Ontario Power Authority

120 Adelaide Street West
Suite 1600
Toronto, Ontario M5H 1T1

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August 29, 2008

VIA COURIER & EMAIL

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, Ontario
M4P 1E4

Dear Ms. Walli:

Re: Ontario Power Authority - Integrated Power System Plan and Procurement Process
Ontario Energy Board File No. EB-2007-0707

Pursuant to in the Ontario Energy Board's July 29, 2008, Decision and Order on Motions ("Decision on Motions"), the Ontario Power Authority ("OPA") has completed its answer to a question brought by a motion of the National Chief's Office on behalf of the Assembly of First Nations (NCO 1) of the Decision on Motions). It is attached as Exhibit I-4-16, and Exhibit I-4-16, Attachment 1. Also according to the Decision on Motions, on August 25th the OPA held a Modelling Session at which GEC-Pembina-OSEA requested information that is now being filed as Exhibit I-43-11. Finally, the OPA is filing updates to some of its pre-filed evidence as listed below. Please find 10 paper copies attached, and note that pdf versions will be filed through the Board's RESS and posted to the OPA's website.

A	7	1, filed August 29, 2008	CVs of OPA Witnesses
A	7	2, filed August 29, 2008	CVs of OPA Consultants
B	1	1, pp. all updated August 29, 2008	The IPSP
D	5	1, pp. 27, 29, 36 to 39 updated August 29, 2008	Renewable Resources
D	6	1, pp. 18 and 19 corrected August 29, 2008	Nuclear Resources for Baseload
D	10	1, pp.1, 2 and 4 updated August 29, 2008	IPSP Authorized Procurements
F	1	1, pp. all updated August 29, 2008	Procurement Process Background
G	2	1, p. 7 Updated August 29, 2008	Plan Cost

I	4	16, filed August 29, 2008	Assembly of First Nations National Chief's Office (AFN - NCO)
I	4	16, Attachment 1, filed August 29, 2008	(AFN - NCO)
I	43	3, pp. 9, 11 and 12 updated August 29, 2008	OPA Model Runs
I	43	4, pp. 7, 8, 12 and 13 updated August 29, 2008	OPA Model Runs
I	43	11, filed August 29, 2008	OPA Model Runs

Yours truly,

(original signed)

Miriam J. Heinz
Regulatory Coordinator

Att. (10 paper copies by courier, pdf versions by e:mail and through RESS)
cc: Mr. George Vegh, McCarthy Tétrault LLP (by e-mail and courier)
Mr. James Harbell, Stikeman Elliott LLP (by e-mail and courier)
Mr. Glenn Zacher, Stikeman Elliott LLP (by e-mail and courier)
EB-2007-0707 Interested Parties (by e:mail and courier)

CURRICULUM VITAE OF LILY BUJA-BIJUNAS

Experience:

Ontario Power Authority (2005 – Present)

Planner, Power System Planning

Personal Interest Pursuits (1999 – 2005)

Ontario Hydro (1981 – 1999)

Manager, Market Analysis and Segmentation (1999)
Manager, Marketing & Sales, Consumer and Small Business (1996 – 1999)
Manager, Planning Projects Department (1995 – 1996)
Technical Services Manager, Consumer Markets (1994 – 1995)
Load Forecast Supervisor (1988 – 1994)
Economic Analyst (1986 – 1988)
Nuclear Design Engineer (1981 – 1986)

National Research Council (1979 – 1980)

Post-Doctoral Research Associate

Department of Energy, Mines and Resources (1978 – 1979)

Post-Doctoral Fellowship

Education:

Bachelor of Science, Honours Physics – 1974
McGill University

Doctor of Philosophy, Nuclear Physics – 1978
McMaster University

Master of Business Administration – 1987
York University

CURRICULUM VITAE OF JASON CHEE-ALOY

Experience:

Ontario Power Authority (August 2006 – present)

Director, Generation Procurement Electricity Resources

Ontario Power Authority (August 2005 – July 2006)

Manager, Generation Development

Independent Electricity System Operator (IESO, previously IMO)

Market Evolution Program: Project Manager, Resource Adequacy (Jan 2003 – July 2005);

Market Services: Market Development, Market Rules Group Senior Analyst, Special Studies (June 2001 – Dec 2003);

Consultant, Market Surveillance and Compliance (Nov 1999 – June 2001)

Ontario Ministry of Energy, Science and Technology (Feb 1999 – Nov 1999)

Energy Division: Energy Policy Branch, Energy Economics and Financial Analysis Economist

Canadian Enerdata Ltd. (Feb 1997 – Feb 1999)

Energy Analyst

Education:

Master of Arts – Economics, York University, Applied Economic Program (1989)

- Completed Schulich Business School (MBA) courses in Forecasting and Ph.D. course in Financial Markets

Honours Bachelor of Arts, *Economics Specialist,* University of Toronto, St. Michael's College

Associations:

Member of the Canadian Association of Business and Economics (CABE)

CURRICULUM VITAE OF ROBERT CHOW

EDUCATION

University of Toronto, Toronto, Ontario (1979)
Master of Engineering

University of Toronto, Toronto, Ontario (1974)
Bachelor of Applied Science

INDUSTRY EXPERIENCE

2005 - Present	Ontario Power Authority, Toronto, Ontario
2005 – 2008	Director, Transmission Integration
2003 – 2005	Alberta Electric System Operator, Calgary, Alberta
2003 – 2005	Manager, Bulk System Planning
2001 – 2003	Acres International Ltd, Oakville, Ontario
2001 – 2003	Senior Consultant, Transmission & Distribution
2000 – 2001	Electric Utility Consultant, Mississauga, Ontario
1999 – 2000	Hydro One Networks, Toronto, Ontario
1999 – 2000	Director, Investment Planning
1998 – 1999	Ontario Hydro Services Co., Toronto, Ontario
1999 – 2000	Director, System Development
1997 – 1998	Director, Asset Sustainment and Development
1974 – 1997	Ontario Hydro, Toronto, Ontario
1997 – 1997	Manager, System Re-Investment
1991 – 1997	Section Head, Customer Supply Planning
1974 – 1991	Transmission Planning Engineer

APPEARANCE(S) BEFORE THE ONTARIO ENERGY BOARD

RP-1998-0001	Hydro One Networks 1st Transmission Rate Hearing, 1999
EB-2007-0051	Hydro One Networks' Bruce to Milton Leave-to-Construct Application

Witness at the following Alberta Energy and Utilities Board hearing:

RP-05-388 (2004)	AESO's Edmonton-Calgary 500 kV Transmission Need Application

CURRICULUM VITAE OF EMAY COWX

Experience:

Ontario Power Authority (Sept 2005 – Present)

Manager, Stakeholder & Community Relations

Elenchus Research Associates (2004 - 2005)

Senior Consultant

Econalysis Consulting Services (2003 – 2004)

Senior Consultant

The Syne Group (1996 - 1998)

Partner

TransCanada Gas Services Ltd. (1988 – 1996)

Senior Sales Representative, U.S. Northeast LDC Marketing (1995 – 1996)
Senior Market Analyst, U.S. Northeast LDC Marketing (1994 – 1995)
Senior Market Analyst, Market Planning and Development (1991 – 1994)
Sales Representative, U.S. Midwest (1988 – 1991)

TransCanada PipeLines Ltd. (1984 - 1988)

Market Analyst, Pipeline Cost of Service – Energy Studies (1986 – 1988)
Assistant Market Analyst, Economic Forecasting – Energy Studies (1984 – 1986)

Education:

Bachelor of Commerce – Memorial University of Newfoundland, Business Administration (Co-operative), 1984

Bachelor of Arts – Memorial University of Newfoundland, Economics, 1984

Diplôme Éducation Collégiale – CEGEP Marianopolis, Social Sciences, 1980

Canadian Securities Course – 1985

Certified Facilitator – The Achieve Group, Calgary, 1993

CURRICULUM VITAE OF GIA M. DEJULIO

Experience:

Ontario Power Authority (2006 – Present)
Manager, Generation Procurement
Manager, Regulatory Affairs

Gia M. DeJulio Consulting Inc. (2001 -2006)
President

Sunoco Inc. (1998 – 2000)
Director, Energy Supply and Regulatory Affairs

TransCanada Energy Ltd (1996 – 1997)
Manager, Canadian Marketing
Manager, Business Development

Western Gas Marketing Limited (1985 – 1996)
Manager, LDC Marketing
Manager, Market Services
Supervisor, Sales Support
Senior Marketing Representative

TransCanada PipeLines Ltd. (1982 – 1985)
Facilities Planning Engineer

Education:

Bachelor of Applied Science, Chemical Engineering, University of Toronto, 1982
Graduate Courses in Masters of Business Administration, University of Toronto
Continuing Studies – Financial Analysis & Control for Managers – York University
Continuing Studies – Managing Your Distributors – York University
Continuing Studies – Strategic Alliances: Managing for Results – York University

Appearances before the Ontario Energy Board:

RP-2004-0213 Natural Gas Forum Technical Consultations on Storage
RP-2000-001 Proposed Gas Distribution Access Rule
RP-1999-0017 Union Gas 2000 Rates Case
EBRO 474-B/476/483/484/485 Joint Hearing on Direct Purchase Issues

Appearances before the Manitoba Public Utilities Board:

091/01 Centra Gas Manitoba Gas Costs

Appearances before the Legislative Assembly of Ontario's Standing Committee on Resources Development:

Energy Competition Act 1998, Bill 35

Representations at the Ontario Energy Board:

2004 Gas Distribution Access Rules (GDAR) Committee
2004 GDAR Electronic Business Transactions Standards Working Group
2003 Natural Gas Forum
1999 Member of Market Design Task Force

CURRICULUM VITAE OF CHUCK FARMER

Experience:

Ontario Power Authority (2008 – present)
Director, Conservation Integration

Ontario Power Authority (2006 – 2008)
Director, Portfolio Development & Planning

Union Gas Limited (2005 -2006)
Director, Market Knowledge & Demand Side Management

Union Gas Limited (2002 – 2005)
Manager, Major Accounts and Market Planning

Union Gas Limited (1999 – 2002)
Team Lead, Commercial and Industrial Marketing

Union Gas Limited (1997 – 1999)
Project Manager, Community Expansion

Classical Gas Inc. (HVAC Retail) (1990 – 1997)
Owner

Union Gas Limited (1986 – 1990)
Sales Representative

Education:

Honors Bachelor of Arts, Business Administration. The Richard Ivey School of Business at the University of Western Ontario – 1986
Continuing Studies – Strategic Management – York University
Continuing Studies – Sales Management – Queens University

Appearances before the Ontario Energy Board:

EB-2007-0791 Ontario Power Authority - 2008 Revenue Requirement Submission
EB-2006-0021 Natural Gas DSM Generic Issues Proceeding
EB-2005-0507 Union Gas Limited – DSM Plan 2006 - 2008

CURRICULUM VITAE OF KAREN FRECKER

Experience:

Ontario Power Authority (2005 – Present)
Planner, Power System Planning

Ontario's Independent Electricity System Operator (IESO, previously IMO) (2004 – 2005)
Analyst, Regulatory Affairs

Trudeau Centre for Peace and Conflict Studies (2003 – 2005)
Researcher

Munk Center for International Studies (2002 – 2003)
Researcher

Interlog Internet Services (1994 – 1998)
Manager, Accounting and Administration

Education:

Honours Bachelor of Arts (2004)
University of Toronto, Specialist in Peace and Conflict Studies, Major in Economics

CURRICULUM VITAE OF BOB GIBBONS

Experience: Ontario Power Authority

Director, Resource Integration
(mid 2005 – present)

Independent Electricity Market Operator (IESO formerly IMO)

Manager, Long Term Forecasts and Assessments
(2000 – mid 2005)

Ontario Hydro

Program Manager, Central Market Project (1996 – 1999)

Contract Negotiation Manager, Electricity Exchange (1993 – 1995)

Operations Strategy Manager, Power System Operations (1989 – 1992)

Supervising Engineer, Power System Operations (1980 – 1988)

Various Positions, Power System Operations (1973 – 1979)

Junior Engineer (1972 – 1973)

Education: B.A.Sc. (Electrical Engineering)
University of Toronto, 1972

M.B.A.
University of Toronto 1976

Memberships: P. Eng. (Ontario)

Appearances before the Ontario Energy Board:

EB-2005-0489 – Ontario Power Authority 2006 Revenue Requirement Submission

CURRICULUM VITAE OF D. BRIAN HAY

Experience:

Ontario Power Authority (June 2005 – Present)
Director, Corporate Communications

PARAGON: Reputation Management (Canada) Incorporated (1990 - To date)
Principal

International Corona Corporation (1990 – 1991)
Vice-President, Corporate Communications and Public Affairs

Texaco Canada Inc. (McColl-Frontenac Inc.) (1985 - 1990)
Director (General Manager), Public Affairs and Corporate Communications

Imperial Oil Limited (1975 – 1985)
Public Affairs Advisor (1975 – 1981)
National Manager, Public Relations (1981 – 1985)

Guaranty Trust Company of Canada (1972 - 1975)
Manager, Marketing Services (national)

Self-employed - project consulting (1971 - 1972)

Lost River Mining Corporation Ltd. (1970 - 1971)
Executive Assistant to President

Mid-Canada Development Foundation Inc. (1969 - 1970)
Executive Director

Department of Trade and Development, Government of Ontario (1967 -1969)
Special Projects Officer

Education:

Honours B.A. McMaster University – 1966
Philosophy and Political Science

M.A. McMaster University – 1971
Behavioral Political Science

Canadian Securities Course – 1971
Canadian Investment Finance – 1972

M.B.A. York and Calgary Universities (1975 - 1979)
(50% complete)

Kepner-Tregoe
Management Decision Making

CURRICULUM VITAE OF NANCY MARCONI

Experience:

Ontario Power Authority (July 2005 – Present)

Planner, Power System Planning

Hydro One (June 2002 – July 2005)

Assistant Network Management Officer, Asset Management (2004-2005)
Assistant Network Management Officer, Engineering (2002–2004)

Education:

Masters of Business Administration (2008)
Wilfrid Laurier University

Bachelor of Engineering Science, Electrical Engineering (2002)
The University of Western Ontario

CURRICULUM VITAE OF ANDRZEJ (ANDREW) PIETREWICZ

Experience:

Ontario Power Authority (June 2005 – present)

Planner, Power System Planning

Independent Electricity System Operator (May 2002 – May 2005)

Analyst, Regulatory Affairs and Market Evolution

Education:

M.Sc.Pl. (2003)
University of Toronto School of Graduate Studies, Department of Geography - Masters Program in Planning

B.A Hons. with distinction (2001)
University of Toronto Faculty of Arts and Sciences, Departments of Geography and Political Science

CURRICULUM VITAE OF VIPIN PRASAD

Experience:

Ontario Power Authority (July 2005 – present)

Director, Portfolio Development and Planning (July 2008 – Present)
Director, Conservation Integration (August 2007 – June 2008)
Director, Long Term Integrated Planning (July 2005 – July 2007)

Alberta Electricity System Operator (AESO), Calgary Alberta (June 2003 – June 2005)

Director Advisory Services

Power Pool of Alberta, Calgary Alberta (Nov 1997 – May 2003)

Acting Chief Operating Officer and Power Pool Administrator (Oct 2002 – May 2003)
Manager Strategic Planning (Nov 2000 – Sept 2002)
Manager Operations Planning (Nov 1999 – Oct 2000)
Operations Planning Engineer (Nov 1997 – Oct 1999)

SASKPOWER, Regina, Saskatchewan Sept 1969 – Oct 1997

Supt. Load and Revenue Forecasting (1995 -1997)
Director Energy Management Services (1992 - 1995)
Director, Generation and Resource Planning (1988 -1992)
Manager Generation Planning (1985 -1988)
Manager Transmission Planning(1983 - 1985)
Superintendent Computer Applications Planning (1981 - 1983)
Senior Transmission Planning Engineer (1974 - 1981)
Dispatch Superintendent (1971 - 1974)
Planning Engineer (1969 - 1971)

Education:

M. Sc. in Electrical Engineering (Power Systems), University of Saskatchewan, Saskatoon 1969

Graduate in Electrical Engineering, Faraday House Engineering College, London, U.K. 1965.

Bachelor of Science, Punjab University, Chandigarh, India 1962

Associations:

Registered Professional Engineer in the Province of Ontario

Senior Member - The Institute of Electrical and Electronics Engineers Inc, USA

CURRICULUM VITAE OF AMIR SHALABY

Experience:

Ontario Power Authority (April 2005 – Present)
Vice President, Power System Planning

Independent Electricity System Operator (previously IMO) (1999-2005)
Manager, Regulatory & Government Affairs

Ontario Hydro, Grid Business Unit (now Hydro One) (1994-1999)
Manager, GRID Strategy & Commerce

Ontario Hydro Services Company (1992-1994)
Manager, Energy Services Planning

Ontario Hydro, System Planning (1980-1992)
Supervising Engineer/Section Head

Ontario Hydro, (1975-1980)
Engineer, Power System Operations & Training Rotations

Education:

B.A. Sc University of Waterloo – 1974
Electrical Engineering
Cooperative Education Program, Power System Concentration.
Ranked 1st in 1973

M.A. Sc University of Waterloo – 1975
Power Systems Specialization. Won National Research Council scholarship

M.B.A. University of Toronto (Now Rotman School of Management) – 1978

Associations: Registered Professional Engineer, The Province of Ontario

Appearances before the Ontario Energy Board:

Demand/ Supply Plan Hearings (1990-1992): the early IMO fees rate hearings

CURRICULUM VITAE OF VICTOR STEIN

Experience:

Ontario Power Authority (2007 – Present)

Planner, Resource Integration, Power System Planning

Ontario Ministry of Energy (2003 – 2007)

Adviser, Energy Supply and Competition Branch

Hydro One (1995 – 2002)

Strategic Planner & other positions, Regulatory Affairs & other departments

Ontario Hydro (1981 – 1994)

Planning Engineer & other positions, Power Resources Planning & other dep'ts

Ontario Ministry of Finance (1975 – 1981)

Economist, Office of Economic Policy

Education:

Bachelor of Science, Physics
McGill University

Master of Science, Physics
Purdue University

Graduate Studies, Physics
University of Pennsylvania

Master of Arts, Economics
University of Toronto

CURRICULUM VITAE OF BING YOUNG

Experience:

Ontario Power Authority (Jan 2006 – Present)

Director, Transmission Integration

Hydro One Inc (May 2000 – Jan 2006)

Manager, Transmission System Development

Senior Network Management Engineer, Transmission System Development

Ontario Hydro Services Company (April 1999 – May 2000)

Senior Network Management Engineer, Transmission System Development

Ontario Hydro (June 1986 – April 1999)

Senior Network Management Engineer, Transmission System Development

Systems Engineer, Grid System Strategies and Plans

Engineer-Operations, Power System Operations Division

Education:

Master of Engineering, University of Toronto (1993)

Bachelor of Applied Science, University of Toronto (1986)

Memberships:

Professional Engineers Ontario

Appearances:

Ontario Energy Board

Hydro One's witness for Sithe Energies Canadian Development S92 Application in 2002.

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CHRISTOPHER BATAILLE

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FAX: 604.683.1253
EMAIL: BATAILLE@MKJA.CA

EDUCATION

SIMON FRASER UNIVERSITY 1998 TO 2005

Doctorate of Resource and Environmental Management

- Thesis Supervisor: Dr. Mark Jaccard
- Thesis Title: *Improving Climate Change Policy Analysis Through Addition of Macroeconomic and Energy Supply Cost Feed-backs to a Technology Simulation Modelling System*

SIMON FRASER UNIVERSITY 1996 TO 1998

Master of Resource Management

- Thesis Supervisor: Dr. Mark Jaccard
- Thesis Title: *Capital for Energy and Inter-fuel Elasticities of Substitution from a Technology Simulation Model: Estimating the Cost of Greenhouse Gas Reduction*

UNIVERSITY OF BRITISH COLUMBIA 1990 TO 1995

Bachelor of Arts

- Thesis Supervisor: Dr. John Helliwell
- Double Major: Economics and Political Science

PROFESSIONAL EXPERIENCE

M.K. JACCARD AND ASSOCIATES
VANCOUVER, BRITISH COLUMBIA JULY '06-PRESENT

Director

- Finding and developing new business
- Setting strategic direction in consultation with the president and executive director
- Determining research and development for analysis and modelling capabilities
- Reviewing all deliverables
- Monitoring budgets
- Analysing and trouble shooting
- Assigning work and offering direction to all staff
- Managing research projects and contracts
- Coordinating activities of a research team and corresponding with clients
- Writing reports, simulation modelling and analysing data
- Conducting quantitative energy and environmental policy analysis

M.K. JACCARD AND ASSOCIATES
VANCOUVER, BRITISH COLUMBIA 1996 TO JULY '06

Partner / Research Associate

- Managing research projects and contracts
- Coordinating activities of a research team and corresponding with clients
- Writing reports, simulation modelling and analysing data
- Conducting quantitative energy and environmental policy analysis

CANADIAN INDUSTRIAL ENERGY END-USE DATA AND ANALYSIS CENTRE
BURNABY, BRITISH COLUMBIA 1996 TO PRESENT

Research Associate

- Doing comparative studies of methods used by different agencies to report greenhouse gas emissions and energy use
- Participating in research projects and contracts, writing reports and analysing data

ENERGY AND MATERIALS RESEARCH GROUP
BURNABY, BRITISH COLUMBIA 1996 TO PRESENT

Research Associate

- Participating in research projects
- Simulation modelling of measures to reduce greenhouse gas emissions
- Writing reports and analysing data
- Presenting to outside groups on behalf of EMRG
- Providing support to Master's students
- Preparing funding applications

SIMON FRASER UNIVERSITY
BURNABY, BRITISH COLUMBIA FALL 1999 & 2006

Graduate level instructor

- Fall 2006 - Head instructor for REM 621 "Ecological Economics", a graduate level introductory course to environmental and natural resource economics in the School of Resource and Environmental Management. The course had 34 students and one full time TA. Set curriculum, lectured, and marked all exams.
- Fall 1999 – Instructor for a graduate level seminar course, "Energy Policy", for the School of Resource and Environmental Management

REFEREED PUBLICATIONS

Bataille, C., K. Tu and M. Jaccard. 2008. Permit sellers, permit buyers: China and Canada's roles in a global Low Carbon Society. *Climate Policy.* Forthcoming.

