MW)
SAB I	n/a	4.2 (Q4)	5.8 (Q4)	5.3 (Q4)	Q4 from 4.2 to 6.1	HJA: 13 med-large plants (400 to 700 MW)
SAB II	2.4 (Q2)	n/a	1.7 (Q1)	1.6 (Q1)	Q1 from 0.6 to 1.7	HJA: 25 large plants (700 MW or more)
SAB PGS	n/a	n/a	63.3 (Q4)	47.1 (Q4)	Q4 from 22.0 to 60.5	HJA: 15 PGS plants
Saunders	2.5 (Q3)	n/a	2.4 (Q3)	2.1 (Q3)	Q3 from 2.0 to 3.2	HJA: 25 large plants (700 MW or more)
5 OPG plants as above (Beck PGS excl'd)	n/a	n/a	2.6 (Q1)	2.6 (Q1)	Q1 from 0.6 to 3.3	HJA: 163 plants
All 6 OPG plants (including Beck PGS)	n/a	n/a	3.0 (Q1)	2.9 (Q1)	Q1 from 0.6 to 3.3	HJA: 187 plants

Note: The above unit energy costs are in U.S. dollars and include both hydro common cost allocations and corporate cost allocations. Official Bank of Canada average midpoint Canadian to U.S. exchange rates (2003 = .7135; 2004=.7683; 2005=.8253, 2006 = 0.8829)

For 2005, the above chart shows that Sir Adam Beck II, OPG's largest hydroelectric station, is in the first (best) quartile, Saunders in the third quartile (middle of quartile) and DeCew Falls No. I and II the third quartile and Sir Adam Beck 1 and Sir Adam Beck PGS are in the fourth quartile of their respective peer groups. Collectively, the regulated stations are in the first quartile due to the fact that Sir Adam Beck II (OPG's largest and lowest cost facility) has a dominating impact on the results and the peer group includes a larger set of plants.

For 2006, the above chart shows that Sir Adam Beck II, OPG's largest hydroelectric station, continued to be in the first (top) quartile; Saunders improved within the third quartile (just missing the second quartile); DeCew Falls I fell to the fourth quartile (mostly due to significantly lower energy production due to penstock problems and related outages); DeCew Falls No. II remained in the third quartile; and Sir Adam Beck 1 and Sir Adam Beck PGS remained in the fourth quartile of their respective peer groups. Collectively, the regulated stations remained in the top quartile excluding SAB PGS, and fell to the second quartile (just missing the first quartile) with SAB PGS included.

The OM&A unit energy cost benchmarking demonstrates that OPG's regulated hydroelectric facilities are cost competitive, especially if their very good reliability performance is taken into account. The OM&A costs for the regulated hydroelectric facilities must be considered in the context of their generally very good availability and reliability performance, as well as the age and condition of some of the plants. Good reliability is usually a function of how well the plants are maintained. This requires a prudent investments and on-going maintenance which drives funding/costs.

It is also important to note that the OM&A unit energy cost ranking for the regulated hydroelectric facilities is negatively impacted by the significant OM&A expenditures at the Sir Adam Beck stations and Saunders required to maintain and operate the Joint Works with NYPA (i.e., ice booms and ice breaking operations, International Control Dam, Iroquois Control Dam, etc., - see section 8.2 in this exhibit). These additional structures and activities are not typical of most of the generating stations that are benchmarked, and account for over

$5M per year in OM&A costs (or seven to nine percent of total annual OM&A costs for the regulated hydroelectric facilities).

Explanations for the ranking and specific cost issues for each station are provided below.

R.H. Saunders

In addition to the special Joint Works costs identified above, the relative OM&A cost ranking of R.H. Saunders is negatively impacted by the following inherent characteristics of the facility:

- There is a need for extensive instrumentation and ongoing monitoring of concrete "growth" associated with alkali-aggregate reaction at the station. Alkali-aggregate reaction is a chemical reaction within the concrete structure (between the cement and certain types of aggregate) resulting in concrete "growth". In the mid to late 1980's this growth led to major operational and structural problems. A major rehabilitation program was implemented in the 1990's to mitigate the effects of the concrete growth and restore operational reliability. The program included cutting "slots" between each of the 16 units using a special diamond wire technique, repairing the powerhouse structure, and replacing major mechanical and electrical equipment. It is difficult to estimate when the concrete growth will stop, thus the growth, and re-established joints between the units, are being monitored. If it is determined in the future that the joints are "closing up" and lead to operational problems, re-slotting of the units will be required. Based on monitoring to date, re-slotting will likely not be required in the next five to ten years.

- R.H. Saunders has on-site operators for both operations and site security. Because Saunders is situated on the St. Lawrence River, which is transected by an international border with the United States, site presence is necessary to ensure security and public safety. The St. Lawrence - Franklin D. Roosevelt plant on the U.S. side (owned by NYPA) is connected to the Saunders plant. Local presence is also required to carry out our operational and maintenance commitments with respect to the Joint Works (including water control at the Iroquois Control Dam and annual installation and removal of ice booms), emergency preparedness, segregated mode of operation switching operations, and water transactions. Absent these unique circumstances, Saunders could be operated remotely from the control centre at Chenaux Generating Station (approximately 200 km away).

Sir Adam Beck I

The OM&A costs of Sir Adam Beck I are higher compared to its peer group due to the following factors:

- The station is over 85 years old and the “power train” equipment is reaching end of life and needs rehabilitation or replacement (condition varies with each unit).
- Three of the ten units are 25 cycle units, with only two of these units in service. The 25 cycle units generally require more maintenance than most 60 cycle units due to their very poor condition. In addition, there is a cost to maintain the additional frequency changer equipment which converts energy from 25 to 60 cycle and vice-versa, and the Niagara Transformer Station which is specifically required for the 25 cycle system.