Greening. L. and C. Bataille. 2008. Bottom-up models of energy: Across the spectrum. Chapter in the forthcoming *International Handbook of Energy Economics.*

Bataille, C., N. Rivers, P. Mau, C. Joseph and J. Tu. 2007. How malleable are the greenhouse gas emission intensities of the G7 nations? *The Energy Journal.* 28(1): 145-169

Bataille, C., M. Jaccard, J. Nyboer and N. Rivers. 2006. Towards general equilibrium in a technology-rich model with empirically estimated behavioral parameters. *The Energy Journal*. Special Issue 2: 93-112

Hourcade, J-C., M. Jaccard, C. Bataille and F. Ghersi. 2006. Hybrid modelling: New answers to old challenges – Introduction to the special issue of the energy journal. *The Energy Journal*. Special Issue 2: 1-12

Jaccard, M., N. Rivers, C. Bataille, R. Murphy, J. Nyboer, and B. Sadownik. 2006. Burning our money to warm the planet: Canada's ineffective efforts to reduce greenhouse gas emissions. *CD Howe Institute Commentary* 234: 1-31

Jaccard, M., and C. Bataille. 2004. If sustainability is expensive, what roles for business and government? The case of greenhouse gas reduction in Canada. *Journal of Business Administration and Policy Analysis* 30-31: 149-183.

Jaccard, M., N. Nyboer, C. Bataille, and B. Sadownik. 2003. Modelling the cost of climate policy: Distinguishing between alternative cost definitions and long-run cost dynamics. *The Energy Journal* 21 (1): 49-73.

Nyboer, J., M. Jaccard, C. Bataille, and A. Laurin. 2002. Assessing the cost of GHG abatement policies: A cost curve analysis. Presented at INEDIS/EETA International Workshop on Policy Modelling for Industrial Energy Use, Seoul Korea November 7.

Jaccard, M., and C. Bataille. 2000. Estimating future elasticities of substitution for the rebound debate. *Energy Policy* 28: 451-455.

REPORTS AND PROJECTS

January 2008 - Ongoing
M.K. Jaccard and Associates. *Quantification of Air Pollutants and Greenhouse Gases for Regulatory Purposes.* Being prepared for Environment Canada, Environmental Stewardship Branch.

October 2007 - Ongoing
M.K. Jaccard and Associates. *Evaluation of the Cleaner Fuel Standard and Cleaner Technology for the Petroleum Refining Sector.* Being prepared for Environment Canada, Clean Air Directorate.

October 2007 - Ongoing
M.K. Jaccard and Associates. *Environment-Energy-Economy Modelling.* Being prepared for the Government of British Columbia, Climate Action Secretariat.

October 2007 - Ongoing
M.K. Jaccard and Associates. *Evaluation of Greenhouse Gas Intensity Denominators for the Petroleum Refining Sector.* Being prepared for Environment Canada, Clean Air Directorate.

September 2007- Ongoing PROJECT MANAGER
M.K. Jaccard and Associates. *Energy –Economy –Environment Modeling of BC Climate Change Policies.* BC Climate Action Secretariat.

July 2007 – September 2007
M.K. Jaccard and Associates. *Economic Analysis of Climate Change Opportunities for Alberta.* Submitted to Alberta Environment, Environmental Policy Branch.

June 2007 – Ongoing PROJECT MANAGER
M.K. Jaccard and Associates. *Integrated Energy Technology Modelling.* Being prepared for Environment Canada, Strategic Analysis and Research.

April 2007 – June 2007 PROJECT MANAGER
M.K. Jaccard and Associates. *CIMS Energy Efficiency Target Modeling.* Submitted to Natural Resources Canada, Office of Energy Efficiency.

April 2007 – Ongoing
M.K. Jaccard and Associates. *Externalities Analysis – Draft IPSP vs PWU Scenarios for the Ontario Electricity Sector.* Being prepared for the Power Workers' Union.

February 2007 – July 2007 PROJECT MANAGER
J&C Nyboer. *Pathways for a Long-term Greenhouse Gas and Air Pollutant Emissions Reductions.* Submitted to the National Round Table on the Environment and the Economy.

January 2007 – Ongoing
M.K. Jaccard and Associates. *Identifying Opportunities for Criteria Air Contaminants Reduction from Research and Development in Canada's Industrial Sector.* Being prepared for Natural Resources Canada, Climate Change Technology and Innovation Initiative.

January 2007 – June 2007 PROJECT MANAGER
M.K. Jaccard and Associates. *Oil and Gas Unit Energy Consumption (UEC) Review for Natural Resources Canada.* Submitted to Natural Resources Canada.

November 2006– December 2007 PROJECT MANAGER
M.K. Jaccard and Associates. *Expert Review of the Ontario Power Authority's Discussion Paper #6: Sustainability.* Submitted to the Power Workers' Union.

September 2006 – October 2006
M.K. Jaccard and Associates. *Advice on a Long-term Strategy on Energy and Climate Change: Phase II*. Submitted to National Round Table on the Environment and the Economy.

August 2006 – January 2007
M.K. Jaccard and Associates. *Carbon Capture and Storage: Perspectives of Ontario Stakeholders and a PWU Strategy*. Submitted to the Ontario Power Workers' Union.

July 2006 – December 2006
M.K. Jaccard and Associates. *Cost Curves for Emissions Reductions for the Future: Phase II.* Submitted to Natural Resources Canada, Office of Energy Efficiency.

February 2006 – July 2006
M.K. Jaccard and Associates. *Demand Side Management Potential in Ontario*. Submitted to the Ontario Power Authority, Power System Planning Group.

October 2005 – July 2006
M.K. Jaccard and Associates. *Cost Curves for Emissions Reductions for the Future*. Submitted to Natural Resources Canada, Office of Energy Efficiency.

March 2005 – July 2006
M.K. Jaccard and Associates and Marbek Resource Consultants. *Demand Side Management Potential in Canada: Energy Efficiency Study.* Submitted to the Council of Energy Ministers Demand-side Management Working Group.

June 2005 – March 2006 PROJECT MANAGER
M.K. Jaccard and Associates. *Canada's Energy and Greenhouse Gas Context.* Submitted to the National Round Table on the Environment and the Economy.

June 2005 – December 2005 PROJECT MANAGER
M.K. Jaccard and Associates. *Report on National Circumstances Affecting Canada's Greenhouse Gas Emissions*. Submitted to Natural Resources Canada.

November 2004 – March 2005 PROJECT MANAGER
M.K. Jaccard and Associates. *Improvement of the OEE/DPAD Decomposition Methodology.* Submitted to Natural Resources Canada.

November 2004 – March 2005
M.K. Jaccard and Associates. *End-use Technology Data Enhancement in CIMS.* Submitted to Natural Resources Canada.

May 2004 – November 2004
M.K. Jaccard and Associates. *Natural Gas Energy Efficiency Potential Study for the Union Gas Service Area.* Submitted to Union Gas Limited.

September 2004 – October 2004
M.K. Jaccard and Associates. *Opportunities Envelope Expert Reviews.* Submitted to Natural Resources Canada.

April 2004 – July 2004
M.K. Jaccard and Associates. *Analysis of Policies for Greenhouse Gas Reduction in Canada.* Submitted to the International Institute for Sustainable Development.

January 2004 – March 2004
Canadian Industrial Energy End-use Data and Analysis Centre. *How Do Consumers and Firms Purchase Equipment That Consumes Energy? A Review of the Literature and Its Implications for Energy Modelling.* Submitted to the Natural Resources Canada.

September 2003 – December 2003
M.K. Jaccard and Associates. *Impact of the Climate Change Plan for Canada on the Lime Industry.* Submitted to the Canadian Lime Institute.

January 2003 – March 2003
M.K. Jaccard and Associates. *Construction and Analysis of Sectoral Cost Curves of GHG Abatement for British Columbia.* Submitted to the Government of British Columbia, Ministry of Water, Land and Air Protection.

April 2001 – March 2003
M.K. Jaccard and Associates. *Construction and Analysis of Sectoral, Regional and National Cost Curves of GHG Abatement in Canada.* Submitted to Natural Resources Canada, Office of Energy Efficiency.

July 2001 – March 2002 PROJECT MANAGER
M.K. Jaccard and Associates. *Construction and Analysis of Sectoral, Regional and National Cost Curves of GHG Abatement in Canada.* Submitted to Natural Resources Canada, Cost Curves Working Group / Analysis and Modelling Group – National Climate Change Implementation Process.

April 2000 – July 2000 PROJECT MANAGER
Canadian Industrial Energy End-use Data and Analysis Centre. *Energy Equipment Purchasing Behaviour: A Review of the Literature.* Submitted to the Natural Resources Canada.

January 1999 – June 2000
M.K. Jaccard and Associates and the Energy Research Group. *Integration of GHG Emission Reduction Options in CIMS.* Submitted to Natural Resources Canada, Analysis and Modelling Group – National Climate Change Implementation Process.

November 1999 – March 2000
M.K. Jaccard and Associates and the Energy Research Group. *Modelling of Energy/Technology Actions and Measures for Reducing Greenhouse Gas Emissions in the Industrial Sector (The Industry Challenge).* Submitted to Natural Resources Canada, Analysis and Modelling Group – National Climate Change Implementation Process.

May 1998 – March 1999
Canadian Industrial Energy End-use Data and Analysis Centre. *1998 Review of the Data Gathering Process for Energy Consumption in the Canadian Petroleum Refining Sector.* Submitted to the Canadian Petroleum Products Institute, Statistics Canada and Natural Resources Canada.

PRESENTATIONS, CONFERENCES, WORKSHOPS, LECTURE TOURS

March 31st - April 1st , 2008 WASHINGTON D.C., USA
2008 National Symposium on Market Transformation: "Using Market Transformation to Address Climate Change" March 30-April 1,2008

- Presentation on *Promoting Energy Efficiency At the Product Supply Level: The Possible Uses of Market Orientated Regulations*

February 5-7, 2008 WASHINGTON D.C., USA
Meeting of the Stanford Energy Modeling Forum
- Presentation on *Energy Demand Modeling in CIMS*

July 19th, 2007 OTTAWA, CANADA
Project presentation to an Experts meeting of the National Roundtable of the Environment and the Economy
- Presentation: *"Pathways and Policies for Deep GHG Reductions in Canada"*

March 29th, 2007 OTTAWA, CANADA
Project presentation to the Plenary of the National Roundtable of the Environment and the Economy
- Presentation: *"Pathways for GHG and CAC Reductions in Canada"*

July 23-27th, 2007 NEW YORK, USA
Panel co-chair for 8th Biennial "ACEEE Summer Study on Energy Efficiency in Industry"
- Chose and reviewed 15 papers for publication and presentation at the conference.

February 9th, 2007 OTTAWA, CANADA
Project opening presentation to CANMET and Natural Resources Canada
- Presentation: *"Identifying Opportunities for Criteria Air Contaminants Reduction from Research and Development in Canada's Industrial Sectors- Introduction to MKJA"*

December 14th, 2006 OTTAWA, CANADA
Final project presentation to Natural Resources Canada
- Presentation: *"Construction and Analysis of Cost Curves of GHG Abatement in Canada: Technical Presentation*

December 6th, 2006 UNIVERSITY OF OXFORD, OXFORD, UK
UKERC Annual Conference: "Quantifying scenarios of a low carbon society" Oxford, UK, December 6th, 2006
- Presentation: *"Emissions and energy policy analysis from nation to factory floor: The uses of CIMS, a technology simulation model with behaviourally realistic micro- and macro-economic feedbacks*

May 11&12th, 2006 NEW ORLEANS, USA
International Energy Technology Conference
- Presentation: *"The CIMS Hybrid Energy –Economy Model: Energy Policy Analysis for North America"*

April 6, 2005 PARIS, FRANCE
The International Workshop on Hybrid Energy-Economy Modelling
- Presentation: *"The CIMS Hybrid Energy-Economy Model"*.

July 8 – 10, 2004 WASHINGTON D.C., USA
24th Annual North American Conference of International Association of Energy Economics
- Presentation paper on *Top-Down and Bottom-up – Finding a Middle and Making It Work.*

October 18 – 21, 1998 ALBUQUERQUE, NEW MEXICO
19th Annual North American Conference of International Association of Energy Economics
- Presentation paper on *New Evidence on Capital for Energy, Inter-fuel, Capital for Carbon and Own Price Carbon Elasticities: Results and Implications from a Disaggregated Technology Simulation Model.*

DONALD M. GORBER, Ph.D.

President - Director of Environmental Assessment & Sustainability Initiatives

EDUCATION

B.A.Sc., Chemical Engineering, 1966, University of New Brunswick (Lord Beaverbrook Scholarship)
M.A.Sc., Chemical Engineering, 1968, University of Waterloo (National Research Council Scholarship)
Ph.D., Chemical Engineering, 1973, University of Waterloo (National Research Council Scholarship)

PROFESSIONAL AFFILIATIONS

Notary Public in the Province of Ontario
Professional Engineers of Ontario (Designated Consulting Engineer)
Association of Professional Engineers of British Columbia
Canadian Nuclear Association (Director 1998-2005)
Canadian Standards Association (EIA Technical Committee)

LANGUAGE CAPABILITIES

English and French; some Spanish

EXPERIENCE

1980-date - SENES Consultants Limited

Founding and current President and Director of Environmental Assessment and Sustainability Initiatives. Technical/scientific responsibilities include management and co-ordination of multi-disciplinary and environmental assessment studies, environmental monitoring programs, government and public liaison, expert testimony, training and sustainable development. Business responsibilities include coordination of local and international offices and development of new market places. Provides project control, co-ordination and management in Canada and internationally.

Provides advice to clients on the implications of the environmental assessment process, manages many major environmental assessments and provides peer review. Types of projects include environmental and socio-economic assessment studies for large municipal and industrial undertakings; ports and marinas: siting of controversial facilities; environmental baseline monitoring programs; environmental audits; hazardous and toxic waste management studies; risk assessments; site decommissioning; development of cleanup criteria and reviews of regulations.

Environmental Assessment - Recent projects include project manager on EAs for two large natural gas cogeneration facilities (Brighton Beach Power Station, Portlands Energy Centre) in Ontario, hydroelectric facilities (Mataggami River and Montreal River) in Ontario and, project manager on EAs for nuclear waste facilities (Pickering Waste Management Facility, Western Waste Management Facility and Whiteshell Nuclear Research Facility) involving in-ground and above-ground storage facilities and warehouses. Project Director on EAs involving road, rail and transit. Project manager on the Waterfront Scan looking at environmental and sustainability issues in downtown Toronto and EA Coordinator on the renaturalization of the river mouth/delta of the Don River in Toronto.

Environmental assessment manager for several projects involving ports, port handling facilities and marinas including a liquefied natural gas (LNG) handling facility in The Bahamas, an industrial port and accompanying storage facilities in Trinidad, an oil refinery dock and a marina in, Canada.

Environmental assessment manager for the Canadian federal Siting Task Force for the decommissioning of the Port Hope, Ontario area waste sites and the disposal of the resultant wastes in a volunteer community.

Project director and EA coordinator on Metro Toronto's willing host landfill site search resulting in an EA submission on the Adam's Mine property in Kirkland Lake, Ontario. Other specific projects include environmental assessment advisor to the province of Ontario on the siting of new correctional facilities; environmental coordinator of the Ataratiri (St. Lawrence Square, Toronto) re-development; advice to the Metro Toronto solid waste environmental assessment plan (SWEAP); environmental assessment studies for several Canadian uranium properties and mines, assessment of coal and metal mining operations; development of cleanup criteria for two former oil refinery sites for use as residential development; siting and environmental assessment of a LNG storage facility; environmental audits of urban-industrial neighbourhoods; critical review of a proposed hazardous waste management facility.

Participated in several environmental assessments, environmental management and monitoring programs in the Caribbean, India and South America.

Regulatory Advice/Mediation - Provides client-consultant liaison for multi-disciplinary teams of specialists and assists clients at meetings with regulatory agencies and the public. Provides assistance and advice to legal counsel in coordinating multi-disciplinary teams of witnesses.

Provides technical advice and liaison with public and public liaison committees. Facilitator and mediator between public, technical groups, government agencies and politicians.

Sustainability – Provides strategic advice to government and industry clients on how to achieve sustainability and how to implement it in their current planning. Assists in the development of Sustainability Master Plans and implementation strategies.

Energy – Provides regulatory, policy and environmental advice to energy clients such as refineries, co-generation facilities, power generation plants, municipalities and electrical utilities.

Solid Waste Management - Provides solid waste management advice on waste management master plans, site selection, 3R's implementation, material recycling facilities, compost plants, anaerobic digestion, pyrolysis, incineration and landfills.

Mining - Provides environmental and regulatory advice to mining companies. Examples include coal, base metal and uranium mines in Canada and overseas.

Training - Develops and provides training sessions on environmental assessment, environmental management, environmental monitoring, regulatory compliance, solid and hazardous waste management, and facility siting. Recent example involves training government staff on 12 Caribbean islands, training government and industrial officials in India on Hazardous Waste Management and Siting; training of Caribbean government, industry and consultants in Trinidad and Tobago on international implications of environmental assessment and co-ordinating a training workshop on environmental assessment for mining projects in Chile.

Expert Testimony - Provides expert testimony at public meetings, hearings and inquiries across Canada and in the United States. Such inquiries have addressed uranium mine operations and the siting of natural gas petrochemical complexes. Appearances have been made on behalf of proponents and regulators. Qualified as an expert witness and testified on behalf of a mining company in the Ontario Provincial Court.

1971-1980 - James F. MacLaren Limited

General manager of the Water and Waste Management Group from 1978 to 1980. Responsible for co-ordinating the activities of the Earth Sciences, Hydrotechnical, Water Treatment and Waste Disposal Division and the Environmental Laboratory.

Manager, Water Treatment and Wastes Disposal Division, 1974 to 1978. Responsible for research on sewage and water treatment plants, design of water and waste treatment processes, design of industrial waste treatment systems, water quality management and environmental assessment studies.

Manager for the development and interpretation of results from water quality monitoring programs. Project engineer involved with process evaluation and design of air and water treatment facilities for several large Canadian oil refineries and petrochemical plants. Preparation of environmental assessments for mining operations and petrochemical complexes which received regulatory approval.

Project manager in charge of compiling several large national inventories for the federal government.

1968-1971 - Doctorate Degree Program

Thesis topic: The Dynamics of Continuous Emulsion Polymerization Reactors.

1966-1968 - Master's Degree Program

Thesis topic: Stochastic Modelling of Continuous Emulsion Polymerization Reactors.

1966 - Imperial Oil Limited, Sarnia, Ontario

Pollution studies of the plant effluent system.

TECHNICAL PAPERS

Dr. Gorber has published more than 100 technical publications and has served as Chairman at many technical conferences.

UNIVERSITY TEACHING EXPERIENCE

Former faculty member in the faculty of environmental studies at York University. Taught graduate courses on environmental assessment and waste management.

HARDY
STEVENSON
AND ASSOCIATES

DAVID R. HARDY, B.A. (Hons.), M.E.S., M.C.I.P, R.P.P.

EDUCATION

Master of Environmental Studies, York University, 1978

B.A. (Hons), Sociology-Urban Studies, York University, 1975

PROFESSIONAL AFFILIATION

Canadian Institute of Planners
Ontario Professional Planners Institute
International Association of Public Participation
International Association for Impact Assessment (Past-Director and Secretary)
Ontario Association for Impact Assessment (Past-Director)
Past-President, Conservation Council of Ontario
Past-President, Scarborough North Rotary
Member, International Association of Business Communicators
Past-Vice-Chair, Canadian Standards Association, Technical Committee on Environmental Assessment
Past-Vice-Chair, Scarborough Social Planning Council
Paul Harris Fellow, Rotary International

AREAS OF SPECIALIZATION

Land-Use and Environmental Planning
Economic Development Assessment
Facilitation and Public Consultation
Social and Environmental Impact Assessment
Project Management
Strategic Planning and Communications

EXPERIENCE

David Hardy is the President of Hardy Stevenson and Associates Limited, a firm specializing in land-use, planning and economic development, environmental impact assessment, facilitation, socio-economic impact assessment, public consultation, strategic planning and project management. Dave is a Registered Professional Land User Planner.

He has participated in over 75 Provincial and Federal level and Class environmental impact assessment studies and managed over 45 socio-economic projects. Many of the EA's focused on proposed energy and infrastructure projects. Dave has provided expert evidence at the:

Ontario Energy Board,
Ontario Court of Appeal (Discovery Hearing),
Ontario Municipal Board,
Ontario Environmental Assessment Board,
Consolidated Joint Board
Federal CEAA and EARP Panels.

EMPLOYMENT

1990 - PRESENT
President, Hardy Stevenson and Associates Limited

2004 – PRESENT
Director, Economic Growth Solutions Limited

2007 – PRESENT
Vice-President and Director, Guyana Hydro Power Limited

1989 - 1990
Senior Planner - Long Range, Town of Aurora.

1986 - 1989
Coordinator - President's/Chairman's Office, Ontario Hydro.

1984 - 1986
Senior Community Studies Planner, Ontario Hydro.

1978 - 1984
Community Studies Planner, Ontario Hydro.

1977 - 1978
Community Relations Officer, Ontario Hydro.

REPRESENTATIVE ASSIGNMENTS

LAND-USE AND ENVIRONMENTAL PLANNING

Management of the social, housing and economic planning for the Eider Rock, Second Irvine Oil Refinery for Enterprise Saint John. Saint John, New Brunswick

Completion of a social impact assessment of hosting the Vancouver 2010 Olympic Winter Games and the Paralympic Winter Games, including a social profile of venues in lower mainland of BC; literature review and interviews with organizers of past Olympic Games; analysis of potential effects; recommendation of impact avoidance and mitigation measures; and recommendation of legacy projects. Hardy Stevenson report went to the IOC in support of the Games.

For the City of Toronto and Save the Rouge, directed staff and sub-consultants involved in the 'Richmond Hill' Oak Ridges Moraine Hearing and assisted in the development of sample policy for the new Oak Ridges Moraine Conservation Plan and Act.

For the Town of Aurora, assumed primary responsibility for completing, and supervising consultants conducting Official Plan Review studies satisfying the requirements of the Planning Act. Wrote the terms of reference, supervised the awarding of contracts and managed studies of the land use, housing, culture and recreation, commercial and retail and transportation aspects of the Official Plan Review. Developed draft environmental policies. Chaired the Transportation Policy Committee; Member of Culture and Recreation Master Plan Committee. (as Senior Planner, Town of Aurora).