The two in-service 25 cycle units will be taken out of service by April 2009. This project is discussed in Ex. D1-T1-S1. One or more of these units may be converted to conventional 60 cycle power. The business case for the first unit conversion from 25 to 60 cycle was approved by the Board of Directors in May 2007 and the project has started. The unit rehabilitation/conversions, and shutdown of Niagara Transformer Station and frequency changer, are expected to reduce OM&A costs at Sir Adam Beck I by the end of 2011. As such, its benchmarking performance is expected to improve thereafter.

Sir Adam Beck II

Sir Adam Beck II is expected to remain in the top quartile of its peer group. All 16 units at the station were upgraded with new more efficient equipment installed from 1996 to 2005.

Sir Adam Beck Pump Generating Station

Sir Adam Beck PGS costs are in the fourth quartile primarily due to the uniqueness of the station relative to other pumped storage stations. This plant is benchmarked with other pumped storage stations that are of much more modern and less complex in design, which have much larger units (economies of scale), and which operate differently than Sir Adam Beck PGS. In addition to its role in pumping water for use during peak periods, Sir Adam Beck PGS is used to control the cross over elevation of the Sir Adam Beck canals, to assist in automatic generation control, as well as to provide flexibility and optimization of operations at the Sir Adam Beck complex. Due to this unique role, the units are subjected to a high frequency of control actions leading to more wear and tear, and more problems and maintenance. These factors lead to significantly higher OM&A unit energy costs than a typical pump generating station, as well as below average availability and reliability.

<u>DeCew Falls</u>

The DeCew Falls I OM&A unit energy costs are in the third and fourth quartile due to the very old age (108 years) and condition of the plant, which results in high maintenance costs. A major overhaul of some of the units is planned to extend the life of the facility, which on completion can be expected to stabilize on-going maintenance costs. This facility is also being assessed to determine whether it will be more economic to replace it with a new unit. A detailed plant condition assessment and life cycle plan is underway to determine the preferred option for this station.

With regard to DeCew Falls II, OM&A costs increased from 2004 to 2006 due to the major overhaul work performed on one of the units in 2005/2006. This caused the ranking to decline from second quartile in 2004 to third quartile in 2005 and 2006. The overhaul program for DeCew Falls II was completed in mid-2007, thus major overhaul costs will no longer be incurred. This should improve the relative ranking of this station in 2008.

7.3 Safety (Accident Severity Rate)

OPG and Hydroelectric spend a significant amount of time and effort through training and awareness to ensure the safety of its employees. Safety performance is benchmarked through the CEA. The benchmarking data supplied by CEA is an aggregate of electrical generation utilities in Canada. Most of these utilities have a mix of various generation technologies and provide transmission service. The top quartile accident severity rate for these utilities from 2003 to 2005 was 4.6 days lost per 200,000 hours. From 2004 to 2007, regulated hydroelectric stations have not had a lost time accident. The accident severity rate for the regulated hydroelectric facilities has been zero for this period (i.e., top quartile performance).

8.0 KEY HYDROELECTRIC REGULATIONS, AGREEMENTS AND PROGRAMS

OPG's regulated hydroelectric facilities are subject to international treaties between Canada and the United States, federal and provincial legislation and regulatory requirements, as well as several contractual arrangements with third parties. Collectively these result in additional costs and program needs with respect to the operation and management of the regulated facilities.

This section provides an overview of:

- Regulations, treaties and agreements with regard to water rights for the regulated hydroelectric facilities.
- The Niagara MOU and the St. Lawrence MOU with NYPA.
- Dam and public safety governance and programs.

A summary of the broad regulatory framework applicable to OPG's regulated facilities, including the environmental requirements for the regulated hydroelectric facilities is provided at Ex. A1-T6-S1.

8.1 Water Rights

<u>Regulation of Water Rights</u>

Hydroelectric generation requires ongoing access to an adequate water supply. The physical availability of water is affected by numerous factors, including variations in precipitation, sublimation, and evaporation. Rights to and restrictions on the use of water are determined primarily by international treaties between Canada and the United States and certain orders and approvals thereunder, together with the application of inter-provincial agreements, federal and provincial legislation, common law as it pertains to real property and riparian rights, as well as the terms and conditions of certain leases and permits with and from the Government of Canada and the Province of Ontario.

International Rivers

OPG's regulated hydroelectric generating stations are directly or indirectly supplied by two major international waterway systems, Lake Erie/Niagara River in the case of the Niagara Plant Group and Lake Ontario/St. Lawrence River in respect of Saunders. As such, the Niagara stations are operated pursuant to two treaties between Canada and the United States and Saunders is subject to one.

The Boundary Waters Treaty of 1909 between Canada and the United States governs all boundary waters between Canada and the United States, including the Lake Erie/Niagara River and Lake Ontario/St. Lawrence River. The Niagara Diversion Treaty of 1950 between Canada and the United States, among other things, provides for the termination of certain sections of the Boundary Waters Treaty of 1909, provides for the construction of the International Niagara Control Works, determines the priority of use for the waters of the Niagara River and Welland Canal, and sets minimum flow requirements over Niagara Falls. Each of the Boundary Waters Treaty of 1909 and the Niagara Diversion Treaty of 1950 continue in perpetuity, but are terminable by either party on 12 months prior written notice. Given the significant importance of these treaties, OPG does not expect Canada or the United States to exercise their termination rights in the foreseeable future.

The Boundary Waters Treaty of 1909 and the Niagara Diversion Treaty of 1950 grant Canada and the United States equal rights to use waters available for power generation. The Niagara Diversion Treaty of 1950 recognizes certain diversion waters (5,000 cubic feet per second or approximately 142 cubic metres per second) which are diverted by Canada into the Great Lakes Basin as not being included in the allotment of waters under the provisions of the treaty, and which is therefore used solely by Canada at OPG's Niagara hydroelectric facilities. This water is diverted from the James Bay watershed by the Ogoki and Long Lac Diversions in northern Ontario, to the Niagara system via the upper Great Lakes.

Through a series of agreements between the Government of Canada and the Province of Ontario, certain Government of Canada statutes, and certain Province of Ontario statutes, OPG has been granted the right to exercise Canada's rights with respect to the construction, maintenance and operation of generating facilities under the Boundary Waters Treaty of 1909 and the Niagara Diversion Treaty of 1950.

OPG and NYPA have entered into an agreement ("Operations MOU") which provides for an opportunity for the parties to maximize energy production from the total water available for generation under the relevant international treaties. The Operations MOU permits, under certain circumstances, an entity the opportunity to extract at such entity's generating facility(ies) (the "Generating Entity") the potential energy from a portion of the other entity's share of the water available for power generation. In return, the Generating Entity provides the revenues resulting from such transaction, as per the terms of the MOU and minus an accommodation charge, to the other entity.

The implementation of, and the operations governed by, the Boundary Waters Treaty of 1909 and the Niagara Diversion Treaty of 1950, are monitored and regulated by certain international entities. The Boundary Waters Treaty of 1909 created an international commission called the International Joint Commission ("IJC") to help prevent and resolve disputes over the use of boundary waters between Canada and the United States. The IJC was asked to help implement the Niagara Diversion Treaty of 1950 by overseeing the design, construction and operation of the International Niagara Control Works. The IJC monitors all activities that may impact the treaties to ensure that the interests of both countries are protected.

The IJC established the International Niagara Board of Control in 1953. The International Niagara Board of Control provides advice on matters related to the IJC's responsibilities for water levels and flows in the Niagara River. The International Niagara Board of Control's main duties are to oversee water level regulation in the Chippawa-Grass Island Pool and the installation of the Lake Erie-Niagara River ice boom. The International Niagara Board of Control also collaborates with the International Niagara Committee, a body created by the

Niagara Diversion Treaty of 1950 to determine the amount of water available for Niagara Falls and power generation.

The IJC established the International St. Lawrence River Board of Control in 1952. The International St. Lawrence River Board of Control's main duty is to ensure that outflows from Lake Ontario meet the requirements of the relevant IJC order, which includes dependable flow for hydropower, adequate navigation depths and protection for shoreline and other interests downstream in the Province of Quebec. The International St. Lawrence River Board of Control also develops regulation plans and conducts special studies as requested by the IJC. Outflows are set by the International St. Lawrence River Board of Control under such regulation plan.

<u>Niagara Parks Commission – Niagara Plants</u>

OPG's tenure for the immediate area surrounding the Beck generating stations, as well as the area surrounding the Beck generating stations' intakes upstream of Niagara Falls, is by way of a lease agreement with The Niagara Parks Commission pursuant to the *Niagara Parks Act* (Ontario).

The *Niagara Parks Act* (Ontario) also grants to Niagara Parks Commission the authority to grant certain rights to use the waters of the Niagara River for purposes of power generation. The Niagara Parks Commission granted franchise agreements to three entities in the late 1800's and the first decade of the 1900's. OPG is a successor to two of the three franchise agreements. Through a series of agreements with the Niagara Parks Commission, and an agreement with FortisOntario Inc., the successor to the third franchise agreement, OPG has the right to use all rights which were granted under the *Niagara Parks Act* (Ontario).

One of the agreements mentioned in the preceding paragraph is commonly referred to as the Niagara Exchange Agreement and is an agreement between OPG and FortisOntario Inc. ("Fortis"). Pursuant to a franchise agreement granted to a predecessor of Fortis for a generating station commonly known as the Rankine Generating Station, Fortis may withdraw a certain amount of water from the Niagara River for purposes of generating at the Rankine

Generating Station. Pursuant to an irrevocable agreement between OPG and Fortis, Fortis has assigned its right to use such waters from the Niagara River to OPG. In exchange, OPG provides a certain amount of energy output continuously until 2009.

The DeCew Falls stations use water that is transported along the Welland Canal from Lake Erie by the St. Lawrence Seaway Management Corporation under an agreement between OPG and the St. Lawrence Seaway Management Corporation that expires on June 30, 2008. OPG has provided notice to the St. Lawrence Seaway Management Corporation of its intent to renew the term of the agreement for a further period of 30 years, as per the terms of the agreement. Discussions have been initiated to reach mutual agreement as to the fees that will be payable during the renewal term.

8.2 Joint Works Agreements with New York Power Authority

As previously discussed, OPG has two agreements with the NYPA with respect to cost sharing and the management of joint works at each of the Niagara River and St. Lawrence River hydroelectric generation developments (collectively the “Joint Works Agreements”). The Joint Works Agreements provide the framework for defining, planning, executing and sharing costs for Joint Works (as defined in the Joint Works Agreements) in association with their respective generating facilities on each of the Niagara River and the St. Lawrence River.

Management and administration of the Joint Works Agreements is carried out by means of the following processes:

- High level, joint meetings of the Niagara and St. Lawrence Joint Works Committees between NYPA and OPG are held every fall to discuss strategic initiatives and operational concerns, to identify areas of risk and to share experience regarding “best practices” for the shared maintenance, operations and project work on the Niagara River and St Lawrence River systems. This meeting is attended by executives from both NYPA and OPG, along with their support staff.