Peer Review, Little Jackfish Hydro-electric facility and transmission lines for the Town of Armstrong

Completed environmental analysis and Design Reports for Phase I and III of the Highway 410 extension through Brampton and Caledon for the Ministry of Transportation.

Class Environmental Assessment Study of the proposed Burlington Station Parking Garage for GO Transit

Class Environmental Assessment Study for the new Union Station Roof for GO Transit

Completed a review of land-uses in the Parkway Belt West Corridor for the Ontario Realty Corporation.

Completed highest and best use studies for parcels of land in Burlington for the Ontario Realty Corporation.

Directing staff involved with land development activities in North Pickering on behalf of the Ontario Realty Corporation.

Directing staff involved with rezoning applications of land on the Finch Corridor on behalf of the Ontario Realty Corporation.

Directing staff involved with highest and best land-use analysis of the former Wesleyville GS site in Port Hope.

Directing staff and sub-consultants involved with the Peer Review of the Clean-up of Low-Level Radioactive Waste and Marginally Contaminated Soils for the Municipalities of Port Hope and Clarington. Canadian Environmental Assessment Act.

Land-use and environmental analysis, York Region 'Long Term Water Supply Project' Durham West Corridor, land-use and socio-economic study for proposed water pipeline and related facilities for York Region and North West Water Utilities.

Reviewed application of 'environment-first' policies within Town of Richmond Hill, Ontario Official Plan (OPA 129) for Oak Ridges Lake Wilcox Resident Association. Expert evidence at Ontario Municipal Board hearing.

Land-use analysis, Dorval Drive Environmental Assessment, Oakville, Ontario

Land-use and socio-economic analysis of Morningside Heights transportation route alignment in Scarborough/ Markham.

Peer review of Canadian Waste Services (later WMI) , Warwick Landfill Expansion for Warwick Watford Public Advisory Committee and Township of Watford Warwick

Peer review of Canadian Waste Services, Richmond Landfill Expansion for Richmond Public Advisory Committee and Environmental Advisory Committee.

Analysis and report on planning considerations involved with By-law variance, 853 Bathurst St. Toronto; OMB Hearing.

Completed a peer review of the Invenergy Power and Greenfield Energy proposals in Sarnia Area.

Review of 'Home Work' By-law, City of Toronto for Deer Park Ratepayers' Group Inc., fall 1996

Completed Human Resources Policies Section for the new Region of Peel Official Plan

Completed Mineral Resources Policy Section for the Town of Caledon Official Plan

Review of new Housing townhouse subdivision, Caledon, Winter 1996

Review of DeBuono property severance application for Mr. & Mrs. Watt, King Township before Committee of Adjustment review, summer 1996.

"Seaton" new community eco-system land use planning proposal. Managed team of consultants to prepare a submission on planning a new town of 90,000 residents.

Planning analysis and socio-economic impact assessment associated with Pit expansion and Gravel Haul route in Oro Township. Expert testimony at O.M.B. Hearing under Aggregate Resources Act and Planning Act.

Assisted Markborough Properties with Oak Ridges Moraine environmental planning strategy associated

with the development of a Regional Mall in York Region.

Completed water and sewer servicing, population, demographic and employment projections, prepared planning reports, commented on O.P.A.s and Secondary Plan Applications and maintained liaison with Regional and Provincial representatives (Senior Planner, Town of Aurora).

Prepared work plan and approach for funding, public consultation, preparing for zoning and Official Plan amendment for a non-profit housing development (Holy Trinity [Guildwood], Scarborough).

Completed a zoning analysis of the proposed North Toronto Community Centre and expert testimony re: Ontario Court of Appeal.

Assigned as Planner by Ontario Hydro to assist Town of Atikokan in addressing socio-economic and land-use impacts associated with generating station construction. Negotiated agreements.

Produced a response to the Province's Blueprint for Waste Management and, as a team member, developed a position on energy policy (Ontario Professional Planners Institute).

Completed data collection and analysis, and authored a research report on the socio-economic impacts of urban growth (as Vice-Chair, Scarborough Social Planning Council).

Completed a policy study on land use and sustainable development for submission to the World Commission on Environment and Development. (Conservation Council of Ontario).

ECONOMIC AND SOCIO-ECONOMIC IMPACT ASSESSMENTS

Economic Development Strategy for the United Counties of Leeds and Grenville.

Tourism Strategy Update for the City of Burlington.

Detroit River Tunnel Project socio-economic impact analysis for various clients.

Town of Espanola, Tourism and Economic Development Study with Economic Growth Solutions.

PRISM Pipeline socio-economic impact assessment study.

King Township, Oak Ridges Moraine Conformity exercise and Official Plan and Zoning Bylaw Update

Town of Bracebridge Economic Development Strategy with Economic Growth Solutions.

Town of Kincardine Strategic Plan with Economic Growth Solutions.

Peel Region Clear Scents socio-economic and social impact analysis in relation to the South Peel Infrastructure Projects.

Economic analysis of the benefits of the St. Lawrence Seaway, in association with HDR Associates Limited for Transport Canada.

Ten-year update of the economic analysis of the L.B. Pearson Airport for the Greater Toronto Airports Authority.

Analysis of closure of Buttonville, Markham, Oshawa airports and highest and best land-use analysis of former airports in relation to the new Pickering Airport and supervised staff. In association with HRD Associates for the Greater Toronto Airports Authority.

Micro-Economic Analysis of the impact of the Sithe Generating Station Goreway Plant, Brampton, Ontario.

Supervised socio-economic impact study of timber harvesting policy options for Ontario Ministry of Natural Resource.

Socio-economic impact peer review Rockfort Quarry application Town of Caledon.

Social impact assessment, Five W Farms quarry aggregates expansion application, OMB appearance.

Hotel Dieu Hospital (Kingston), analysis of social impacts to local community of Health Services Restructuring Commission recommendations pertaining to Hotel Dieu Hospital

1177284 Ontario Limited, examination of social and cultural impacts of siting a crematorium and columbaria in Vaughan, Ontario

Vector Pipeline, completion of socio-economic analysis and public consultation strategy for final link of the Chicago to New York 48" natural gas pipeline.

Micro-Economic Analysis, Analysis of the economic benefits of the $160 million dollar Millennium (Dawn, Ontario to Lake Erie) pipeline.

Social Impact Assessment Dawn Compressor Station to Lake Erie 36" natural gas pipeline, with Ecological Services for Planning and Ecoplans for Union Gas and TransCanada Pipelines

Centreville Quarry, socio-economic impact assessment peer review, Camden East Township, for Lafarge Canada Limited, appeared and gave expert evidence before the Ontario Municipal Board

Balm Beach, Perkinsfield and Wyevale, Consumers Gas, (Tiny Township) XHP 4" natural gas pipeline socio-economic impact assessment with Ecological Services for Planning

Carp 4" Pipeline Socio-Economic Study with Ecological Services for Planning for Consumers Gas for proposed natural gas pipeline, with Ecological Services for Planning.

Dufferin County, Site U4 landfill analysis and Waste Generation and 3Rs review, for Harrington and Hoyle, East Luthur Grand Valley Township.

Socio-economic Impact Assessment of High Occupancy Vehicle (HOV) Lanes, supporting Proctor and Redfern and Metro Toronto Transportation Department.

ITER Research Facility, Socio-economic impact site assessments and scoping Federal Environmental Assessment requirements for Canadian Fusion Fuels Technology Centre

Research on Community Impact Agreements in relation to Taro Quarry Landfill, for Turkstra, Garrod, Hodgson

Socio-economic and cultural impact assessment study, Line Nine reversal project for InterProvincial Pipelines Limited. With Ecological Services for Planning.

Socio-economic and cultural impact assessment study, Consumers Gas, Supply to Village of Chalk River and Chalk River Nuclear Labs of proposed 4" natural gas pipeline. With Ecological Services for Planning.

Socio-economic and cultural impact assessment study, Centra Gas, Supply to Tweed, Ontario and IKO to Marmora, Ontario of proposed 4" natural gas pipeline. For Centra Gas Limited.

Socio-economic and cultural impact assessment study, Consumers Gas Dufferin Simcoe Reinforcement study of proposed 12" natural gas pipeline. For Consumers Gas Limited.

Peer Review Laidlaw Environmental Inc. hazardous

waste landfill Compensation and Terms of Good Neighbour Policy -- Laidlaw Environmental and WOHICA.

Preparation of Evidence and Expert Testimony at Ontario Environmental Assessment Board, North Simcoe Landfill, Terms, Conditions and Compensation, on behalf of Wye Citizens.

Peer review of social impact assessment and public consultation program for a proposed 12 inch natural gas transmission pipeline for the Town of Ancaster, Ontario. Expert evidence at Ontario Energy Board.

Peer Review of Taro Aggregates East Quarry Landfill proposal social impact assessment; preparation of proposed socio-economic Conditions of Approval.

Peer Review of Social Impact Assessment of Laidlaw Inc. Rotary (PCB) Kiln, Sarnia. Retained by Citizen's Environmental Action Group through Willms and Shier.

Social Impact Assessment and Public Consultation Review of Steetley Quarry Products Hamilton-Wentworth landfill site environmental assessment documents. Environmental Assessment Board expert witness on behalf of Greensville Citizens Against Serious Pollution and the Calvin Christian School.

Social Impact Assessment of 3R's Strategies in the Greater Toronto Area, work currently in progress for the Ministry of the Environment. Reviewing demographic factors related to efficacy of 3R's programs. Joint project with RIS Ltd., Future Urban Research and Dillon Consultants Ltd.

Socio-economic Analysis of Tenaska Energy (Omaha, Nebraska) and Campbell's Soup Co-generation project. Project management, social and economic impact analysis of 100 MW proposed co-generation facility in South Etobicoke. Joint project with Chait and Associates and Jonathan Kauffman and Associates.

World Bank, Senior staff presentation, Energy Division, re: socio-economic strategic considerations in reactor operation, decommissioning and spent fuel management in CIS countries and Eastern Europe, Washington, D.C. in cooperation with ESTI Ltd.

Prepared witnesses and conducted socio-economic research to support Ontario Hydro social impact assessment team testifying at the Environmental Assessment Board Demand/Supply Plan Hearings.

Coordinated the socio-economic impact assessment for Ontario Hydro's 2800MW Wesleyville Candu A project environmental assessment. Assembled and managed the SIA consulting team, designed the assessment, defined the study area, and supervised sub-consultants.

Researched potential socio-economic impacts associated with the siting of a future North Channel Generating Station, and assisted in the completion of the North Channel Social Evaluation of Sites: Support Document.

Assumed lead responsibility for the study design, research, and assessment of associated impacts and preparation of the Social Environmental Assessment for the Hamner to Mississauga Transmission line approved by the Ministry of the Environment.

Onakawana GS socio-economic analysis scoping study.

Developed and completed many of Ontario Hydro's early socio-economic impact assessment studies. Work included scoping, researching and writing the Elliot Lake T.S. to Quirke Lake T.S. transmission line socio-economic impact assessment, one of the first Ontario Hydro projects to receive approval under the Environmental Assessment Act. Completed socio-economic impact and/ or public consultation activities for

the:

- Algoma TS to Elliot TS
- Cherrywood TS to Parkway TS line
- Supply to Picton TS
- Beaverton TS to Lindsay TS
- Lennox GS to Oshawa TS
- Parkway Belt 500 kV lines
- Supply to Brantford TS

Also responsible for the Scoping of the social impact assessment component of the South-West Ontario transmission expansion and the Supply to Ottawa (Eastern Ontario) (Approved by the Consolidated Hearings Board).

Conducted (with research support) the community impact monitoring program for the Atikokan Generating Station community impact agreement. As a member of a project team, researched and supervised the production of annual community impact monitoring reports.

Response to The Interim Waste Authority's Step 5 Approach and Criteria, Joint Author, Social impact analysis, site examination, structured interviews regarding impact of M6 Town of Markham proposed landfill site.

IWA Short List Analysis, South York Quarry Lands. Project management of comparative evaluation process and social impact analysis of rank of South York Quarry lands against other York Region short list sites. Joint project with Dames and Moore, Canada, Hemson Consultants Ltd., and Robert Lehman Planning Consultants Ltd.

Development of Landfill Site Search Social Criteria and Evaluation Methodology and Local Economy and Tourism/Recreation Criteria and Methodology, Parry Sound Waste Management Master Plan. Criteria prepared for Cave Engineering.

Case Study Analysis of Hazardous Waste Transportation in Canada. Report prepared for Atomic Energy of Canada Ltd.

Analyzed Waste Facility Siting Social Criteria prepared by the Provincial Interim Waste Authority for Superior Crawford Sand & Gravel Ltd.

Reviewed Social Impact Assessment of L.B. Pearson Airside Development for the City of Etobicoke. Expert testimony at FEARO Hearing.

Conducted a social impact assessment study and the public involvement program of the proposed expansion of the Green Lane Landfill site in Southwold Township (As sub-consultant to Conestoga Rovers, for St. Thomas Sanitary Collection Services Limited).

Developed Social Impact Assessment Site Selection Criteria and SIA work plan for the Greater Toronto Area Solid Waste Interim Steering Committee (As sub-consultant to the LURA Group).

Conducted an analysis of project characteristics of critical importance to a socio-economic impact assessment for the Nuclear Fuel Waste Management Centre.

Served as a founding member and Board Member of the International Association for Impact Assessment and past-member of the Professional Development Committee, Co-Chair, Barbados Conference.

For Canadian Industry Program for Energy Conservation (CIPEC), wrote annual report associated with Canadian Industry position on energy efficiency as follow up to KYOTO, Japan, climate change conference.

Peer review of genetic engineering policy issues germane to the world wide operation of Ciba-Geigy Limited (now Novartis), Basie, Switzerland

Provided strategic advice related to emergency communications planning related to ISO 14,000 requirements for Dupont Canada.

As Coordinator of Ontario Hydro's President's and Chairman's Office (policy advisor), provided strategic planning and public affairs advice regarding external pressures shaping public opinion.

Assessed corporate business activities for their public affairs implications, monitored the production of a Corporate Annual Report and wrote or reviewed all correspondence between the Chairman and President of Ontario Hydro and Federal and Provincial Members of Parliament, heads of government, Deputy Ministers, members of the public and assisted in the development of the organizations first corporate donation program.

Contributed to the development of Ontario Hydro's first corporate environmental strategy. (as Coordinator of the Chairman and President's Office of Ontario Hydro).

For the Town of Armstrong prepared Model Forestry and Community Forestry program proposal.

As President of the 33 member organization Conservation Council of Ontario, 1988-90, supervised senior staff and led the Council through a major period of expansion.

Provided employee assessments associated with the re-organization of Ontario Hydro's Design and Construction Branch.

Co-authored the initial environmental strategy position paper for the Bank of Montreal.

Planned and implemented a communications plan for the relocation of several thousand Ontario Hydro employees to new work locations and developed strategies for changing corporate culture (Mission and Values).

Conducted research into the social and ethical issues related to tritium exports as a member of the Tritium Issues Working Group. The study assisted Ontario Hydro, the Ministry of Energy, the Federal Department of Energy, Mines and Resources and Atomic Energy Control Board in developing tritium policy (Secondment to P.J. Spratt and Associates).

Completed five and ten year evaluation of the Eastern Ontario Model Forest. Extensive research and survey work throughout Eastern Ontario.

Completed Ontario-wide analysis of aforestation attitudes for Canadian Forest Service and provided recommendations.

FACILITATION, PUBLIC CONSULTATION, MEDIATION

For the City of Toronto, facilitated the public process leading to the approval of the St. Clair West TTC Upgrades.

For the Toronto Waterfront Revitalization Corporation, facilitated the public process associated with the Portlands 'Transit-first' EA process.

For the Toronto and Region Conservation Authority, facilitated a strategic summit in relation to issues important to all groups involved with the Don Watershed.

Developed transmission line construction community relations program: scope of work involved developing newsletters, monitoring community attitudes, developing communications programs, organizing information centres, contacting press, civic officials and community leaders on matters associated with route and site selection, land acquisition, forestry, and construction activities on transmission line rights-of-way.

Served as primary public contact person for the construction of the Lennox to Oshawa 500 KV transmission line and the Supply to Picton and a

support person for the 500 KV Parkway Belt corridor (Community Relations Officer, Ontario Hydro).

Facilitated the public approvals process for the Hamilton, Halton, Peel, York and Durham Water and Waste Water Master Plans.

Facilitated the public approvals process for the City of Toronto, Peel Region and Durham Region Biosolids Master Plans.

Centennial Creek Watershed public consultation and planning - Scarborough. Assisted City of Toronto with public consultation for watershed remediation and prepared 'citizens tool kit' for ecosystem management.

Peel Region, Caledon East Water Supply Study, and Pressure Zone 7 facilitation of Public Meetings and Workshops.

Facilitated 8 meetings of Toronto Beneficial Use of Bio-Solids Multi-Stakeholder Advisory Committee and developed public consultation and communications strategy. Also prepared a social evaluation matrix for proposed pelletization technologies.

Facilitated 4 Workshops in Saint John NB toward developing a strategy for parking and snow removal for Saint John Parking Commission.

Facilitator and mediation of Ontario Energy Board rate application hearings for OH Servco and Transco application and managing facilitation of new electricity licences (20 sessions).

Facilitated Workshops leading to revision of Ontario Nuclear strategy for decommissioning Ontario's nuclear reactors. Also facilitated the National and Regional Workshops leading to the development of the Managed Adaptive process for the Nuclear Waste Management Organization.

Facilitated Community Workshop for the design of expansion of 9th Line between Markham and Whitchurch Stouffville

Facilitated series of workshops for the Pickering Working Group for Ontario Hydro Nuclear.

Facilitated workshops for the Ministry of Natural Resources in Northern Ontario for the Lands For Life land-use planning initiative across North-western Ontario

Diocese of Toronto, Facilitated series of budget development process and organizational restructuring for a major faith group.

CANMET, Natural Resources Canada, AETE program, Facilitation of Final Integration Report Workshop.

Facilitated an action plan with Pickering residents and staff to address Ontario Hydro's emissions of copper, brass, lead and zinc into Lake Ontario.

Government of the Yukon, planning and lead facilitator in Workshop on socio-economic impact assessment.

Facilitation of Criteria and Factors Ranking Workshop, Supply to Bronte 230kV transmission line project, Town of Oakville, Ontario Hydro

Public Consultation Training and Facilitation for Model Forest Managers and staff. Two day Ottawa Workshop for Canadian Model Forest Network.

Mediation of outstanding rate issues of interest to Ontario Hydro, Municipal Electric Association and Association of Major Power Consumers (GM, INCO, Ford Motors, Stelco).

Strategic Planning and Facilitation for Kortright Centre workshop on education and tourism.

Reviewed and Reported on Public Consultation Programs associated with High Level Nuclear

Waste Disposal for NUSYS, Paris, France.

Facilitated Ontario Hydro Greenhouse Gas Multi-Stakeholder Strategy Workshop(s).

Facilitated Ontario Ministry of Natural Resources workshop on Intrinsic Value associated with Forest Revenue decisions.

Ontario Hydro Multi-Stakeholder Consultation workshops. Facilitated 5 Workshops on Rates and Non-Utility Generation before 1994 Ontario Energy Board Hearing.

Planned, organized and facilitated a two day workshop for Ontario Ministry of Natural Resources, Forest Values Project. To seek advice on forest revenue options from 75 stakeholders (110 participants) from First Nations, environmental interests and the forest industry. Prepared report.

Designed, organized and facilitated a three day Workshop for Ministry of Natural Resources Timber Production Policy. Prepared report representing views of variety of sectors and stakeholders (90 participants).

Planned, facilitated and reported on a two day consensus building workshop on an Environmental Strategy for Peel Region's Official Plan. All Provincial, municipal and agency stakeholders were represented.

History of Public Consultation Efforts documented for Ontario Hydro-AECL for Federal Environmental Assessment Panel hearing.

Research and analysis of Public/Government Review and Input to Ontario Hydro's Demand/Supply Planning Process for Ontario Hydro.

Developed the scope of work and implementation program, and assumed the lead role for Ontario Hydro's Demand/Supply Planning Study consultation program for Provincial leaders and utilities. Organized key stakeholder meetings in 19 Ontario communities. Documented the consultation findings in several reports including the report entitled, Meeting Future Energy Needs: Regional Consultation Program (as Senior Community Studies Planner, Ontario Hydro).

Coordinated industry-wide involvement in a major Canadian public hearing related to nuclear energy, (IPPANI) hearing.

Trainer, Lecturer, Integrating Public Participation and Social Impact Assessment, Globe and Mail Insight Seminar, Strategies for Effective Consultation.

Facilitated Pre-Consultation Workshop and Developed Public Consultation Strategy for Ministry of Natural Resources, Sustainable Forest Initiative.

Developed Public Consultation Outline for Region of Durham Waste Transfer Station Study.

Coordinated public consultation for the proposed Green Lane Landfill Expansion.

Initiated and managed a Province-wide public involvement program for Ontario's input to a major United Nations conference.

Edited conference proceedings, wrote articles, lectured at universities in the United States and Canada and advised numerous industries in the area of corporate ethics.

Initiated, developed and managed a Religious Organization Communication program supported by Ontario Hydro, and later developed Ontario Hydro's Corporate Ethics Support Program.

Founded, and served as founding editor of the Ethics and Energy Newsletter, ultimately published by the Journal of Business Ethics, Kluwer Academic Publishers, Dordrecht, The Netherlands.

RESEARCH REPORTS (partial list)

Diversification of Generation and Carbon Trading Opportunities Through the Guyana Hydropower Project, presented at First Forum International Conference, June 2007.

Turtruba Rapids Hydropower Project, Pre-Feasibility Study, August, 2005, Hardy Stevenson and Associates Limited in association with ENMAN Services Limited

Planned and facilitated an executive staff seminar on the moral and ethical aspects of the Nuclear Fuel Waste Management Concept and contributed to the seminar report. (Atomic Energy of Canada Ltd.)

Completed numerous research reports on various social, economic and environmental aspects of generating facilities and transmission lines. As a member of a project team, Dave completed the development of Ontario Hydro's Level 1 policy governing the export of CANDU reactors, and the systems, material, equipment, technology and services associated with export agreements.

Completed technology assessments of the social and community impacts of interim and extended storage facilities for irradiated fuel.

Developed the research design, supervised consultant support and reported the effects of the irradiated fuel transportation component of the interim and extended storage facility.

Co-Author, "Precious Values" a report on existence and intrinsic values in forest policy decision making for Forest Values Project, Ministry of Natural Resources, Nov 1994.