- The overall management of the respective Joint Works Agreements has been delegated to the Services Manager for the Niagara Plant Group and the Saunders Production Manager and Site Controller for the Ottawa/St. Lawrence Plant Groups.
- Quarterly meetings of local working committees for each of the Memoranda are held with technical and finance staff from both NYPA and OPG in order to:
    - Determine if new work, or revised existing work meets the criteria for joint works as per the Memoranda of Understanding.
    - Conduct a detailed review of the five-year plan to classify, prioritize and break out work packages that qualify for joint works for both NYPA and OPG. Cost estimates and scope of work packages are reviewed and appropriate changes are made where necessary, with the agreement of both parties.
    - Review year-to-date variances from budget on a work-package-by-work-package basis to help OPG and NYPA understand and identify variances that may be permanent in nature and therefore require funding adjustments to other areas of the plan. Every effort is made to defer other recurring non-production maintenance activities when a permanent, unfavourable variance is confirmed. However, there will be occasions when deferral is not an option so the variance would be approved on an exception basis with the expectation that the following year's expenditures are returned to approved levels.
    - Review year-end projections on a work-package-by-work-package basis to feed into both NYPA's and OPG's overall forecasts and to prioritize work. This process also provides the opportunity to manage other, current year, joint works costs so that the overall impact on the whole program is minimal.

The Joint Works Agreements at Niagara and R.H. Saunders are administered separately from each other.

8.3 Dam Safety and Public Safety

OPG's Hydroelectric Business Unit operates a total of 238 dams in connection with its 64 hydroelectric plants. Of these, twenty-seven dams, including several special hydraulic structures, are associated with stations in the Niagara Plant Group and three dams are associated with the R.H. Saunders Generating Station. Dam safety legislation does not currently exist in the Province of Ontario, although the Ministry of Natural Resources is currently considering introducing dam safety legislation. While the regulatory regime concerning dam safety and public safety is currently in a state of development, OPG has well-established programs in these areas that are in many respects seen as a model for emerging standards and regulatory requirements. As such, this section will start with an overview of OPG's dam safety program and will then discuss the existing and emerging regulatory requirements in these areas.

<u>OPG's Dam Safety and Waterways Public Safety Programs</u>

OPG's Dam Safety Policy, approved by the Board of Directors directs that dams be designed, constructed, operated and maintained in a manner that meets all regulatory requirements or, in the absence of regulations, the safety guidelines published by the Canadian Dam Association or other industry best practice.

The former Ontario Hydro established a dam safety program in 1985 to ensure the safe and reliable operation of its dams and related facilities. OPG is one of the first dam owners in Canada to have developed and implemented a dam safety program and is seen to be an industry leader in many aspects of the program. External reviews conducted by the Association of State Dam Safety officials in 1997 have concluded that OPG's program is effective, well-managed and contains all necessary technical elements to minimize the risks to the public, property and the environment associated with the dams and their operations.

OPG's dam safety program includes the preparation of annual project execution plans by each plant group, including the Niagara Plant Group and the Ottawa/St. Lawrence Plant Group with which Saunders is affiliated. These plans ensure that the plant groups are accountable for their respective dam safety programs, and associated activities:

- Inspection, monitoring and surveillance of dams and hydraulic structures.
- Routine testing of flow control equipment.
- Emergency preparedness plan updates, drills and exercises.

- Staff training on all aspects of emergency preparedness, operations, maintenance and surveillance.
- Periodic reviews to ensure compliance with current standards and practices.
- Technical audits and independent expert reviews.
- Rehabilitation projects (maintenance and dam safety improvements where necessary).
- Development and maintenance of governing documents, including policies, standards, guidelines and procedures.
- Incident reporting and follow up on lesson's learned.
- Communications with regulatory agencies regarding emergency preparedness and compliance issues.
- Research and development for the purposes of continuous improvement of the program.

In regards to the periodic reviews, these involve the engagement of independent consulting engineers and are performed at five to ten year intervals, depending on the consequence rating of the structures. For dams and hydraulic structures at the regulated hydroelectric facilities, the periodic reviews are conducted on five year intervals. There are also a number of on-going studies supporting the periodic reviews and assessment of integrity. These studies are incorporated in OPG's business plans.

Over the past three years, OPG's Hydroelectric Business Unit has spent great effort to develop a number of technical documents concerning public safety around dams, as well as materials to educate the public and raise awareness of the hazards associated with the operation of our dams and hydroelectric facilities. This work was undertaken in advance of government requirements/guidelines or industry standards in this emerging area to ensure continued due diligence in public safety. Both the Ministry of Natural Resources and Canadian Dam Association, are presently in the process of developing guidelines for public safety around dams. OPG is participating in both of these initiatives.

OPG has incorporated the Waterways Public Safety Program into its managed systems with the following elements:

- Development of guidance documentation/standards.

- Delegation of accountabilities.
- Operating procedures.
- Physical control measures (installation, maintenance, inspection and testing).
- Employee training.
- Incident reporting.
- Public education and awareness.
- Program reporting.
- Oversight.

In the area of public safety around dams, OPG has worked diligently to entrench a "Stay Clear - Stay Safe" message as part of the public education program. OPG actively engages other agencies such as the Ministry of Natural Resources ("MNR"), Ontario Provincial Police, St. John's Ambulance, Life Saving Society, the Ontario Waterpower Association, and numerous other stakeholders in water safety education to partner in delivering the message to the public.

Regulatory Regimes for Dam Safety and Waterways Public Safety

In Canada, dams come under the jurisdiction of the provinces, with the exception of dams situated in boundary waters and those owned by the Government of Canada. The majority of OPG's dams fall within the jurisdiction of the Province of Ontario.

Federal / International Jurisdiction

The IJC has an oversight role in regards to dams and associated works on boundary waters, including the St. Lawrence and Niagara Rivers. In 1998, the IJC published a review entitled "Unsafe Dams?" which assessed the state of governance for structures located on boundary waters in both Canada and the United States. Their conclusion was that though owners such as OPG were exercising appropriate levels of due diligence in regards to dam safety, additional oversight in the form of provincial dam safety regulations was required for dams in Canada. In 2006, the IJC published an update of this report, which again concluded that owners were fulfilling their due diligence requirements, but that the Province of Ontario needed to act on the recommendation for legislation to govern the safety of dams.

Province of Ontario – Dam Safety

The Province of Ontario currently governs dams under the *Lakes and Rivers Improvement Act*, administered by the MNR. Sections 14 and 16 of the *Lakes and Rivers Improvement Act* require MNR approval for activities such as the construction, alteration, improvement, or repair of dams. The existing MNR Criteria for Approval under the *Lakes and Rivers Improvement Act* were developed in 1977 and are currently regarded as a guidance document relating to provincial standards for such aspects of dam safety as the classification of dams, the selection of the inflow design flood and structural stability criteria. The MNR began a process for developing an actual regulation governing dam safety in 1999. The regulation is expected to be enacted under the *Lakes and Rivers Improvement Act*. The initial release from the MNR was in the form of a draft-for-comment Ontario Dam Safety Guidelines in 1999. The MNR has since updated the draft in 2004, which included a posting on the Environmental Registry, entitled Technical Guidelines and Standards for Dam Safety and Public Safety Around Dams. Since posting the draft in 2004, the MNR has engaged industry in a consultative process to further refine the provincial standards. OPG is an active member of the MNR's Advisory Panel and Working Groups which form part of the consultation. The Ministry's consultative process is on-going with no definitive date for conclusion.

Based on OPG's preliminary review of the most recent version of the draft regulation from MNR, OPG does not anticipate that major capital improvements will be required for the dams or hydraulic structures associated with regulated hydroelectric facilities. However, the draft regulation would impact the facilities by imposing an annual administrative registration fee for dams. As well, the regulation will likely require additional engineering resources to prepare documentation required to support applications for approval under the *Lakes and Rivers Improvement Act* covering maintenance works on the dams. The MNR has not provided definitive direction as of yet in regards to the fee structure, or the exact requirements for approvals under the *Lakes and Rivers Improvement Act*.

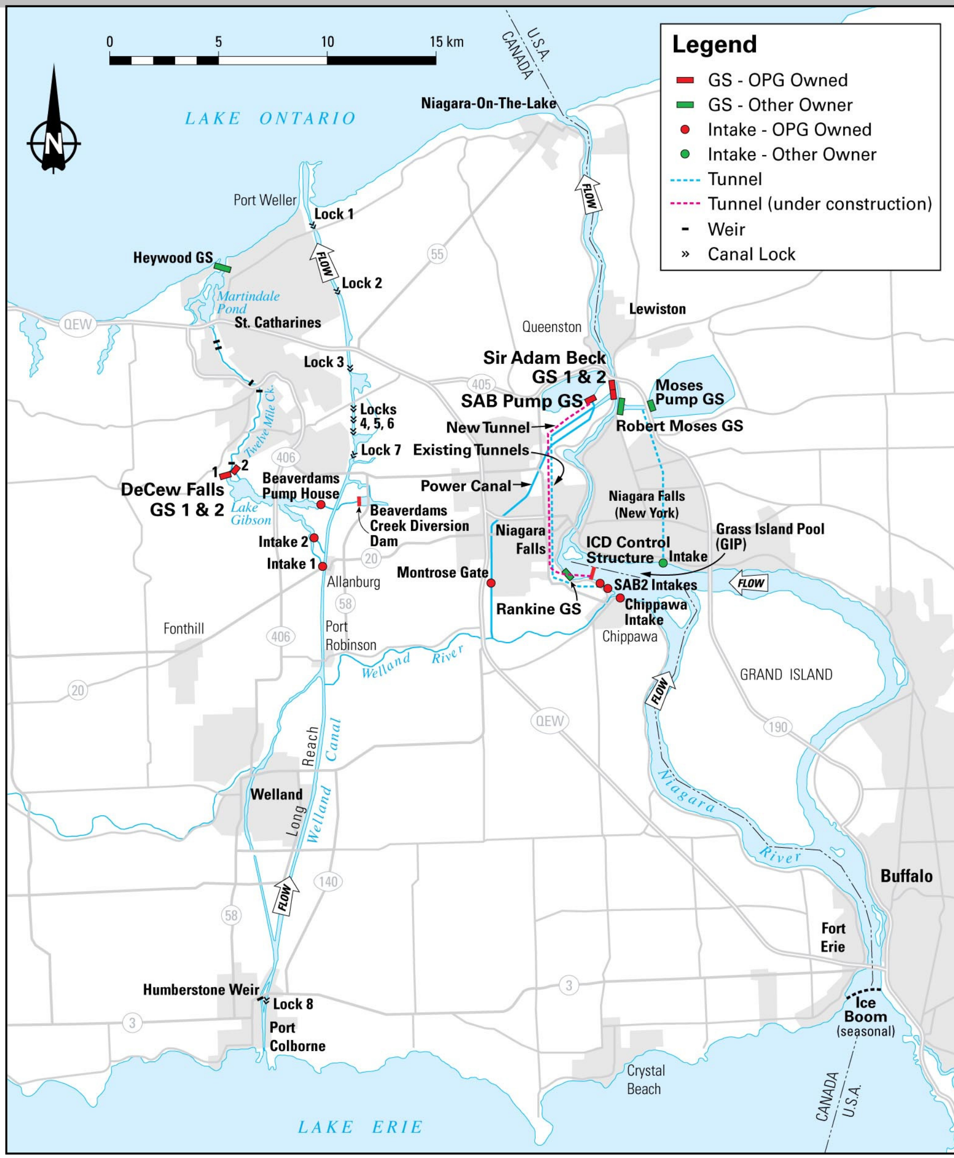
Pursuant to OPG's dam safety program, dam safety periodic reviews were completed for dams associated with the Sir Adam Beck facilities, and the International Niagara Control Works, in 2007, and for the DeCew Falls Generating Station facilities in 2003. Periodic reviews were completed for dams associated with the R.H. Saunders Generating Station in 2005. While there were recommendations for work to be carried out at each of these facilities to maintain their safe operation, there were no specific recommendations which would be likely to change as a result of the proposed new provincial dam safety regulation. Costs associated with the recommended maintenance and safety improvements have been incorporated in business plans.