Author, Facilitators Report on Nuclear Fuel Waste Management Concept government peer review workshop, for Atomic Energy of Canada Limited, Jan 1995.

Co-Author, Region of Peel Official Plan Environmental Strategy Report: Final Report. January 1994 with Gartner Lee Limited and Macaulay Shiomi Howson Ltd.

Author, Forest Values Options Development Workshop Report and Co-Author of Proceedings, Ministry of Natural Resources, December, 1993.

Author, Timber Production Policy Project Workshop Report and Co-Author of Proceedings, Ministry of Natural Resources, November, 1993.

Co-Author, Greater Toronto Area 3Rs Analysis, Draft Social Environmental Technical Appendix, Ministry of Environment and Energy, with Future Urban Research Ltd., Dillon Ltd., RIS Ltd., November, 1993, May 1994.

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RHONDA WRIGHT HILBIG, P.Eng

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University of Western Ontario, London, Ontario (1986)
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INDUSTRY EXPERIENCE

- 23 years of experience in Ontario's electricity sector, including nine years at the Independent Electricity System Operator.
- Current role and responsibilities:
  - ***Section Head, Market Forecasts and Integration, IESO***
  - Oversee the administration of the outage management and near term forecast functions, and ensure the reliability of the IESO controlled grid through assessments in the near term.
- Previous Experience:
  - ***Section Head, Market Analysis, IESO –*** Responsible for analysis and change management initiatives relating to the operation of the IESO controlled grid and the IESO administered markets.
  - ***Section Head, Compliance and Dispute Resolution, IESO –*** Responsible for monitoring compliance of market participants to market rules and manuals.
  - ***Senior Engineer, Market Entry, IESO –*** Responsible for incorporation of market participant facilities into IESO reliability and market tools.
  - ***Ontario Hydro –*** 14 years of utility experience in transmission and distribution customer service and thermal generating station operations.

PROFESSIONAL AFFILIATIONS / TASK FORCES / WORKING GROUPS

- Registered as a Professional Engineer in the Province of Ontario
- Chair, Dispatch Issues Working Group, IESO
- Chair, Dispatchable Load Working Group, IESO
- Co-Chair, Day Ahead Commitment Process Operation Implementation Working Group, IESO
- Member, Regional Standards and Compliance Working Group, a subcommittee of the US Canada Joint Task Force on the August 14, 2003 Blackout
- Member, Transmission System Code Task Force, Ontario Energy Board

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THE INTEGRATED POWER SYSTEM PLAN FOR THE PERIOD 2008-2027

1.0 INTRODUCTION

This exhibit presents the Integrated Power System Plan (the "IPSP" or the "Plan") for the period 2008 to 2027.

2.0 OVERVIEW

The IPSP is designed to assist, through the effective management of electricity supply, transmission, capacity and demand, the achievement of the government of Ontario's goals identified in the Supply Mix Directive dated June 13, 2006 (the "Directive").

As discussed in Exhibit B-3-1, the OPA's plan to achieve the Directive's goals was developed by identifying the areas of discretion left open by the Directive and applying the OPA's planning criteria to make decisions in those areas. This resulted in an IPSP that prioritizes how Conservation and supply resources should be acquired through (i) meeting the requirements of the Directive in light of the OPA's planning criteria (the "Directive Priority"); and (ii) sequencing the installation of resources, in light of lead times and necessary transmission enhancements (the "Implementation Priority").

2.1 Directive Priority

With respect to the Directive Priority, the Directive identifies a number of goals respecting Conservation and supply resources. The IPSP ensures that these goals are met by identifying the priority order in which the resources are planned to meet the province's resource requirements with respect to capacity, electricity production, and flexibility. The IPSP is not represented by any single case or scenario but rather, it represents the ongoing capability to meet resource requirements across a range of conditions. The range of conditions described in Exhibits D-9-1 and G-1-1 illustrates the possible range of resource requirements. In planning to meet an estimated range of resource requirements, the IPSP identifies specific priorities for the near-term, but will, more generally, develop options for the mid term and explore opportunities for the longer term.

The resources identified in the Directive each make their own contribution to meeting these requirements. In summary, the Directive Priority is as follows:

1. Maximize feasible cost effective contribution from energy efficiency, demand management, fuel switching, and customer based generation ("Conservation");
2. Maximize feasible cost effective contribution from renewable sources;
3. Make up baseload requirements remaining after Steps 1 and 2 above with nuclear power;
4. Replace coal-fired generation with power from committed and planned resources. Specifically, in order to ensure that existing coal-fired facilities are replaced by 2014, gas-fired generation ("GFG") facilities are planned to be installed in the areas of Northern York Region, Kitchener-Waterloo-Cambridge-Guelph and the Greater Toronto Area ("GTA") by 2014; and
5. Restrict contribution of GFG to specific projects as required when additional Conservation and renewable resources are not feasible or cost effective.

Transmission is a facilitator and enabler of supply choices and therefore transmission considerations were integrated in all steps in the planning process. Transmission planning is particularly important in meeting the Directive's renewable goals since the accessing and delivery of potential renewable resources depends on making substantial transmission enhancements.

2.2 Implementation Priority

The Directive Priority outlined above does not necessarily represent the order in which resources will be installed. For example, in light of necessary transmission investments to enable hydroelectric resources, many hydroelectric resources will be brought on later in the Plan term. As a result, the Directive Priority is accompanied by an Implementation Priority.

The Implementation Priority should also be understood as enabling contributions from different resources as opposed to a rigid in-service schedule for specific facilities. The IPSP ensures that resources will be prioritized in an economically prudent and cost effective manner by creating opportunities for resource acquisition in the future. In other

words, it is economically prudent and cost effective to have more than one choice when it comes to acquiring a resource.

It is also important to note that the IPSP will be implemented through a number of projects, facilities and programs, some of which are within the OPA's control and some of which are not. There are a number of initiatives that the OPA is currently pursuing and plans to pursue in order to implement the IPSP in accordance with the Directive and Implementation Priorities. These initiatives are summarized at the end of this exhibit at Table 5. The specific projects, facilities, and programs that are referenced in Table 5 comprise the OPA's current view of a reasonable way to implement the IPSP. The sequence and specific projects will likely change as opportunities present themselves in the market place. Included within those projects are resources that the OPA intends to procure through the OEB-approved procurement process prior to the end of 2010. These procurements are addressed in greater detail in Exhibit D-10-1. Also included in Table 5 are resources and programs that the OPA intends to pursue under existing Directives issued by the Minister of Energy under the *Electricity Act, 1998* (the "Act").

Table 5 also includes nuclear resources that are being pursued directly by the government of Ontario. Specifically, on March 7, 2008 the government commenced a Request for Proposal that will lead to additional nuclear capacity of 2,000 MW to 3,500 MW at the Darlington nuclear site. On June16, 2008, it announced that it was committed to 6,300 MW from the Bruce site. This includes 3,040 MW of capacity from Bruce A; accordingly, the June 16, 2008 commitment is for an additional 3,260 MW of capacity from the Bruce site (either refurbished or new build). As a result, the government has now committed to between 5,260 and 6,760 MW of additional nuclear capacity. For planning purposes, the IPSP will continue to assume the same in-service dates, etc. as originally planned for nuclear facilities and non-nuclear resource decisions will continue to be planned around these assumptions. However, the specific capacity, cost, and in-service date for the recently committed facilities will be determined in accordance with the government's RFP process (with respect to the Darlington site) and related initiatives (with respect to the

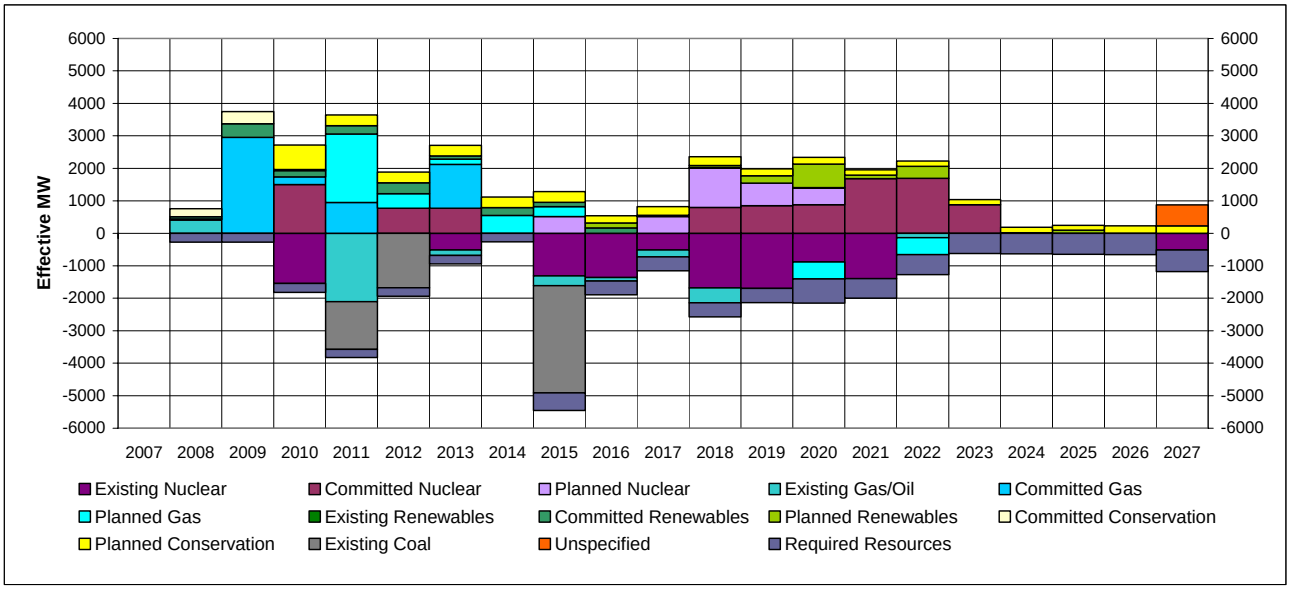
Bruce site), and not in the IPSP application. This is described in greater detail in Exhibit I-22-87.

The change in the installed capacity of resources resulting from the Directive and Implementation Priorities is illustrated in summary form in Figure 1 below. In Figure 1, which reflects Case 1A, resources are categorized as either "Existing", "Committed" or "Planned". Existing Resources are those resources that were in-service as of July 2008. Committed Resources are those resources that are either under contract to the OPA, subject to a procurement directive or being pursued by the government directly. Planned Resources are those resources that are included in the IPSP but are neither Existing nor Committed. Figure 2 reflects Case 1B.

According to the OEB's Report on the Review of the IPSP, "The economic prudence or cost effectiveness of specific generation or conservation projects that were the subject of governmental procurement or OPA procurement prescribed by Ministerial directive issued prior to the date of approval of the IPSP (for example, the OPA's York region demand response process or the existing Standard Offer Program) will not be assessed as part of the IPSP review process, even if these projects are included in the IPSP." [1] As a result, only Planned resources are being reviewed for economic prudence and cost effectiveness in this application. Existing and Committed resources are not.

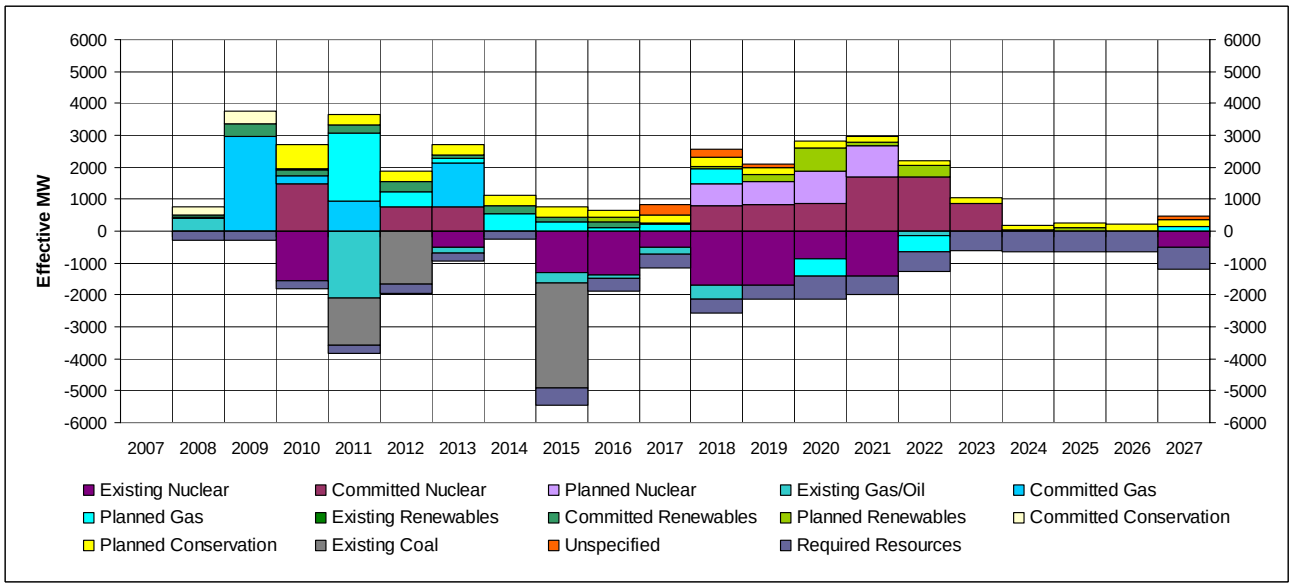
[1] Report of the Board on the Review of, and Filing Guidelines Applicable to, the Ontario Power Authority's Integrated Power System Plan and Procurement Processes, pp. 8-9.

Figure 1: Case 1A: Annual Resource Additions and Reductions (Effective MW)



Source: OPA

Figure 2: Case 1B: Annual Resource Additions and Reductions (Effective MW)



Source: OPA

The remainder of this exhibit addresses how the IPSP prioritizes and implements the contribution from the Conservation and supply resources identified in the Directive. The Conservation and supply evidence in Exhibit D has not been updated, but should be interpreted in light of these revisions.

3.0 CONSERVATION

3.1 The Directive

The Directive's Conservation goals are to reduce demand by 1,350 MW by 2010 and an additional 3,600 MW by 2025. The Directive states:

> The goal for total peak demand reduction from Conservation by 2025 is 6,300 MW. The plan should define programs and actions which aim to reduce projected peak demand by 1,350 MW by 2010, and by an additional 3,600 MW by 2025. The reductions of 1,350 MW and 3,600 MW are to be in addition to the 1,350 MW reduction set by the government as a target for achievement by 2007. The plan should assume Conservation includes continued use by the Government of vehicles such as energy efficiency standards under the Energy Efficiency Act and the Building Code, and should include load reductions from initiatives such as : geothermal heating and cooling; solar heating; fuel switching; small scale (10 MW or less) customer-based electricity generation, including small scale natural gas-fired co-generation and tri-generation, and including generation encouraged by the recently finalized net metering regulation.

Directive Priority

Conservation takes priority over supply resources in that the IPSP first applies all economic and feasible Conservation to meeting resource requirements before applying supply resources. Economic Conservation is defined as Conservation that is more cost effective than supply resources as determined by applying a Total Resource Cost ("TRC") Test. Feasible Conservation is Conservation that can be used for resource planning. In other words, the Conservation contribution can make as predictable and reliable a contribution to meeting resource requirements as the alternative supply resource.

The OPA will seek to develop and identify Conservation opportunities that exceed the Directive's 2010 and 2025 Conservation goals. However, determining whether and how this can be done requires a realistic understanding of the feasibility of achieving Conservation beyond the goals. Such an understanding can only occur as Ontario gains more experience in Conservation and in associated evaluation, measurement and verification ("EM&V") results. In addition, the OPA will monitor future policy changes such as codes and standards, price, carbon taxes and land use that underpin the potential estimate to establish the feasibility of exceeding the goal.

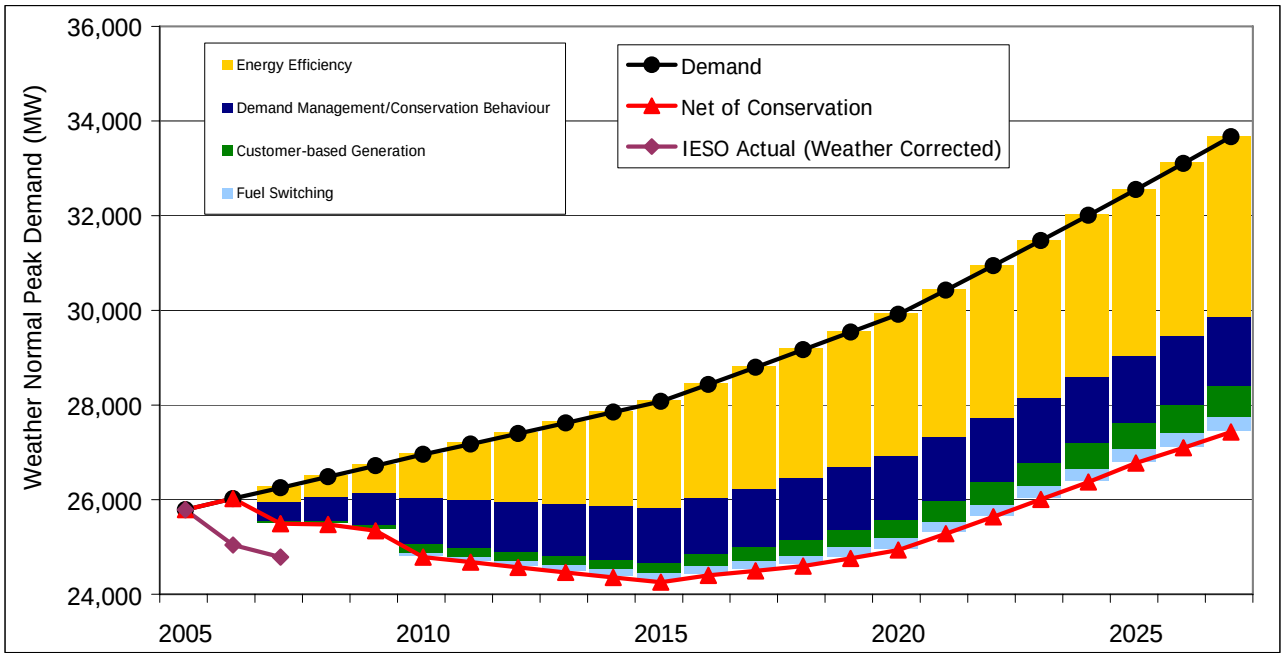
The IPSP has sufficient flexibility to develop a number of options on both the Conservation and the supply side. If experience from the 2008 to 2010 Conservation programs demonstrates that there is feasible Conservation to exceed the Directive goal, that Conservation will be compared to alternative supply resources before any commitment is made.

Implementation Priority

There are four types of Conservation identified in the Directive: efficiency, demand reduction/conservation behaviour, self-generation and fuel switching.

The contribution of each of the Conservation categories over the term of the IPSP are illustrated in Figure 3, as follows:

Figure 3: Impact of Conservation on Peak Demand (MW)



Source: OPA

The weather-corrected actual demand values for 2006 and 2007 are provided in Figure 3 above. These demand values are approximately 700 MW less than the 2006 and 2007 IPSP demand estimates, net of Conservation.

At this point, it is not possible to provide an explanation for the difference with any level of certainty. Two factors contribute to the reduced demand estimates: reduction in the level of demand due to economic factors, and the contribution of Conservation savings.

With respect to the reduction of demand due to economic factors, 2006 and 2007 saw a significant downturn in the health of Ontario's manufacturing sector. The 2005 Ontario Budget called for GDP growth rates of 2.8% and 3.4% for 2006 and 2007, respectively. The more recent 2008 Ontario Budget indicated much more modest growth of 2.1% occurred for each year. The extent and permanency of this downturn and the future prospects for these industries are still uncertain. If the downturn is a long term one, it would have a downward pressure on the Reference forecast.

However, in the longer term, downward pressure may be countered by the upward pressure that may result from a greater presence of manufacturing of different types of industrial products or other energy intensive activities, such as hybrid plug-in electric vehicles and other non-fossil fuel alternatives such as heat pumps. The last two years has seen mounting activity and interest in non-fossil-fueled technologies.

With respect to the contribution of Conservation, although it is possible that Conservation in excess of what was planned for has been obtained, verified Conservation estimates are not available. It is therefore not possible to determine what this contribution may have been at this time.

This is a time of great uncertainty with significant forces affecting the demand forecast. The current ambiguity in determining the explanation for current demand levels affects long-term estimates as well. This shows the need to plan to a range or band of forecasts, and not to focus on a single set of numbers. The OPA will be monitoring over the next few years activities related to the above factors and will adjust its planning assumptions when more clarity is gained.

The programs through which the OPA currently intends to implement the 2010 Conservation goals are set out in Table 1, below:

Table 1: Committed Conservation Resources 2008 – 2010

	PROGRAM TARGETS			CONSERVATION CATEGORIES			
Program	**Target (MW)**	**Free Rider Rate (%)**	**Net Demand Reduction (MW)**	**Energy Efficiency (MW)**	**Demand Management (MW)**	**Fuel Switching (MW)**	**Customer-based Generation (MW)**
New Construction Program	45	30	32	32			
Existing Buildings Retrofit	242	30	169	169			
Low Income & Aboriginal	16	30	11	11			
Demand Response	105	30	74		74		
Total Mass Market Programs	**408**	**30**	**286**	**212**	**74**		
New Construction Program	55	30	39	39			
Existing Building Retrofit	492	30	344	274		70	
Socially Assisted Housing	29	30	20	20			
Total Commercial/Institution Market Programs	**576**	**30**	**403**	**333**		**70**	
Industrial Markets							
Industrial Programs	113	30	79	79			
Demand Response Programs	451	30	316		316		
Total Industrial Market Programs	**564**	**30**	**395**	**79**	**316**		
Customer-based Generation							
Customer-based Generation Programs	211	30	**148**				148
Total OPA Resource Acquisition Programs	**1,759**	**30**	**1,231**	**625**	**390**	**70**	**148**
Other Influenced CDM							
Smart Meters	**176**	**0**	**176**				
Total Conservation & Demand Management[2]	**1,940**		**1,410**	**620**	**390**	**70**	**150**

Source: OPA (Exhibit D-4-1, Table 20)

All of the programs to meet the 2010 goals will be carried out in accordance with directives issued by the Minister of Energy. As a result, they will not be carried out in accordance with the procurement process for which the OPA is seeking OEB approval. The mix of programs will likely change as better opportunities present themselves.

[2] Totals have been rounded to nearest 10 MW.

4.0 RENEWABLE SUPPLY

4.1 The Directive

The Directive's goal is for a 2010 target for renewable supply of 10,402 MW and a goal of approximately 15,700 MW for 2025. It states:

> Increase Ontario's use of renewable energy such as hydroelectric, wind, solar and biomass for electrical generation. The plan should assist the government in meeting its target for 2010 of increasing the installed capacity of new renewable energy resources by 2,700 MW from the 2003 base and increase the total capacity of renewable energy sources used in Ontario to 15,700 MW by 2025.

Directive Priority

Renewable supply is second in priority to Conservation. After accounting for the feasible and economic contribution of Conservation, the IPSP applies the feasible and economic contribution from renewable supply. The OPA's approach to determine the feasible and economic contribution of renewable supply is as follows:

- All feasible hydroelectric resources are included on the basis that hydroelectricity is the most economic of the renewable resources;
- Bioenergy, wind (small sites) and solar resources were included generally on the basis of the expected response to standard offer procurement programs; and
- Large wind sites were used to provide the remaining resources needed to meet the goal. The sites were included on the basis of lowest "all-inclusive unit cost" (in which the cost of associated transmission is included).

The total capacity of the assumed planned resources meets the Directive's renewable goals. Unlike the plan for Conservation goals, the IPSP does not seek to exceed the Directive's goals for renewable resources. This is because the incremental renewable resource would be large wind projects. These projects would not be cost effective when compared to the supply resources included in the Plan that would be displaced.

Implementation Priority

There are two key elements to implementing the renewable goals: the acquisition of renewable supply and the transmission enhancements that are necessary to facilitate the supply.

With respect to supply, the 2010 Directive goal of 10,402 MW of renewable resources will be implemented through acquiring all renewable resources that may be feasibly implemented by that time.

The mix of renewable resources that currently make up the most attractive opportunities is illustrated in Table 2:

Table 2: Meeting the 2010 Renewable Resources Goal (Installed Capacity in MW)

	MW	
Hydroelectric in 2003	7,636	
Bioenergy in 2003	66	
The 2003 Base		**7,702**
Hydroelectric added since 2003[3]	108	
Wind added since 2003	501	
Bioenergy added since 2003	26	
Total Resources Added Since 2003		**634**
Existing Hydroelectric	7,744	
Existing Wind	501	
Existing Bioenergy	92	
Existing Resources		**8,336**
RES Hydroelectric[4]	104	
RES Wind	789	
CHP 1 Biomass	63	
Total RES and CHP1		**956**
SOP Solar	355	
SOP Hydroelectric	60	
SOP Wind	716	
SOP Bioenergy	46	
Total SOP[5]		**1,178**
Total Committed Resources		**2,134**
Quebec Interconnection		**1,250**
TOTAL RESOURCE INCREASE		**4,019**
REQUIRED RESOURCE INCREASE		**2,700**

Source: OPA

[3] Includes resources added since 2003 (6 MW) minus the Beck frequency changer (50 MW) which was removed from service.

[4] Includes Hydroelectric Supply Agreement with OPG in-service by 2010 (41 MW) plus RES 3 (40 MW) and Umbata Falls (23 MW).

[5] Includes RESOP contracts as of July 2008. The in-service dates for renewable resources procured under the standard offer program reflect the contractual in-service dates. The OPA acknowledges that there is considerable uncertainty with respect to actual in-service dates.

The 2025 Directive goal of 15,700 MW of renewable resources will be implemented in order of feasibility in light of transmission availability. The mix of renewable resources that currently make up the most attractive opportunities is set out in Table 3:

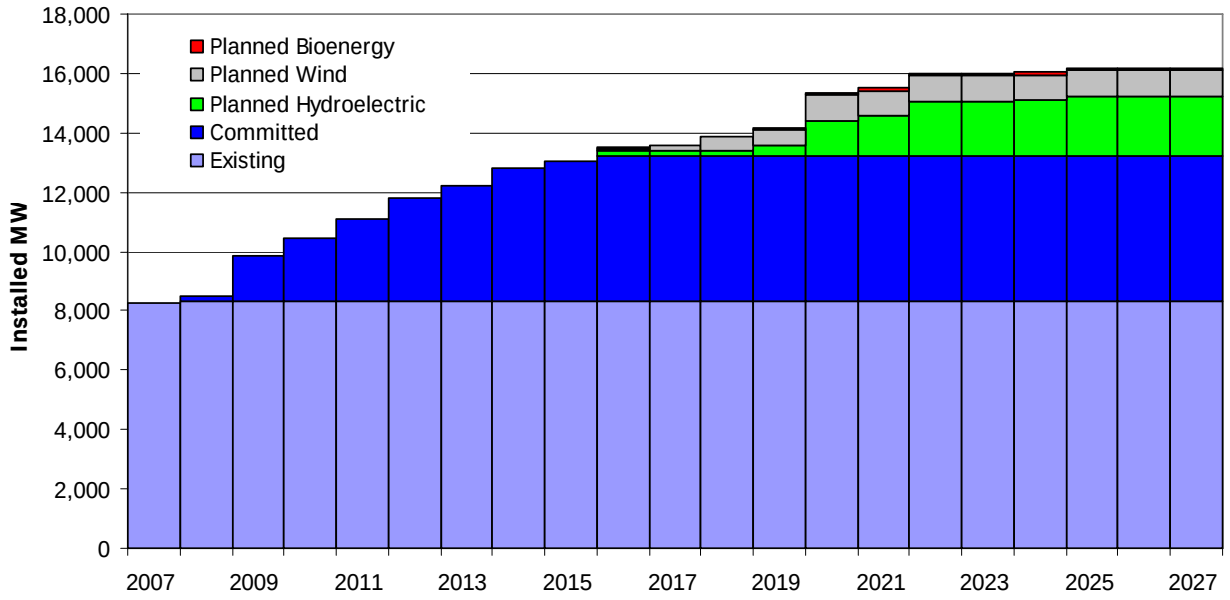
Table 3: Meeting the 2025 Renewable Resources Goal – Existing, Committed and Planned Resources (Resources Used in Ontario - Installed MW)

	MW
Hydroelectric	
Existing	7,744
Committed	1,033
Planned	1,991
Total Hydroelectric	**10,768**
Wind	
Existing	501
Committed	2,889
Planned	862
Total Wind	**4,251**
Bioenergy	
Existing	92
Committed	497
Planned	68
Total Bioenergy	**656**
Solar	
Existing	-
Committed	488
Total Solar	**488**
Total Renewable Resources	**16,164**

Source: OPA

The implementation schedule for planned renewable resources is set out in Figure 4:

Figure 4: Planned Renewable Resources (Installed MW)



Source: OPA

The detailed break-down of the existing, committed and planned renewable resource mix is set out at Tables 9, 27, 28, 30, 31 and 33 of Exhibit D-5-1[6].

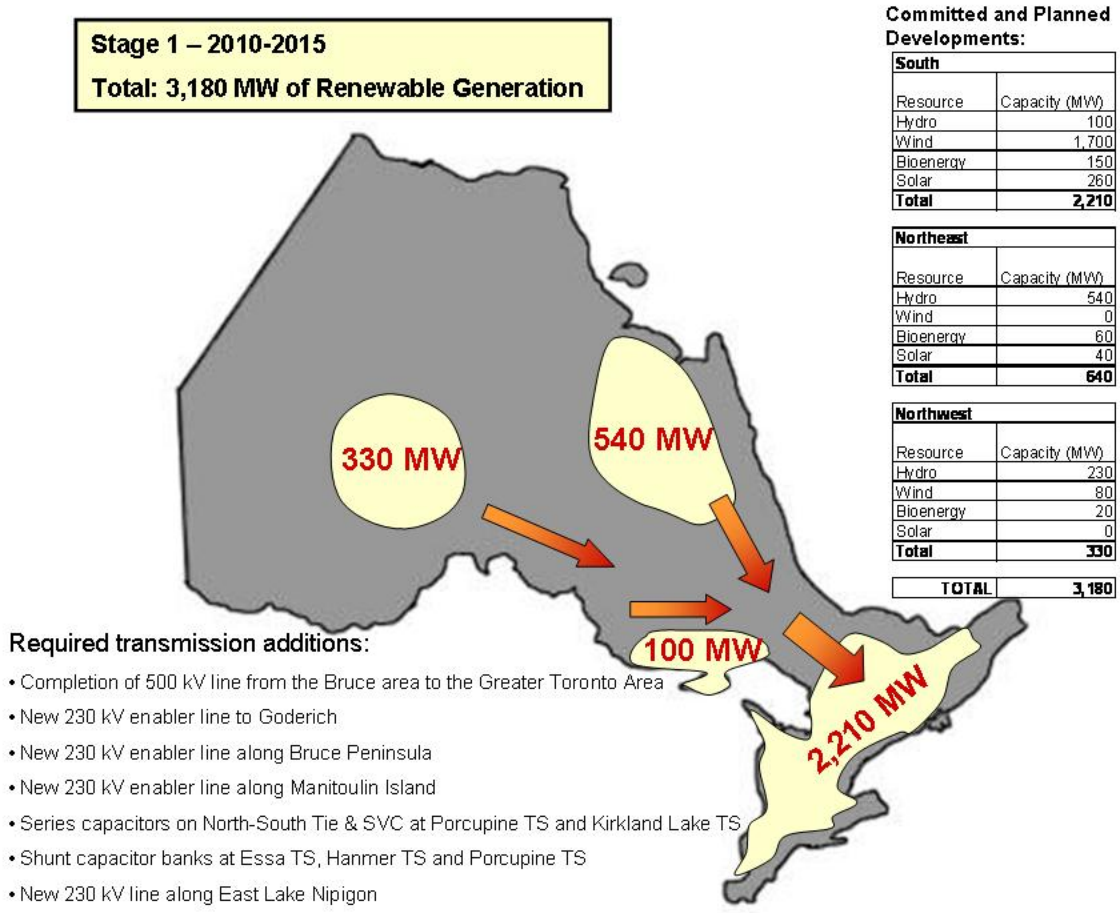
That mix will likely change as better opportunities present themselves and as progress with the implementation of transmission enhancements and enabler lines becomes clearer. All of the renewable resources to be procured by 2010 will be procured in accordance with Directives from the Minister of Energy. As a result, they will not be carried out in accordance with the procurement process for which the OPA is seeking OEB approval.

The staging of the committed and planned renewables is closely linked to the development of enabling transmission reinforcement. Development is planned to occur in three stages, as presented in Figures 5, 6 and 7 as follows:

[6] These tables have not been updated to reflect the resource mix shown in Figure 4.

- Stage 1 adds about 3,200 MW of renewables resources over the period 2010 to 2015;
- Stage 2 increases planned renewables by 1,100 MW to a cumulative total of about 4,300 MW, over the period 2016 to 2019; and
- Stage 3 further increases planned renewables by 2,000 MW to a cumulative total of about 6,300 MW, in 2020 and beyond.

Figure 5: Planned Development of Renewable Resources – Stage 1



Committed and Planned Developments:

South	
Resource	Capacity (MW)
Hydro	100
Wind	1,700
Bioenergy	150
Solar	260
Total	**2,210**

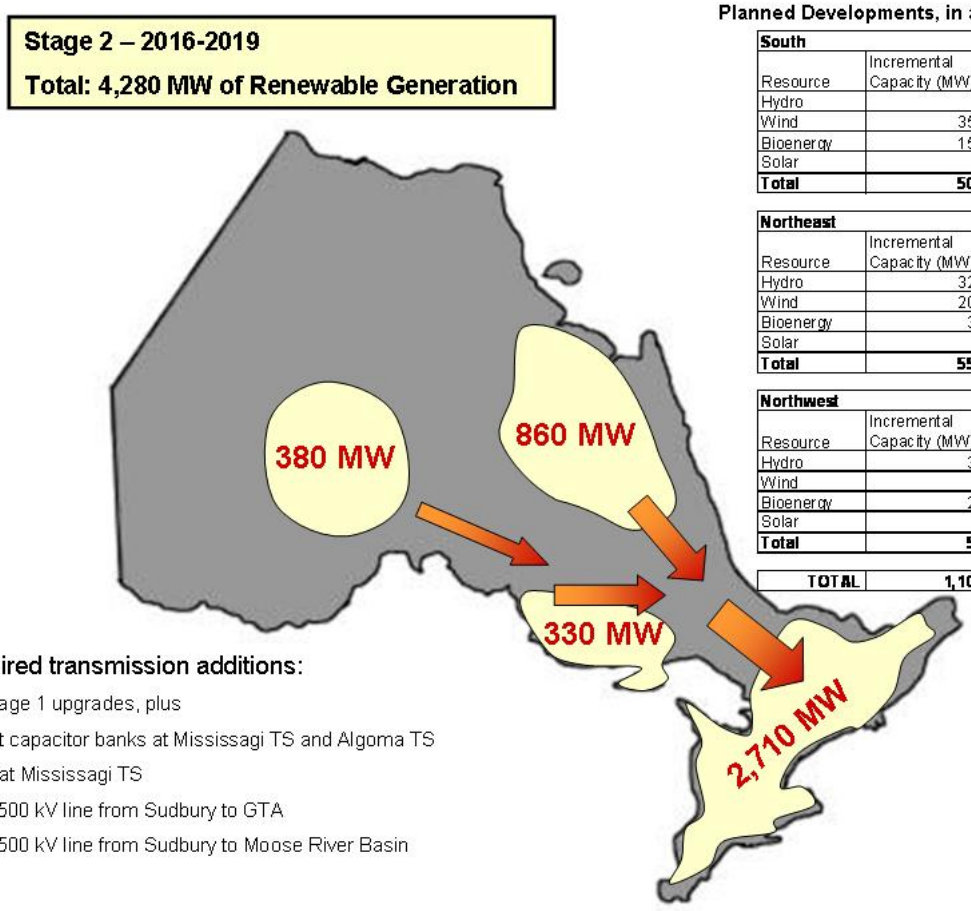
Northeast	
Resource	Capacity (MW)
Hydro	540
Wind	0
Bioenergy	60
Solar	40
Total	**640**

Northwest	
Resource	Capacity (MW)
Hydro	230
Wind	80
Bioenergy	20
Solar	0
Total	**330**

TOTAL	**3,180**

Source: OPA

Figure 6: Planned Development of Renewable Resources – Stage 2



Planned Developments, in addition to Stage 1:

South		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	0	100
Wind	350	2,050
Bioenergy	150	300
Solar	0	260
Total	**500**	**2,710**

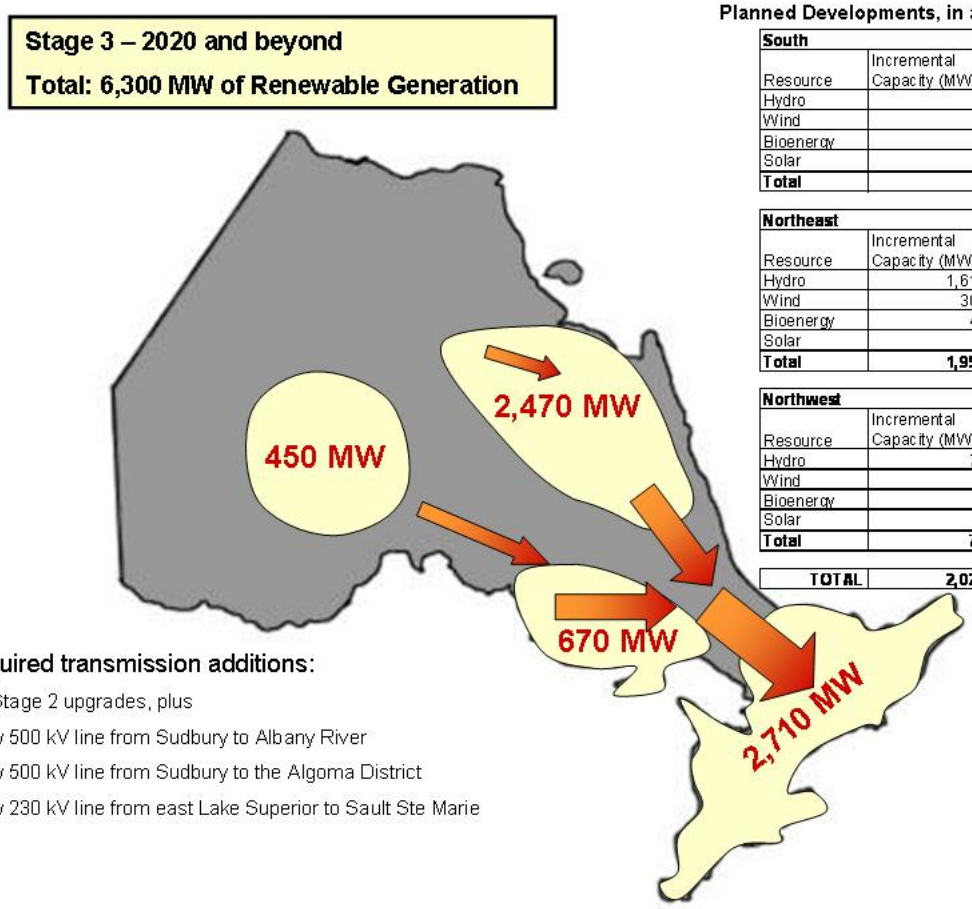
Northeast		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	320	860
Wind	200	200
Bioenergy	30	90
Solar	0	40
Total	**550**	**1,190**

Northwest		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	30	260
Wind	0	80
Bioenergy	20	40
Solar	0	0
Total	**50**	**380**

TOTAL	**1,100**	**4,280**

Source: OPA

Figure 7: Planned Development of Renewable Resources – Stage 3



Planned Developments, in addition to Stage 2:

South		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	0	100
Wind	0	2,050
Bioenergy	0	300
Solar	0	260
Total	**0**	**2,710**

Northeast		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	1,610	2,470
Wind	300	500
Bioenergy	40	130
Solar	0	40
Total	**1,950**	**3,140**

Northwest		
Resource	Incremental Capacity (MW)	Cumulative Capacity (MW)
Hydro	70	330
Wind	0	80
Bioenergy	0	40
Solar	0	0
Total	**70**	**450**

TOTAL	**2,020**	**6,300**

Source: OPA

Certain transmission development work will need to be initiated shortly to make the necessary transmission enhancements to meet the foregoing timetable. The specific transmission development work that is needed, the dates by which the development work must be commenced, and the estimated costs of the development work are addressed in the evidence relating to the applicable transmission projects.

5.0 NUCLEAR FOR BASELOAD

5.1 The Directive

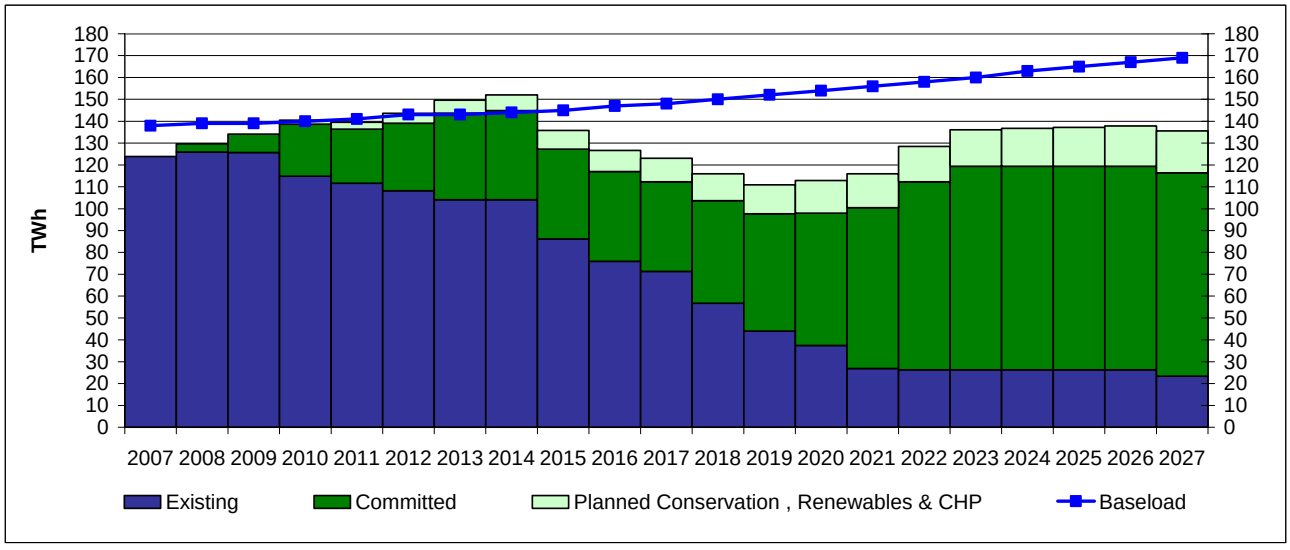
The Directive provides that the IPSP plan for nuclear power to meet baseload requirements but limit the installed in-service capacity to 14,000 MW. The Directive States:

> Plan for nuclear capacity to meet base load electricity requirements but limit the installed in-service capacity of nuclear power over the life of the plan to 14,000 MW.

Directive Priority

The Directive priority is to first apply the feasible and economic contributions of Conservation and renewable supply to meet base-load requirements. After this contribution is taken into account, there is a gap. This gap is illustrated in Figure 8, which demonstrates the contribution of existing and committed resources as well as planned Conservation and renewable resources to meet baseload resource requirements.

Figure 8: Existing and Committed Baseload Resources + Planned Conservation, Renewable and CHP Baseload Resources (TWh)



Source: OPA

As illustrated in Figure 8, after the contributions from existing and committed supply, planned Conservation and renewable resources are taken into account, there remains a baseload requirement of approximately 35 TWh. That baseload requirement may be met

by one of two candidates: nuclear power and combined cycle gas turbine generation ("CCGT"). In light of the OPA's planning criteria as addressed in Exhibit D-6-1, and the OPA's analysis in Exhibit D-3-1 Attachment 1, nuclear power is demonstrated to be the superior of those two candidates. The IPSP therefore plans for nuclear power to meet the remaining baseload requirements.