Province of Ontario - Waterways Public Safety

Currently there is no provincial or federal regulation with respect to public safety around dams which would address public safety from the perspective of changes in operating water levels, discharges from the hydropower or dam facilities, as well as other waterways based hazards posed by the facilities. In this regard, OPG has exercised due diligence in undertaking a major program to develop guidelines, standards and materials to improve the public's awareness in the interest of public safety associated with dams and hydropower station operations. The Province of Ontario has indicated that it intends to incorporate a waterways public safety program as part of their proposed dam safety regulations. OPG has participated in the development of the provincial guidelines which have been based primarily on OPG's practices.

LIST OF ATTACHMENTS

Niagara Plant Group



Sir Adam Beck GS 2& 1

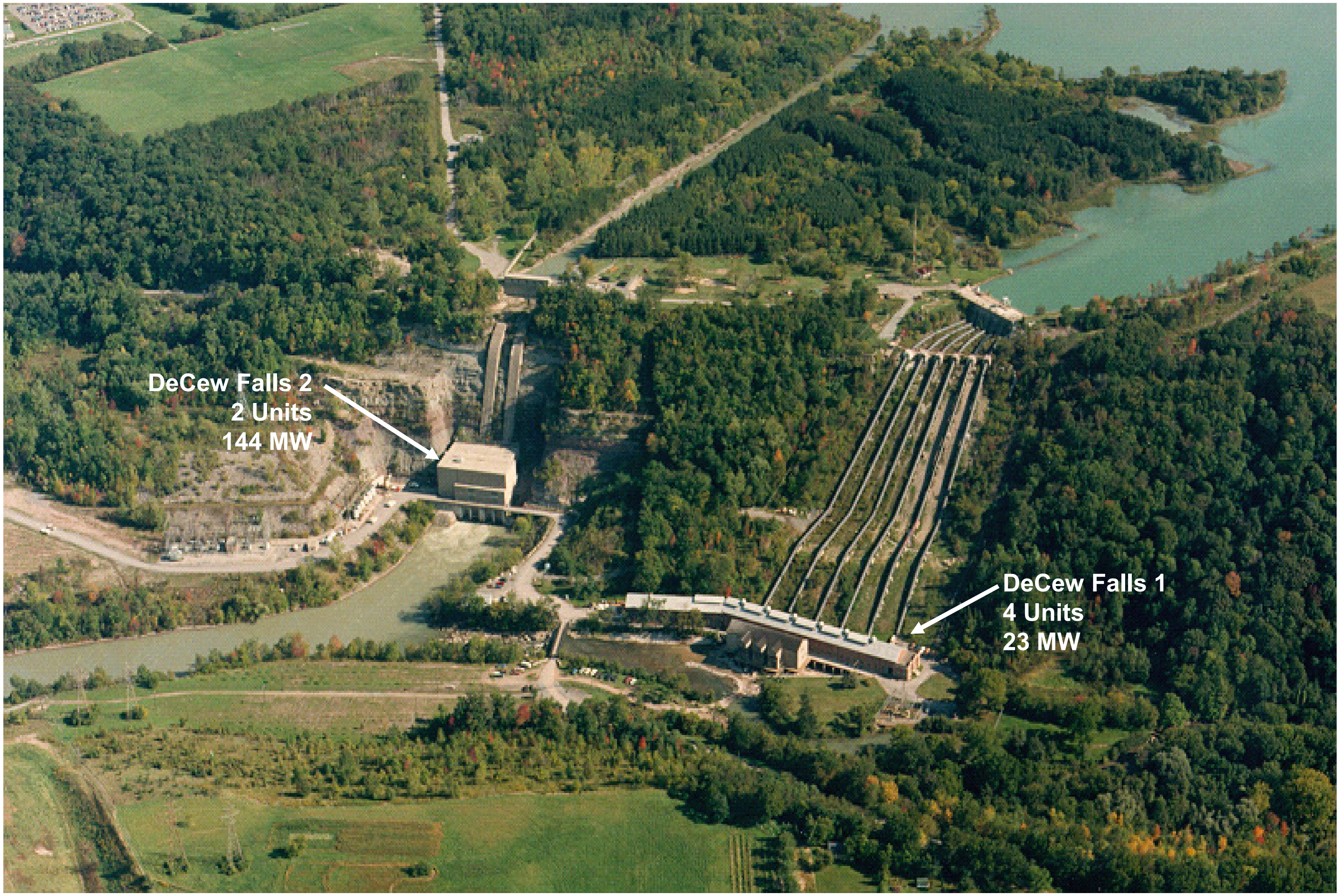
DeCew Falls GS 1 & 2

ONTARIO POWER GENERATION

Niagara – Sir Adam Beck (SAB) Complex

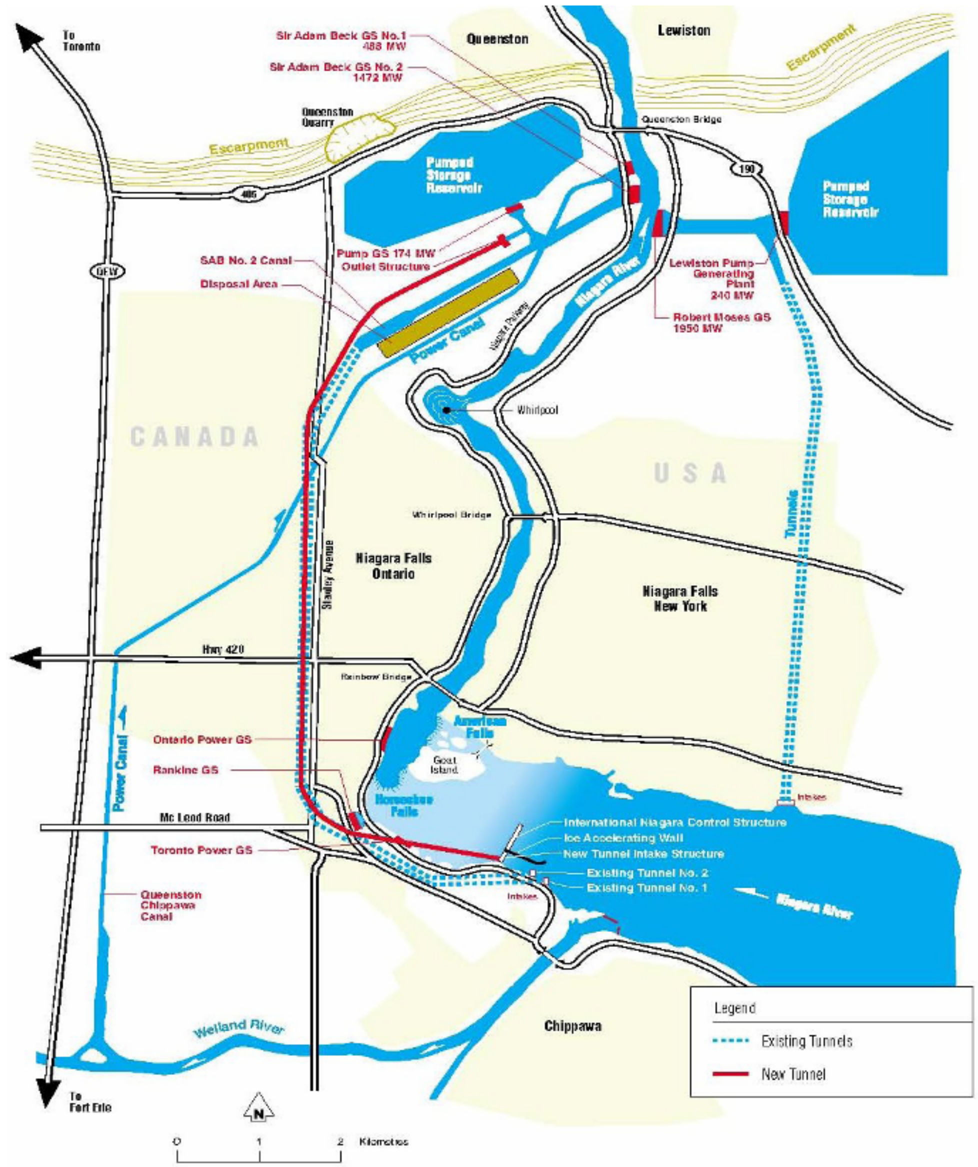
ONTARIO POWER GENERATION

Niagara – DeCew Falls 1 & 2



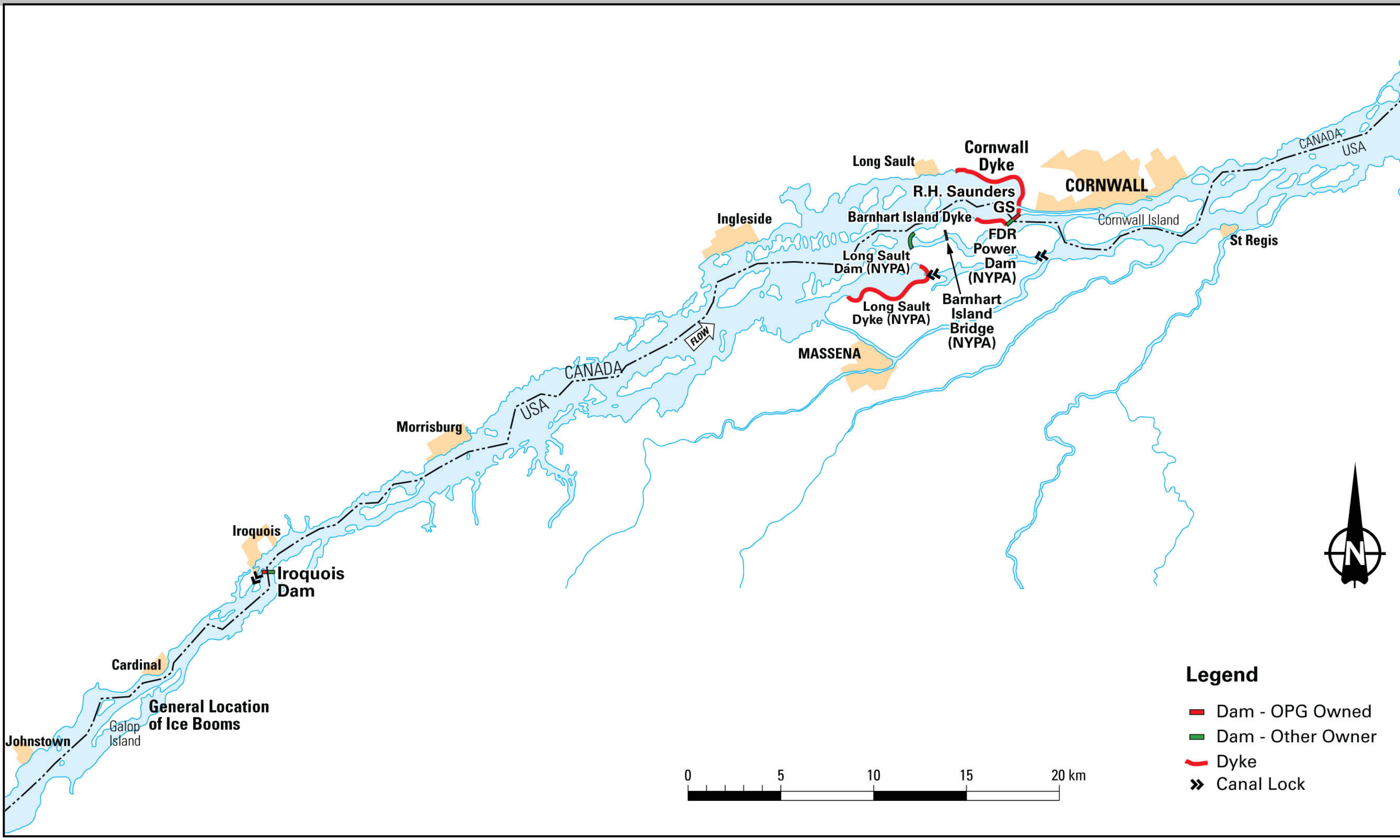
ONTARIO POWER GENERATION

Niagara Tunnel - Overview



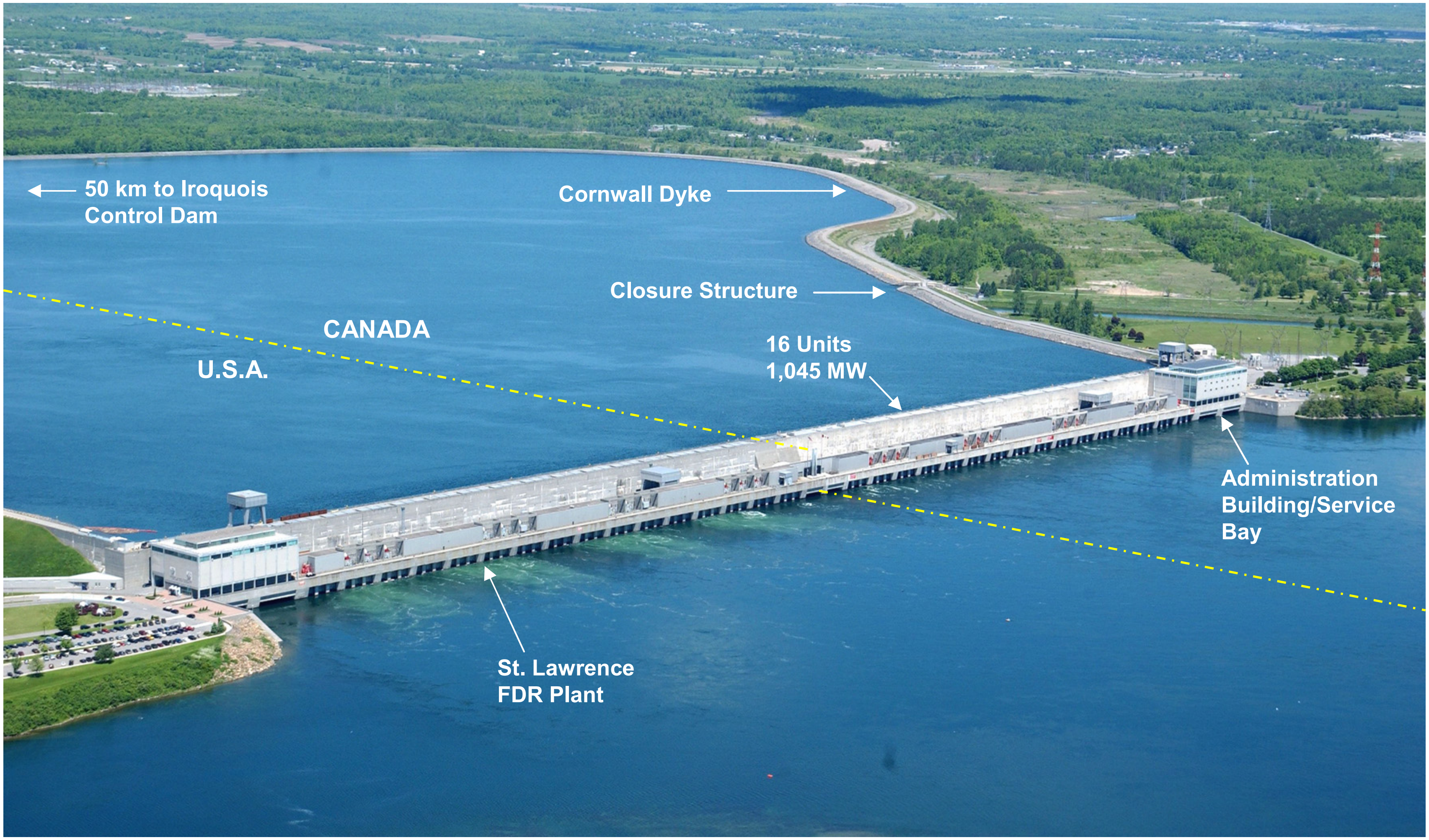
ONTARIO POWER GENERATION

St.Lawrence River



ONTARIOPOWER GENERATION

Saunders GS



ONTARIO POWER GENERATION