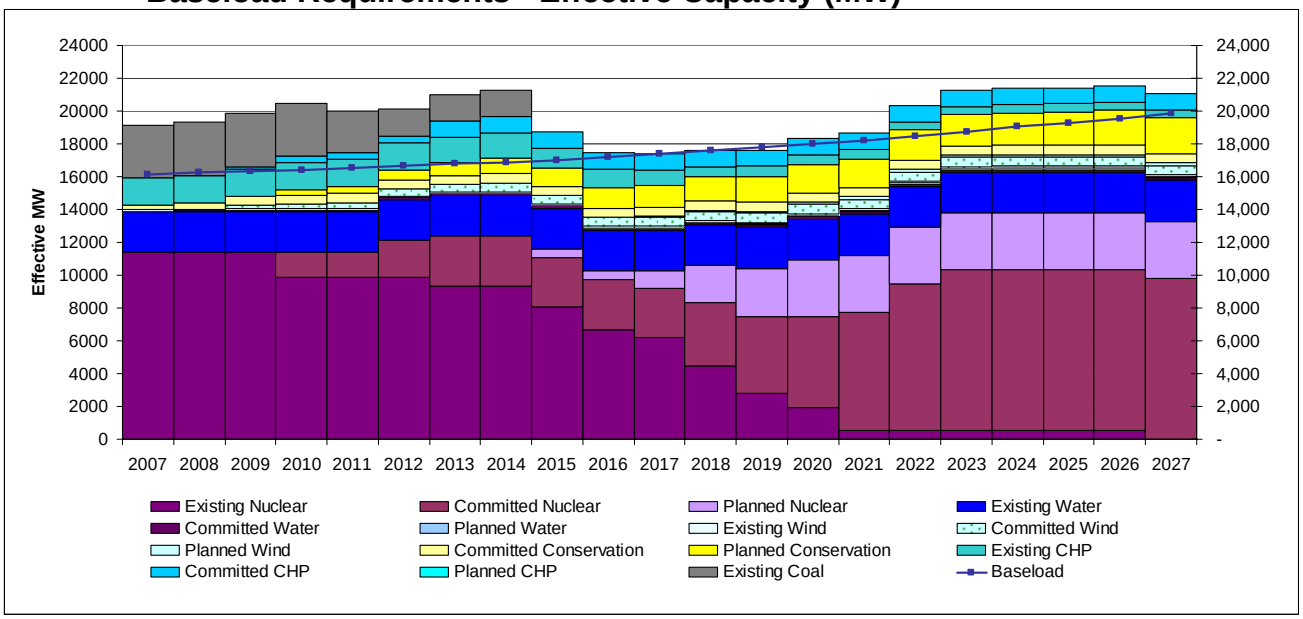
Implementation Priority

As indicated in the discussion respecting Directive Priority, nuclear power is preferable to CCGT for meeting baseload requirements. From an implementation perspective, the issue is whether the requirement for new nuclear resources should be met through refurbishment of existing nuclear plants ("refurbishment") or through building new plants ("new build"). Subject to economic viability, refurbishment is an attractive option for the following reasons:

- Compared to the new build option, refurbishment provides a shorter lead-time advantage as a result of unit refurbishment outages of two years or less;
- Refurbishment utilizes existing generation sites and transmission infrastructure thereby minimizing the associated environmental footprint;
- Local and surrounding community support for the continued operation of the Pickering, Bruce and Darlington generating stations is strong; and
- Experience from past and current refurbishment projects, both domestically and internationally, is leveraged on an on-going basis. This could result in improved project cost and schedules.

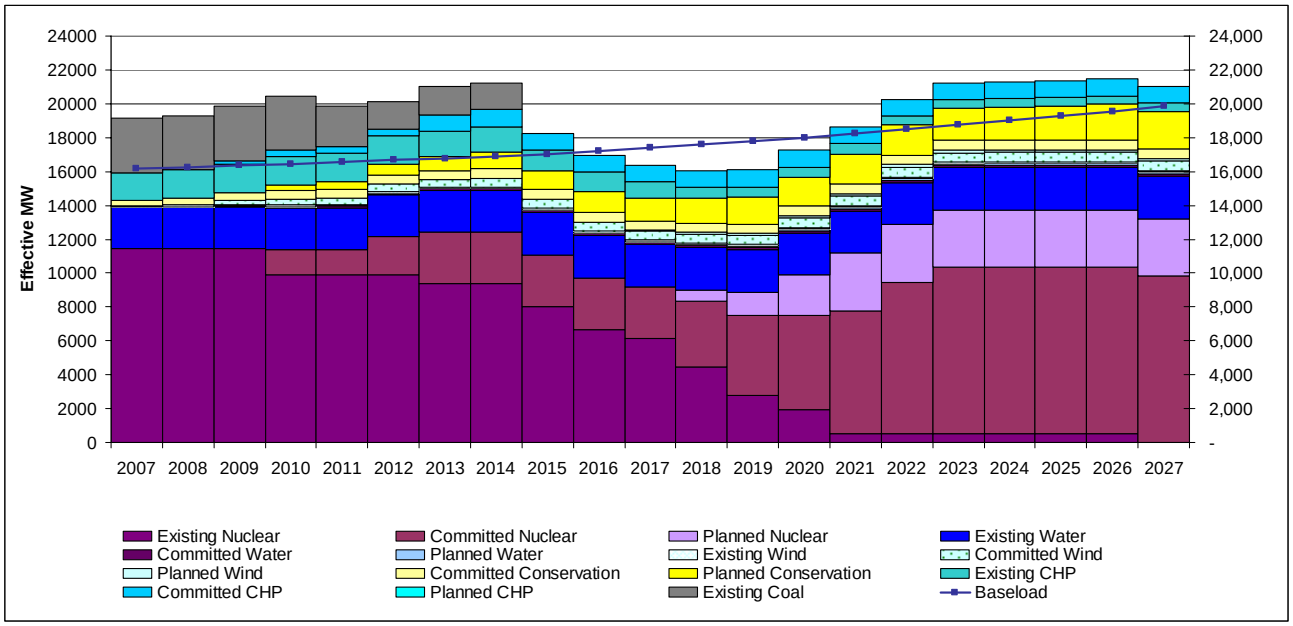
The most immediate implementation decision respecting refurbishment is with respect to Pickering B. The IPSP has built in the flexibility to address either scenario. If OPG decides to refurbish Pickering B, then the IPSP assumes that the associated capacity of 2,064 MW will be installed by 2018. This constitutes Case 1A under the IPSP. If OPG decides not to refurbish Pickering B, then the Plan assumes that the associated capacity of 2,064 MW will be replaced at a later time by new nuclear resources. This constitutes Case 1B under the IPSP. These cases are illustrated in Figure 9 and Figure 10, respectively, as follows:

Figure 9: Case 1A (with Pickering B Refurbishment): Resources to meet Baseload Requirements - Effective Capacity (MW)



Source: OPA

Figure 10: Case 1B (No Pickering B Refurbishment): Resources to meet Baseload Requirements – Effective Capacity (MW)



Source: OPA

To enable the retirement or the refurbishment of Pickering B, a new Oshawa transformer station may need to be built and brought into service by 2015. The details of this project, including the necessary transmission development work, are addressed in Exhibit E-4-1.

The OPA does not intend to procure any nuclear supply by the end of 2010.

6.0 COAL REPLACEMENT

6.1 The Directive

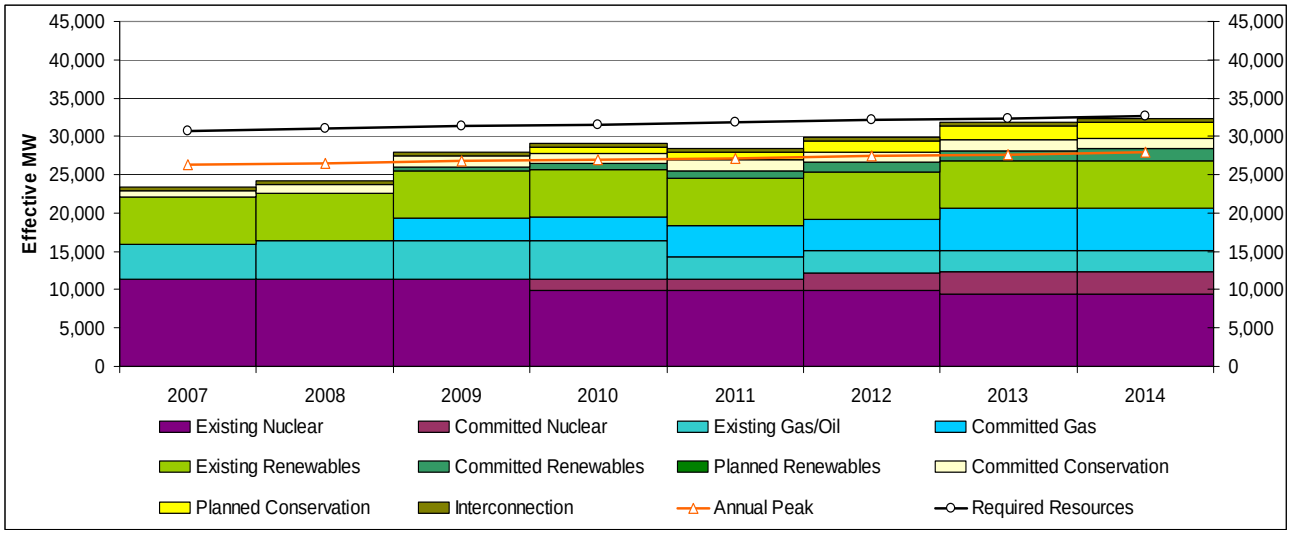
The Directive provides that the IPSP should plan for the replacement of coal-fired generation in the earliest practical time frame. It states:

> Plan for coal-fired generation in Ontario to be replaced by cleaner sources in the earliest practical time frame that ensures adequate generating capacity and electric system reliability in Ontario. The OPA should work closely with the IESO to propose a schedule for the replacement of coal-fired generation, taking into account feasible in-service dates for replacement generation and necessary transmission infrastructure.

Directive Priority

The Directive priority is to first apply the feasible and economic contributions of Conservation and renewable supply to replace coal-fired generation. Figure 11, below, demonstrates the contribution of existing and committed resources as well as planned Conservation and renewable resources to meet the requirements currently met by coal-fired generation:

Figure 11: Contribution from Existing, Committed and Planned Conservation, Renewable, Nuclear, Gas/Oil & Interconnection Resources in the Absence of Coal-fired Resources (MW)



Source: OPA

As illustrated in Figure 11, after all alternative resources are taken into account, and coal is removed, there remains a capacity gap. In addition, there is also a gap with respect to the contribution of coal-fired generation to energy production and system reliability. These contributions are discussed in Exhibit D-7-1. The only remaining resource with the characteristics to replace these contributions is gas-fired generation ("GFG"). As a result, replacing coal-fired generation will require an additional contribution from GFG, accompanied by any necessary transmission enhancements. There are different reliability requirements in the North West system and the remainder of the system. Each area, therefore, has to be looked at separately.

With respect to the North West, the IPSP plans for the replacement of the Atikokan and Thunder Bay coal-fired generation plants with a combination of Conservation and renewable resources to be available by 2014. With respect to the remainder of the system, the OPA considered a number of options for GFG to replace coal-fired generation in the earliest practical timeframe. These included consideration of existing gas-fired resources such as Lennox and Non-Utility Generators ("NUGs"), the potential expansion of existing GFG sites or facilities, addition of local GFG, and the conversion of coal-fired generating units to GFG.

Based on this assessment, three candidate options were identified:

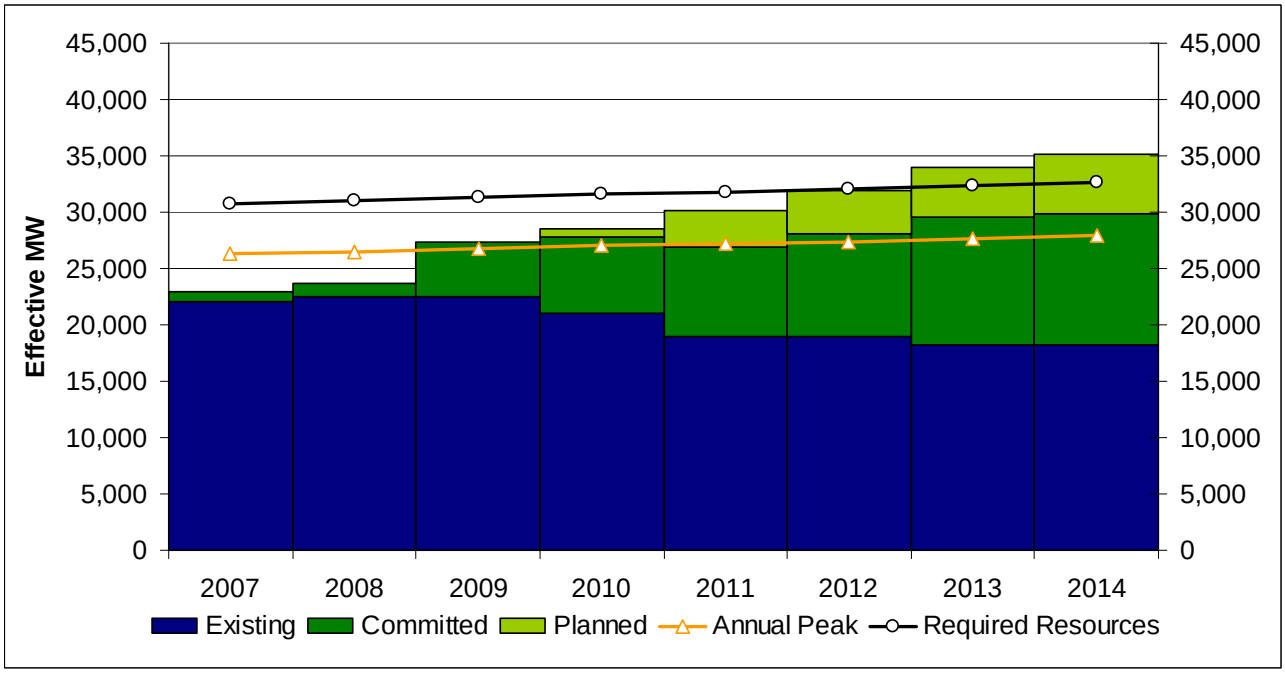
- GFG located near existing gas supply and infrastructure (i.e., the Sarnia area Dawn Hub, the location in Ontario with the lowest commodity and gas transportation cost);
- GFG located where there are local area reliability needs, accompanied by relatively modest transmission system enhancements (i.e., Northern York Region ("NYR"), Kitchener-Waterloo-Cambridge-Guelph ("KWCG"), Southwest GTA ("SW GTA") and the Greater Toronto Area (the "GTA")); and
- Conversion of coal-fired generating units to GFG. This option requires extensive associated transmission system enhancements where there are local area reliability needs.

The OPA's analysis in Exhibit D-7-1 demonstrates that, in light of the OPA's planning criteria, among these three candidates, the installation of 2,200 MW of GFG to meet local area reliability needs in NYR, KWCG, SW GTA and the GTA, accompanied by relatively modest transmission system enhancements, most effectively meets the Directive's requirements with respect to replacement of coal-fired generation.

Implementation Priority

As indicated above, local GFG is planned for the energy and capacity production contributions for coal-fired generation to be replaced by 2012. The reliability contribution will be replaced by these and other facilities by 2014. This replacement schedule is illustrated by Figure 12:

Figure 12: Resources to Allow Replacement of Coal-fired Resources (MW)



Source: OPA

In addition, to enable coal replacement, certain enhancements to the transmission system are needed in the Thunder Bay area. The details of these enhancements, including the necessary transmission development work, are addressed in Exhibit E-6-1.

As a result, the OPA intends to implement the coal replacement requirements of the Directive by procuring 1,200 MW of GFG to meet local area reliability needs (in NYR and SW GTA) in accordance with government directives and 1,000 MW of GFG (in KWCG and GTA) in accordance with the OEB-approved procurement process. Further details with respect to these procurements are provided in Exhibit D-10-1.

7.0 GAS FOR PEAK, HIGH EFFICIENCY AND HIGH VALUE USE

7.1 The Directive

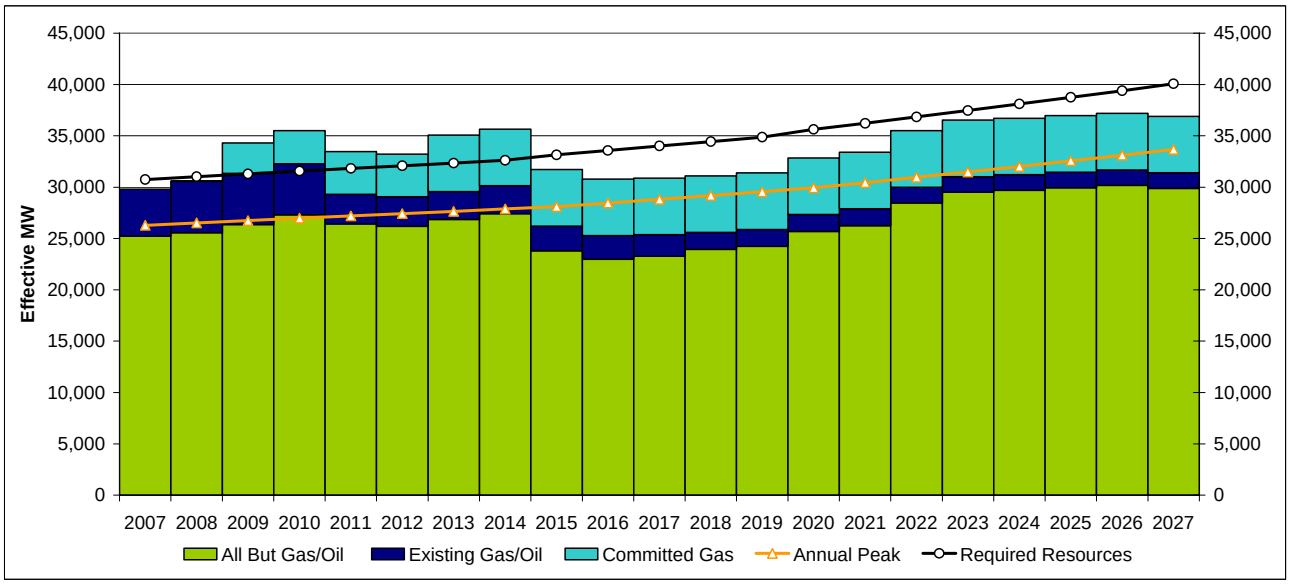
The Directive states:

> Maintain the ability to use natural gas capacity at peak times and pursue applications that allow high efficiency and high value use of the fuel.

Directive Priority

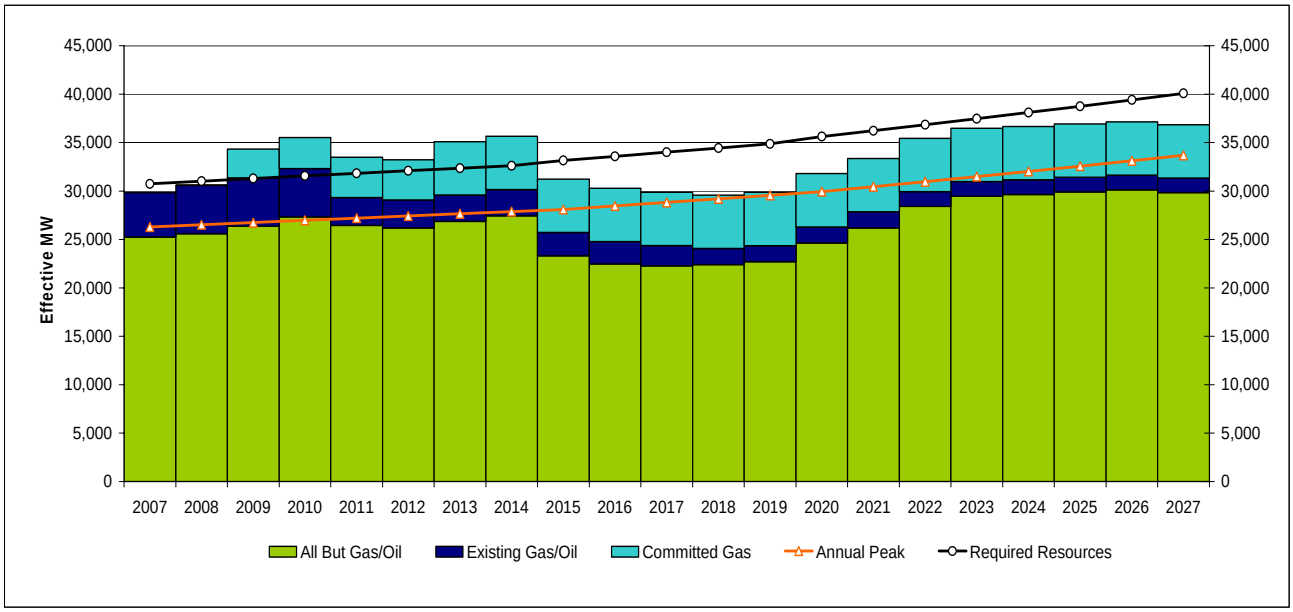
The Directive priority is to first apply the feasible and economic contributions of Conservation and renewable supply to meet peaking requirements. The contribution from nuclear power is then added. After these contributions are taken into account and the contribution from committed GFG is added, there is a remaining gap to be met by GFG. This gap is illustrated in Figure 13 and Figure 14, which demonstrate the contribution of these resources to meeting intermediate/peaking requirements under Case 1A (with Pickering B refurbishment) and Case 1B (without Pickering B refurbishment).

Figure 13: Required Gas-Fired Resources – Assuming Pickering B Refurbished (Effective MW)



Source OPA

Figure 14: Required Gas-Fired Resources – Assuming Pickering B Not Refurbished (Effective MW)



Source: OPA

As illustrated in Figures 12 and 13 after the contribution of existing, committed and planned resources, there remains a requirement for GFG.

In order to maintain the contribution by GFG to peaking, high value and high efficiency uses, the use of gas in the IPSP is restricted as much as possible to either simple cycle gas turbines ("SCGT") or CCGT.

Implementation Priority

As discussed above, GFG also contributes to meeting local area requirements, and to replacing the contribution of coal-fired generation. GFG will also be used when alternative resources are not feasible or cost effective. The IPSP also includes a certain amount of "proxy gas" to represent unspecified supply resources indicated for the long term, that will not necessarily prove to be gas-fired, but are modelled as if they will be.

When gas-fired resources are used, they are generally planned to be SCGT, to meet peaking requirements, or CCGT, to meet intermediate requirements. The Plan also includes combined heat and power ("CHP", also known as cogeneration) resources, that

meet baseload requirements, where the amount included in the Plan is that expected to materialize from OPA procurement programs. There are also a number of gas-fired generators, known as non-utility generators or NUGs, which are assumed to operate as baseload resources because of the contractual terms of their current NUG contracts. The Plan assumes that for the NUG contracts that expire by 2015, the associated capacity will continue, but will meet intermediate and peaking load requirements, depending on whether the NUGs are CCGT or SCGT resources, respectively.

The current list of contracts and projects through which the IPSP intends to meet the GFG requirements is set out in Table 4, below:

Table 4: Allocation of Committed and Planned Gas-Fired Resource Requirements

	Pickering B Refurbished			Pickering B Not Refurbished		
Project/Site	**Generation Type**	**MW**	**In-Service**	**Generation Type**	**MW**	**In-Service**
Lennox	CST	2,100	2011	CST	2,100	2011
CHP (Committed)	CHP	500	2013	CHP	500	2013
Northern York Region (Committed)	SCGT	350	2011	SCGT	350	2011
Kitchener-Waterloo-Cambridge-Guelph	SCGT	450	2012	SCGT	450	2012
Southwest GTA (Committed)	CCGT	850	2013	CCGT	850	2013
GTA	SCGT	550	2014	SCGT	550	2014
NUG Replacement	SCGT/CCGT	469	2013 +	SCGT/CCGT	1,368	2013 +
Unspecified/Proxy Gas	SCGT/CCGT	650	2018+	SCGT/CCGT	825	2017 +
	Total	**5,919**		**Total**	**6,993**	

Source: OPA Southwest GTA may be met by either CCGT or SCGT, but was modelled as CCGT. Likewise, GTA could be met by either type, but was modelled as SCGT. CST is the acronym for "Condensing Steam Turbine"

This mix will likely change as better opportunities present themselves.

Some of these projects/sites will be procured by the end of 2010 in accordance with the OEB-approved procurement process. These are: Kitchener–Waterloo-Cambridge-Guelph and GTA (as discussed above). In addition, another facility, the Lennox Generating Station, operates under a Reliability-Must-Run contract with the IESO. The contribution

from that facility will also be procured by the OPA. This is described in greater detail in Exhibit D-8-1, Attachment 1 and Exhibit D-10-1.

8.0 NEAR-TERM ACTION PLAN

The Directive and Implementation Priorities lead to both near-term and longer-term action plans. As indicated in the introduction**,** the IPSP identifies specific priorities for the near-term, but will, more generally, develop options for the mid-term and explore opportunities for the longer-term.

This leads to a near-term action plan that the OPA will carry out over the 2008 to 2010 period to implement the IPSP. That near-term action plan has the following components:

- Conservation: The OPA will, through resource acquisition and under existing government Directives, procure approximately 1,400 MW of Conservation resources. It will also invest in market capability and market transformation activities;
- Renewable Supply: The OPA will, under existing government Directives, procure up to 2,700 MW of renewable resources; and
- Gas Fired Generation: The OPA will, through an OEB-approved procurement process, procure gas-fired projects that are required for local area supply and transmission relief. The capacity targets for these projects are as follows: (1) 550 MW of SCGT or CCGT capacity in the GTA and (2) 450 MW of SCGT capacity in Kitchener-Waterloo-Cambridge-Guelph. Further, the OPA will, in accordance with procurement directives, procure additional gas-fired projects that are required for local area supply and transmission relief. The capacity targets for these additional projects are as follows: (1) 850 MW of CCGT capacity in the Southwest GTA and (2) 350 MW of SCGT capacity in Northern York Region. Finally, the OPA will enter into a procurement contract with OPG to replace the OEB-approved Reliability-Must-Run contract that is currently in place with respect to the Lennox GS through the OEB-approved procurement process.

In addition, it will be necessary for transmission proponents to carry out development work with respect to the transmission projects recommended in the IPSP. Certain of these projects, in addition to meeting the Directive's supply mix goals, are aimed at ensuring regional and local area reliability (i.e., Windsor Essex, Central and Downtown Toronto, and Milton Transformer Station). The recommended transmission projects, and the necessary development work, are referred to above and are addressed in more detail in the

supporting evidence relating to the individual projects. It is not expected that any of these projects will result in a leave-to-construct application before the OEB during this near-term period.

9.0 CONCLUSION

The OPA's Plan to achieve the Directive's goals involves prioritizing how Conservation and supply resources should be acquired through (i) meeting the requirements of the Directive in light of the OPA's planning criteria (the "Directive Priority"); and (ii) the sequencing of installing resources, especially in light of long lead times and necessary transmission enhancements (the "Implementation Priority").

With respect to the Directive Priority, the IPSP ensures that the identified resource goals in the Directive are met by identifying the priority order in which the resources are planned to meet the electricity needs of the province as follows:

1. Maximize feasible cost effective contribution from energy efficiency, demand management, fuel switching, and customer based generation (Conservation);
2. Maximize feasible cost effective contribution from renewable sources;
3. Make up baseload requirements remaining after Steps 1 and 2 above with nuclear power;
4. Replace coal-fired generation with power from committed and planned resources. Specifically, in order to ensure that existing coal-fired facilities are replaced by 2014, gas-fired generation ("GFG") facilities are planned to be installed in the areas of Northern York Region, Kitchener-Waterloo-Cambridge-Guelph, Southwest GTA and the Greater Toronto Area ("GTA") by 2014; and
5. Restrict contribution of GFG to specific projects as required when additional Conservation and renewable resources are not feasible or cost effective.

The Directive Priority is accompanied by an Implementation Priority. The Implementation Priority is the relative chronological ordering of resource additions. The IPSP is the combination of the Directive Priority and the Implementation Priority. It is set out in summary form in Table 5, below.

Table 5: Summary of the IPSP

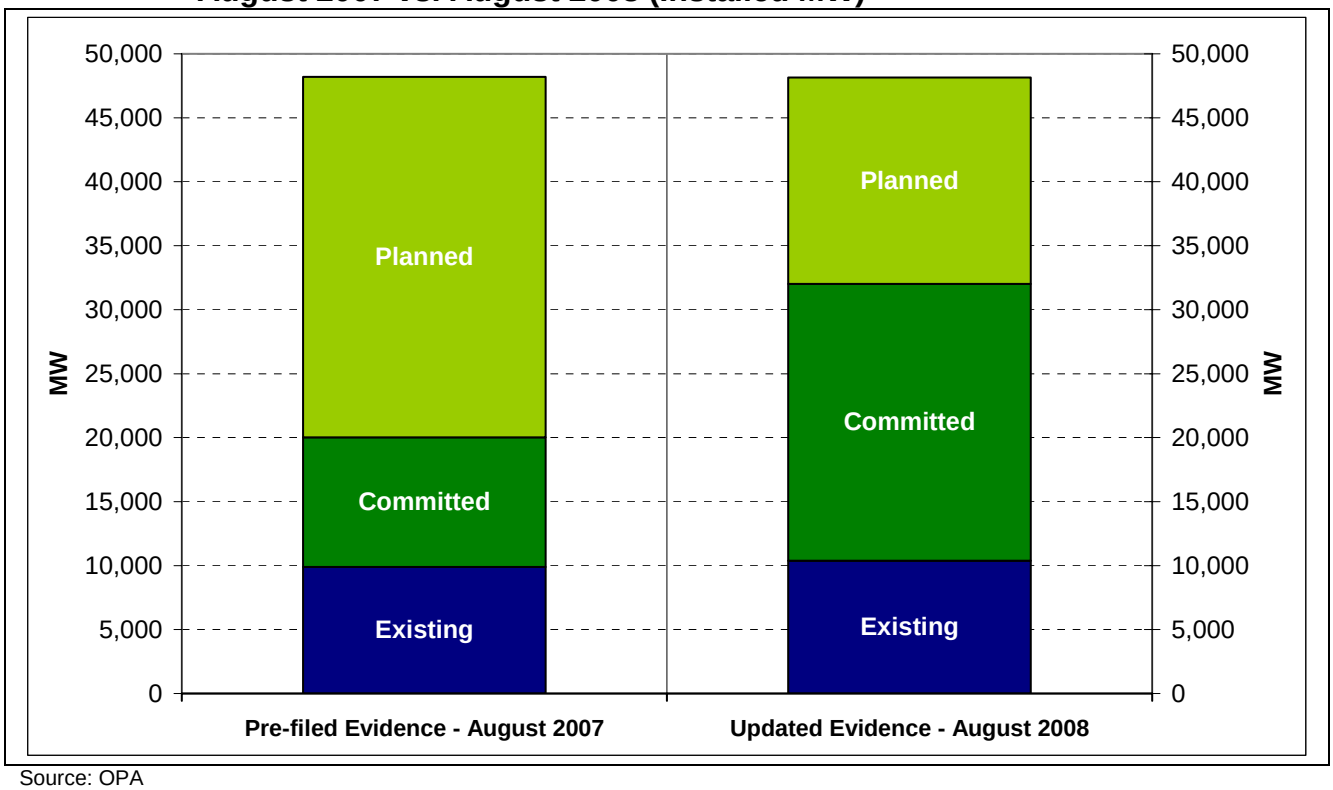
Subject of Directive	Directive Goals	Directive Priority	Implementation Priority	Current Mix of Projects/ Facilities/ Programs (Evidence Reference)	Procurement Authorization (for resources to be acquired by end of 2010)
Conservation	2010: 1,350 MW 2025: an additional 3,600 MW	Maximize feasible cost effective contribution from Conservation before supply resources.	2010 goals to be met through resource acquisition; experience with programs to provide information on how to economically meet and exceed 2025 goal using combination of resource acquisition, capability building and market transformation programs.	2010: Exhibit D-4-1, Table 21 2025: Exhibit D-4-1, Table 22	Government Directives
Renewable Supply	10,402 MW by 2010 15,700 MW by 2025	Maximize feasible cost effective contribution from renewable sources before other supply resources in the following order of economic priority: hydro, bioenergy, and wind.	2010: All feasible renewable resources that can be installed prior to 2010 should be acquired; 2025 goal to be met by first applying all feasible hydro resources (1,991 MW) and all feasible bioenergy (68 MW). The remainder of the goal (862 MW) to be made up of large wind projects. The order of implementation will be coordinated with necessary transmission enhancements.	2010: Exhibit D-5-1, Table 1 2025: Exhibit D-5-1, Tables 2, 19, 31, and 33.	Government Directives
Nuclear for Baseload	Up to 14,000 MW	Make up remaining baseload requirements remaining after Conservation and renewable supply with nuclear supply. Refurbished	10,249 MW of nuclear capability required, either from refurbishments or new build. Depending on refurbishments, new nuclear capacity of 1,400 MW to 3,400 MW, starting in 2018.	Exhibit D-6-1 Table 14	No Procurements Planned

Subject of Directive	Directive Goals	Directive Priority	Implementation Priority	Current Mix of Projects/ Facilities/ Programs (Evidence Reference)	Procurement Authorization (for resources to be acquired by end of 2010)
		nuclear facilities have planning advantages and are generally preferred to new nuclear facilities. However, each case is fact dependent.			
Replacement for Coal Fired Generation	Replace coal-fired generation in earliest practical timeframe.	Replacing coal-fired generation requires replacing its three types of contributions to Ontario's electricity needs: capacity (6,434 MW), energy production (24.7 TWh) and reliability (flexibility, dispatch ability, and ability to respond to unforeseen supply availability).	15,000 MW of resources are planned by 2015, partly to replace coal, partly to meet growth, and partly to catch up with deficiencies that existed in the beginning of the planning horizon. Gas-fired generation will be installed in the areas of York Region, Kitchener Waterloo and Southwest GTA. This will allow for the energy and capacity production contributions to be replaced by 2012. The reliability contribution will be replaced by these and other facilities by 2014.	Exhibit D-7-1, Table 5	Conservation and Renewable Resources: Government Directives GFG: (a) OEB Approved Procurement Process (550 MW GTA SCGT or CCGT, 450 MW KWCG SCGT); (b) Government Directives (850 MW SW GTA CCGT, 350 MW NYR SCGT)
Natural Gas	Confine gas to peaking, high value and high efficiency uses.	Gas fired generation will be used to meet peak and intermediate requirements and to provide flexibility. When gas-fired resources are used, they should be restricted as much as possible to either simple cycle gas generation (to	In addition to meeting the local area supply requirements in York Region, Kitchener-Waterloo and Southwest GTA, current facilities that operate as baseload may be converted to meet intermediate and peaking needs and energy will be procured from Lennox GS to replace the Reliability Must Run Contract with the IESO. An additional	Exhibit D-8-1, Table 9	OEB Approved Procurement Process

Subject of Directive	Directive Goals	Directive Priority	Implementation Priority	Current Mix of Projects/ Facilities/ Programs (Evidence Reference)	Procurement Authorization (for resources to be acquired by end of 2010)
		meet peaking requirements) or combined cycle gas generation (to meet intermediate requirements). Any new contracts and facilities should reflect these requirements as much as possible.	400-650 MW of "proxy gas" may be required around 2017.		

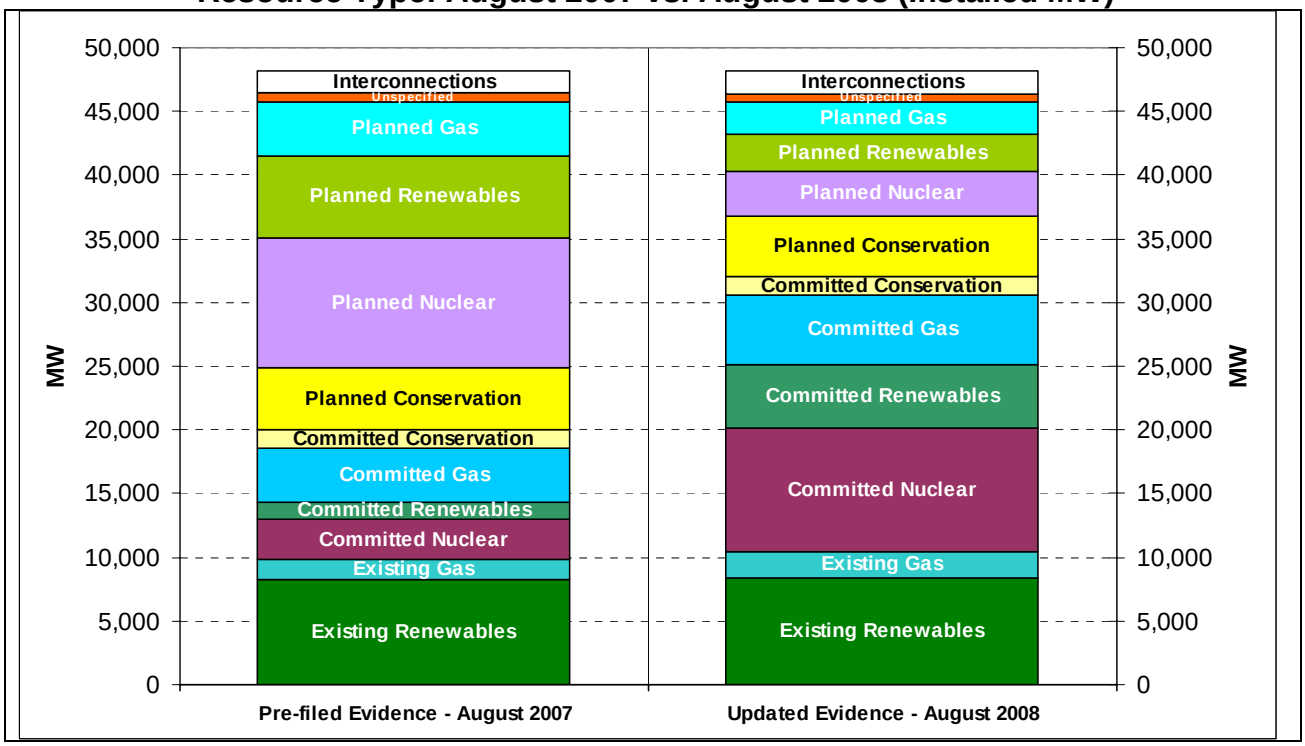
Figure 15 shows updated IPSP resources as of August 2008 in terms of commitment status as compared to IPSP resources in the evidence filed in August 2007. It will be seen that committed resources as of August 2008 are approximately 11,500 MW greater relative to as of August 2007 and that the requirement for planned resources is reduced accordingly. Figure 16 provides additional detail by illustrating both commitment status and resource type.

Figure 15: Comparison of Existing, Committed and Planned Resources: August 2007 vs. August 2008 (Installed MW)



Source: OPA

Figure 16: Comparison of Existing, Committed and Planned Resources by Resource Type: August 2007 vs. August 2008 (Installed MW)



Source: OPA

Table 15: Potential Hydroelectric Resources – All-Inclusive Unit Energy Costs (¢/kWh)

Region	Site	Capacity (MW)	Loss (%)	ACF	LUEC (¢/kWh 4% DR)			All-in (4% DR)	All-in (8% DR)
					Base	Conn.	Bulk		
Eastern	McVittie GS	0.8	2.5	0.6	3.79	1.76	-	**5.7**	**9.7**
	Casselman	1.2	2.5	0.4	5.63	1.76	-	**7.6**	**13.1**
	Wanapitei Lake Dam	2.0	2.5	0.7	3.26	0.61	-	**4.0**	**6.8**
	Km 4.8 - Mcvittie S	2.0	2.5	0.3	7.01	1.32	-	**8.6**	**14.8**
	Fenelon Falls	2.6	2.5	0.4	5.63	0.81	-	**6.6**	**11.5**
	Bark Lake Dam	4.0	2.5	0.6	3.79	0.35	-	**4.2**	**7.3**
	Trent University	5.4	2.5	0.6	3.75	0.26	-	**4.1**	**7.1**
	Healey Falls	6.0	2.5	0.6	3.70	0.24	-	**4.0**	**7.0**
Northeastern	Wakusini	1.2	6.8	0.6	3.79	1.35	0.83	**6.4**	**10.9**
	Wakusini Near Junction	1.5	6.8	0.6	3.79	1.08	0.83	**6.1**	**10.5**
	Red Cedar Lake Dam	2.0	1.6	0.4	5.63	1.21	-	**7.0**	**12.0**
	Serpent River	2.2	1.6	0.7	3.26	0.63	-	**4.0**	**6.8**
	Neelands Rapids, Twp. Fournier	2.2	6.8	0.3	6.85	1.35	1.52	**10.4**	**17.9**
	McCarthy Chute	2.2	1.6	0.7	3.26	0.63	-	**4.0**	**6.8**
	Below Cross Lake	2.2	1.6	0.6	3.79	0.74	-	**4.6**	**7.9**
	Lang Lake (La Cloche Mts.)	2.3	1.6	0.6	3.79	0.70	-	**4.6**	**7.9**
	Opasatika Rapids	2.6	6.8	0.6	3.79	0.62	-	**4.7**	**8.2**
	Gravelle Chute	2.7	1.6	0.7	3.26	0.51	-	**3.8**	**6.6**
	Wanatango Falls, Twp. Mann	3.0	6.8	0.3	7.48	1.06	1.66	**10.9**	**18.9**
	Breakneck Falls	3.8	6.8	0.6	3.79	0.43	-	**4.5**	**7.8**
	Ragged Chute	4.0	1.3	0.4	5.64	0.61	-	**6.3**	**11.0**
	Frederick House Lake Dam	4.0	6.8	0.6	3.79	0.40	-	**4.5**	**7.8**
	Timmins South	4.0	6.8	0.6	3.79	0.40	-	**4.5**	**7.8**
	Nairn Falls	4.5	1.3	0.7	3.11	0.29	-	**3.5**	**6.0**
	Mattagami Lake Dam	4.5	6.8	0.6	3.79	0.36	-	**4.5**	**7.7**
	Mariva Falls	5.4	6.8	0.7	3.47	0.28	-	**4.0**	**7.0**
	Poplar	6.6	6.8	0.3	7.18	0.49	1.66	**10.0**	**17.3**
	Christopher Rapids	7.2	6.8	0.7	3.24	0.20	-	**3.7**	**6.4**
	Rapids, Twp. S. Clute And Leitch	9.8	6.8	0.3	6.60	0.33	1.66	**9.2**	**15.9**
	Big Beaver Falls	11.0	6.8	0.6	3.28	0.29	-	**3.8**	**6.6**
	Sextent Rapids	14.0	6.8	0.5	3.75	0.28	1.00	**5.4**	**9.3**
	Upper Mattagami (Various Sites)	16.0	6.8	0.6	5.50	0.47	-	**6.4**	**11.1**
	Espanola	16.3	1.3	0.7	2.81	0.18	-	**3.0**	**5.2**
	Yellow/Island Falls	18.0	6.8	0.6	2.96	0.18	-	**3.4**	**5.8**
	High Falls	19.3	1.3	0.7	2.68	0.15	-	**2.9**	**5.0**
	Newpost Creek	25.0	6.8	0.6	4.75	0.32	-	**5.4**	**9.4**
	Big Eddy	27.6	1.3	0.7	2.35	0.10	-	**2.5**	**4.3**
	Allen Rapids	131.0	6.8	0.5	3.72	0.13	1.05	**5.3**	**8.3**
	Sand Rapids	131.0	6.8	0.5	3.68	0.26	1.03	**5.3**	**8.4**
	Renison	135.0	6.8	0.5	4.09	0.07	1.19	**5.7**	**9.1**
	Blacksmith Rapids	140.0	6.8	0.4	4.37	-	1.30	**6.1**	**9.7**
	Grand Rapids	174.0	6.8	0.4	4.31	0.09	1.26	**6.1**	**9.7**
	Nine Mile Rapids	295.2	6.8	0.5	3.62	0.07	0.96	**5.0**	**7.8**
	Chard	370.0	8.3	0.5	4.06	0.11	1.50	**6.2**	**9.8**
	Lower Mattagami (Various Sites)	454.0	6.8	0.2	5.50	0.08	0.42	**6.4**	**10.6**
	Hat Island	490.0	8.3	0.5	3.80	0.09	1.37	**5.7**	**9.1**
Northwestern	Caribou Falls	1.0	14.8	0.7	3.51	1.49	-	**5.9**	**10.0**
	Trowbridge Falls	1.1	14.8	0.7	3.49	1.35	-	**5.7**	**9.7**
	N. Thunder Bay	1.1	14.8	0.7	3.38	1.27	-	**5.5**	**9.3**
	Bentley Creek	1.7	14.8	0.7	3.39	0.84	-	**5.0**	**8.5**
	Shabaqua Corners	2.9	14.8	0.3	7.48	1.12	-	**10.1**	**17.5**
	At Hwy 17	2.9	14.8	0.6	3.79	0.56	-	**5.1**	**8.8**
	Hume	4.1	14.8	0.3	7.48	0.79	-	**9.7**	**16.8**
	Myrtle Falls	4.8	14.8	0.4	5.63	0.51	-	**7.2**	**12.5**
	High Falls	6.0	14.8	0.6	3.70	0.27	-	**4.7**	**8.1**
	Long Lake Dam	6.5	14.8	0.6	3.65	0.25	-	**4.6**	**7.9**
	Lot 2 Block 'A' Twp. Paipoonge	6.6	14.8	0.3	7.17	0.49	-	**9.0**	**15.6**
	Km 8 & Km 12.8 (#286 & 288)	8	14.8	0.4	5.22	0.30	-	**6.5**	**11.3**
	3.2 km below White Lake	9	14.8	0.3	6.83	0.38	-	**8.5**	**14.7**
	Dragonfly Lake	10	14.8	0.3	6.59	0.33	-	**8.1**	**14.1**
	Mileage19.2/25.6	10	14.8	0.6	3.33	0.32	-	**4.3**	**7.4**
	Lower Lake	10	14.8	0.7	2.87	0.28	-	**3.7**	**6.4**
	Mokoman Falls	11	14.8	0.3	6.48	0.60	-	**8.3**	**14.4**
	1.6 km below Chicagonce Falls	12	14.8	0.3	6.42	0.56	-	**8.2**	**14.2**
	Lac Seul	13	14.8	1.0	1.96	0.15	-	**2.5**	**4.3**
	Hay Rapids/High Falls	13	14.8	0.4	4.73	0.37	-	**6.0**	**10.4**
	Wawatay	14	14.8	0.6	3.14	0.23	-	**4.0**	**6.8**
	7.2 km from mouth	58	14.8	0.5	3.62	0.07	-	**4.3**	**7.3**
	Mileage 7.9	85	16.7	0.5	3.60	1.04	0.06	**5.7**	**9.4**
Southern	Lady Evelyn Lake Dam	2	1.6	0.6	3.79	0.71	-	**4.6**	**7.9**
	Rideau Falls	2	2.5	0.4	5.63	1.21	-	**7.0**	**12.1**
	Lower Burnt Chute	3	1.6	0.6	3.79	0.46	-	**4.3**	**7.5**
	North Bala	4	1.6	0.6	3.79	0.35	-	**4.2**	**7.3**
	Mistinikon Lake Dam	4	1.6	0.6	3.79	0.35	-	**4.2**	**7.3**
	Byng Inlet	4	1.6	0.6	3.79	0.32	-	**4.2**	**7.2**
	Hound Chute	5	1.6	0.8	2.90	0.21	-	**3.2**	**5.5**
	Gibson	5	1.3	0.6	3.79	0.28	-	**4.1**	**7.1**
	Larder	7	1.6	0.6	3.61	0.20	-	**3.9**	**6.7**
	Schikluna	7	1.3	0.8	2.91	0.16	-	**3.1**	**5.4**
	Chaudiere	7	2.5	0.4	5.06	0.33	-	**5.5**	**9.6**
	DeCew Falls	18	1.3	0.3	6.25	0.34	-	**6.7**	**11.6**

Source: OPA

Note: "MW" is installed capacity, "ACF" is average capacity factor (annual), "Conn." is total attributed connection cost (site connection plus enablers), "Bulk" is bulk transmission (network) upgrade) cost. "DR" is social discount rate, in real terms.

Table 16: Potential Wind Resources: Large Sites – All-Inclusive Unit Energy Costs (¢/kWh)

Region	Site	Capacity (MW)	Loss (%)	ACF	LUEC (¢/kWh 4% DR) Base	Conn.	Bulk	All-in (4% DR)	All-in (8% DR)
Bruce	Wingham (D 22)	36	1.3	0.3	8.92	0.25	-	**9.3**	**12.1**
	Stratford (S 59)	60	1.3	0.3	8.78	0.11	-	**9.0**	**11.7**
	Stratford (S 60)	123	1.3	0.3	8.33	0.13	-	**8.6**	**11.2**
	Bruce (S 36)	177	1.3	0.3	7.72	0.05	-	**7.9**	**10.2**
	Bruce Peninsula (S 46, S 5)	380	1.3	0.3	7.69	0.44	0.05	**8.3**	**10.9**
	Goderich (D 32, D 38, D 37, S 58)	429	1.3	0.3	7.94	0.11	0.19	**8.4**	**10.9**
Eastern	Wallace (S 23)	42	2.5	0.3	8.03	0.18	-	**8.4**	**11.0**
	Wallace (S 45)	200	2.5	0.3	7.85	0.21	-	**8.3**	**10.8**
	Pembroke (S 26, S 18, S 29)	207	2.5	0.3	8.36	0.72	0.27	**9.6**	**12.8**
	Picton (S 54, S 53)	292	2.5	0.3	7.84	0.25	-	**8.3**	**10.8**
Northeastern	Northern Georgian Bay (S 43) *	66	1.6	0.3	8.59	0.76	-	**9.5**	**12.6**
	Dymond (S 48) *	66	8.3	0.3	8.59	0.54	-	**10.0**	**13.1**
	East Lake Superior (S 17) *	72	5.8	0.3	8.34	0.22	0.40	**9.5**	**12.5**
	Pinard (S 50) *	76	8.3	0.3	8.50	1.60	-	**11.0**	**14.9**
	Larchwood (S 33) *	119	1.6	0.3	8.21	0.21	0.18	**8.7**	**11.5**
	East Lake Superior (S 30) *	200	5.8	0.3	7.79	0.20	0.40	**8.9**	**11.8**
	Martindale (S 40) *	200	5.8	0.3	7.98	1.00	-	**9.5**	**12.8**
	Manitoulin Group 1 (S 35, S 22) *	400	3.4	0.3	7.98	0.41	0.44	**9.1**	**12.2**
	East Lake Superior Group 2 (S 6, S 4) ^ *	400	5.8	0.3	7.79	0.01	1.30	**9.7**	**13.0**
	East Lake Superior Group 1 (S 25, S 2) *	400	5.8	0.3	7.79	0.01	0.94	**9.3**	**12.4**
	Manitoulin Group 2 (S 8, S 13, D 19, D 25) ^ *	554	3.4	0.3	8.10	0.38	0.41	**9.2**	**12.2**
Northwestern	Rabbit Lake (S 51) *	44	14.8	0.3	8.78	0.40	-	**10.8**	**14.1**
	Alexander (S 39) *	78	16.7	0.3	8.64	0.94	-	**11.5**	**15.3**
	Marathon (S 7) *	95	14.8	0.3	8.49	0.12	-	**10.1**	**13.1**
	Fort Frances (S 56) *	154	14.8	0.3	7.92	0.32	-	**9.7**	**12.6**
	Northern Superior (S 44) *	200	14.8	0.3	8.13	0.09	-	**9.6**	**12.6**
	Alexander (S 47) *	200	16.7	0.3	8.13	0.56	-	**10.4**	**13.8**
	Lakehead (S 55, S 32, S 42) *	579	14.8	0.3	8.14	0.65	-	**10.3**	**13.7**
	Thunder Bay (S 12, S 10, S 11, S 14, S 3) *	604	14.8	0.3	8.02	0.44	0.07	**10.0**	**13.2**
Southern	Kingsville (S 1)	33	1.3	0.3	8.58	0.25	-	**9.0**	**11.6**
	Kent (S 16)	41	1.3	0.3	8.30	0.34	-	**8.8**	**11.4**
	Windsor (S 31)	69	1.3	0.3	7.83	0.01	-	**7.9**	**10.2**
	Simcoe (D 18)	100	2.5	0.3	7.77	0.10	-	**8.1**	**10.5**
	Simcoe (D 23)	200	2.5	0.3	7.67	0.16	-	**8.0**	**10.4**
	Port Burwell (D 21)	200	1.3	0.3	7.29	0.09	-	**7.5**	**9.7**
	Elmira (D 24)	200	1.3	0.3	7.67	0.05	-	**7.8**	**10.1**
	Kingsville (D 20)	200	1.3	0.3	7.29	0.06	-	**7.4**	**9.6**
	Parry Sound (S 28, S 15, S 38, S 41, S 49)	237	1.6	0.3	8.92	0.32	0.41	**9.8**	**13.0**
	West of London (S 57, S 52, D 26)	337	1.3	0.3	8.36	0.36	0.81	**9.7**	**13.0**
	North Bay (S 34, D 39, S 37) *	402	9.6	0.3	8.18	0.34	0.60	**10.1**	**13.5**

Source: OPA.
Note: A single representative LUEC is shown for all sites within a cluster. "DR" is social discount rate, in real terms. "ACF" is average capacity factor (annual), "Conn." is total attributed connection cost (site connection plus enablers), "Bulk" is bulk transmission (network) upgrade) cost.
^ Group 1 sites must precede corresponding Group 2 sites.
* Northern wind sites are contingent on major reinforcement of North-South Tie.

These sites and associated energy production are also given in Table 10. For the sites within a cluster, a single representative LUEC is shown, to indicate the economics of the cluster considered as a whole.

The ranges of unit costs for each resource type by region are summarized in Table 17:

Table 17: Potential Renewable Resources – Range of Unit Energy Costs by Region

	All-Inclusive Unit Energy Costs (¢/kWh 4 % DR)		
	Minimum	**-**	**Maximum**
Hydroelectric			
Eastern	3.97	-	8.55
Northeastern*	2.48	-	6.44
Northwestern*	2.48	-	8.30
Southern	3.11	-	7.02
Wind			
Eastern	8.27	-	9.59
Northeastern	8.74	-	11.01
Bruce	7.87	-	9.29
Northwestern	9.64	-	11.50
Southern	7.44	-	10.10
Bioenergy	8.10	-	11.90

Source: OPA.
Note: "DR" is social discount rate expressed in real terms.
* For the purpose of comparison with large wind sites, hydroelectric sites smaller than 10 MW in Northeastern and Northwestern Ontario have been excluded from this table.

Hydroelectricity is seen generally to have a lower unit energy cost than wind resources.[10] The economic advantage of hydroelectric over wind is in fact greater than this LUEC comparison alone would suggest, because of the higher capacity value of hydroelectric. That is, for given installed capacity of hydroelectric and wind resources, the hydroelectric resources make a much larger contribution to meeting the annual peak in system demand, thereby substantially avoiding the need (and costs) for other resources that would otherwise be needed to meet system adequacy requirements.[11]

[10] This conclusion applies to the hydroelectric sites for which costs estimates have been provided. The conclusion will not necessarily apply to other sites, such as those on the Northern Rivers (except the two sites on the Albany River), which will be seen to be judged not feasible.

[11] The refinement to the LUEC comparison between wind and hydroelectric resources given in this exhibit reflects the general consideration that LUECs are most useful in making comparisons between resources of the same type, and that more refined analysis may be required in comparing resources of different types.

For the wind resources, more of these other resources would be required, adding to total system cost. This consideration is addressed further under Step 4.

Step 4: Determine the renewable resources to be included in the Plan

Feasibility considerations were applied to the four resource types as follows:

Solar

Large solar facilities now addressed as committed, totaling 88 MW, may not all proceed to development. It is assumed that new large facilities will replace those that do not proceed, with no net incremental capacity beyond the 88 MW. On this basis, planned solar resources (from large facilities) are presented as zero. Small, less than 500 kW solar resources, are considered part of the Conservation plan (see Exhibit D-4-1) and so are not counted towards the renewable resources target.

Bioenergy

All bioenergy identified previously as potential (450 MW) is assumed, on the basis that simple connection is all that will be required (no enabler lines or transmission upgrades).

Hydroelectric

As discussed in more detail later in this exhibit, hydroelectric resources were determined to be more economic than wind resources.[12] Therefore, all feasible hydroelectric resources are counted towards meeting the renewable resources target. In assessing feasibility, the OPA has considered the constraints on hydroelectric development, including the constraints on development in parks, and the Northern Rivers and Moose River Basin commitments, as discussed below.

The Plan includes the development of some sites that are currently located on lands classified as parks and protected areas, including conservation reserves. These sites

The remaining 1,508 MW needed to meet the 2025 target is to be addressed by large wind sites, the sole remaining resource.[16] This amount of large wind was increased by 384 MW to provide a margin to allow for some of the resources not materializing. The resulting amount of large wind needed is 1,892 MW.[17]

To achieve this 1,892 MW of large wind, the OPA has identified twice the required amount from the most economic sites from the Hélimax study, on the assumption that 50% of the capacity from these sites will come into service.[18] The 50% adjustment also incorporates an adjustment for a number of large sites that have been divided into sites less that 10 MW (i.e., small) sites and would otherwise be double counted. In order to establish the large sites qualifying as most economic, the large sites were selected in order of their all-inclusive LUECs.

This process resulted in the selection of four of the ten clusters shown in Table 13. These clusters are: Bruce Peninsula, Goderich, East Lake Superior and Manitoulin. The common connection lines associated with these large site clusters are also included in the Plan, as discussed in Exhibit E-2-2.

The specific sites included in the Plan should be viewed as representative and corresponding to a plausible development path for meeting the 2025 renewables target. However, no site should be viewed as excluded for future development by virtue of not being included in this list of assumed sites (including the sites that did not qualify as "most economic"). The development of wind potential will be driven by procurements, and will reflect proponent interest and local community acceptance. Therefore, development will not necessarily proceed in economic merit order.

In summary, the planned wind resources are 1,148 MW of small wind facilities and 1,891 MW of large wind facilities, for a total of 3,039 MW.

[16] That is, 1,508 is 2,656 - 1,148.
[17] That is, 1,892 is 1,508 + 384.
[18] Selection of large wind sites is described in Exhibit E-2-2.

Hydroelectric versus wind economic comparison

The Plan includes all feasible hydroelectric potential. However, while the least economic hydroelectric sites have all-inclusive LUECs lower than those of the most economic of the large wind sites not included in the Plan, the differences are relatively small. This may be seen from comparisons between Table 15 and Table 16. As stated previously, LUEC analysis has limitations in comparing the relative economics of different resource types. In particular, LUEC is an energy measure, raising the question of the degree to which capacity considerations might affect the conclusion reached. Additional factors to be considered are the discount rate and hydroelectric capital costs assumed for the evaluation. This section addresses these questions, and demonstrates that "least-economic feasible hydroelectric" is more economic than "best excluded" wind, when both energy and capacity are considered, for a range of discount rates and higher capital costs. However, this conclusion does not hold at the margins, namely a combination of both a higher discount rate and higher hydroelectric capital costs relative to the reference assumptions.

The first step is to put the potential hydroelectric and wind resources on a common effective capacity basis, as discussed previously. The least economic hydroelectric resource will have a higher demand-meeting capability per unit of installed capacity than the best excluded wind resource. That is, in order to have the same effective capacity as the hydroelectric resource, a wind resource would have to be augmented by a peaking resource. This is achieved by adjusting both the hydroelectric and wind LUECs to the same (100%) demand-meeting capability, by adding the proportional amount of the capital cost of an appropriate peaking resource (simple cycle gas turbine ("SCGT")), the resource used in the Plan to provide incremental peaking capacity.[19]

In Table 20 the least-economic feasible hydroelectric resource is taken to be the 370 MW Chard site on the Albany River (as given in Table 15). While there are several feasible hydroelectric sites with somewhat higher LUECs, all are small, less than

10 MW, and not suitable for assessing the merits of the approach adopted in developing the Plan.

Table 20: Impact of Effective Capacity Considerations on Unit Energy Cost of Hydroelectric and Wind (¢/kWh)

Resource	LUEC (all-inclusive)	LUEC Capacity Adjustment	LUEC (all-inclusive capacity-adjusted)
Least-economic feasible hydro	6.17	0.49	6.67
Best-excluded wind	9.59	2.28	11.87

Source: OPA
Note: "Least-economic feasible hydro" is Chard on the Albany River. "Best-excluded wind" is the Pembroke cluster.

The best-excluded wind resource is taken to be the 207 MW Pembroke cluster. Table 16 shows a number of sites of slightly lower LUEC, but these are all sites that are contingent on completion of the North-South transmission reinforcement (whose cost is attributed solely to hydroelectric) and/or sites that are contingent on the completion of other sites in the same geographic area (to which are attributed the associated incremental transmission costs). Therefore, in both cases, the LUECs shown for these excluded sites are artificially lowered relative to that of the Pembroke cluster. The Pembroke cluster is therefore judged to be the most appropriate comparator.

Table 20 shows that the least economic hydroelectric project included in the plan (Chard) is more economic than the most economic wind resource excluded from the Plan (Pembroke cluster). Therefore, by extension, all included hydroelectric facilities in the Plan, will be more economic than all excluded wind resources, for the reference assumptions.

The next step is to establish that this conclusion is valid for a range of discount rates that might reasonably be applied in developing the Plan. The LUEC analysis presented

[19] The appropriate amount of adjustment is based on the 20% effective capacity of wind and the 73% availability of an installed MW of hydroelectric capacity at the time of the system peak.

above is based on a social discount rate of 4% expressed in real terms.[20] A higher discount rate was applied to the marginal resource decision, i.e., least-economic hydroelectric versus best-excluded wind.

Discount rates are discussed in Exhibit D-3-1, Attachment 1. A discount rate of 8% (real) was used to recalculate the LUECs for these two facilities. The results are shown in the following Table 21.

Table 21: Impact of Assumed Discount Rate (DR) on Unit Energy Cost of Hydroelectric and Wind (¢/kWh)

	Capacity-adjusted all-inclusive LUEC	
Resource	**(4% DR)**	**(8% DR)**
Least-economic feasible hydro	6.67	10.46
Best-excluded wind	11.87	15.74

Source: OPA
Note: "Least-economic feasible hydro" is Chard on the Albany River. "Best-excluded wind" is the Pembroke cluster.

The results show that when hydroelectric and wind power resources are compared on a common effective capacity basis, the hydroelectric resource is more economic than a wind power resource of the same installed capacity, for a social discount rate up to 8%. The margin is seen to decrease with increasing discount rate.

The final assessment is with respect to the capital cost assumptions. Construction costs in general have risen since 2005 when the hydroelectric estimates used in the Plan were developed. Table 22 shows the comparison when the capital cost of the least economic hydroelectric resource is increased by 50%, from $2,600/kW to $3,900/kW (2007 dollars).

[20] "Real terms" means 4% after deducting the expected annual rate of inflation.

Table 22: Impact of Assumed Hydroelectric Capital Cost on Unit Energy Cost of Hydroelectric and Wind (¢/kWh)

Resource		Capacity-adjusted all-inclusive LUEC (4% DR)	Capacity-adjusted all-inclusive LUEC (8% DR)
Least-economic hydroelectric	($2,600/kW)	6.67	10.46
Least-economic hydroelectric	($3,900/kW)	8.31	13.34
Best-excluded wind		11.87	15.74

Source: OPA
Note: "Least-economic feasible hydro" is Chard on the Albany River. "Best-excluded wind" is the Pembroke cluster.

The comparison shows that under the assumed higher capital costs for hydroelectric resources, the least-economic hydroelectric site is more economic than the best-excluded wind at both a 4% and 8% discount rate.

The overall conclusion is that the general approach of including all feasible hydroelectric resources in the Plan is justified, recognizing that at the margins, the cost of least-economic hydroelectric and best-excluded wind will be comparable. It is not possible at this time to be more definitive. Site-specific data on many potential new hydroelectric sites, especially those that would come into service beyond 2015, is extremely limited, meaning that installed capacities, energies and costs have a significant degree of uncertainty. While the present analysis provides justification for pursuing the development of these sites, the next steps must focus on improving understanding of the site specifics.

The need for more site-specific data applies especially to the two Albany River sites, Hat Island and Chard, which together constitute the largest hydroelectric capacity addition included in the Plan. In particular, the remoteness of these sites from major population centres and infrastructure could lead to substantial cost premiums for their development.

Another factor to be considered in future assessments of the relative economics of hydroelectric and wind is developments in wind technology and associated cost performance that can be anticipated.

Summary of the Application of Planning Criteria in Developing Renewable Resources in the IPSP

The feasible renewable resources are next reviewed, in the context of the six planning criteria. Feasibility and cost are seen to be the primary determinants of the renewable resource mix.

Feasibility and Cost

The set of resources identified as feasible is based on lowest cost or on expected response to directives or procurement programs. All feasible hydroelectric resources were included, on the basis that hydroelectric resources are the most economic of the renewable types.[21] Bioenergy and RESOP wind (small sites) resources were included on the basis of expected response to procurement programs.[22] Large wind sites were included on the basis of lowest cost (selecting twice as much as needed, to reflect the uncertainty as to which specific sites will be developed). The total amount of wind so selected is within the 5,000 MW limit for system operability. Solar resources are assumed be small customer-owned facilities that are considered in the Conservation plan (see Exhibit D-4-1).

The total capacity of the assumed renewable resources only slightly exceeds the renewables target.[23] The case for not including more renewable resources in the Plan is that to do so would add to the costs of the Plan for the reasons set out below.

[21] When resources are compared on a common demand-meeting capability (effective capacity).
[22] It is noted that the criteria are not completely independent. For example, one factor considered in determining the feasible potential was societal acceptance, especially at the local level.
[23] Exceeding it by 384 MW, which is not considered significant in the overall context of the Plan.

Q. The fourth step in the OPA's analysis was to determine the preferred option for meeting the remaining baseload requirements. What is the preferred option?

A. In Step 4, nuclear and CCGT resources were considered as feasible options. The OPA analysis determined that nuclear was the preferred baseload resource as discussed in Exhibit D-3-1, Attachment 1. This does not preclude the possibility of new feasible resources emerging in the future. Specifically, it is possible that contracts for firm imports of baseload resources may prove to be available, or that Conservation resources in addition to those specified in the Directive may be realized. With respect to Conservation, the OPA will be reviewing the results of its Conservation programs through EM&V. These results may demonstrate that additional Conservation resources could be a feasible baseload alternative to supply.

Q. The fifth step of the OPA's analysis was to determine the feasible amount of, and contributions from, the preferred option to meet the remaining baseload requirements. What is the feasible amount and what are the expected contributions to meeting the baseload requirements?

A. In order to respond to this question, it is necessary to consider the timing of new build nuclear generation and whether or not nuclear units are refurbished.

Q. What is the timing of new nuclear generation?

A. Under both Case 1A and Case 1B, the earliest in-service date for new nuclear generation is 2018, based on the assumption of a 10 year lead time requirement for new nuclear. The OPA understands that the following preliminary assessments are being carried out by OPG and Bruce Power.

- In 2006, Bruce Power and OPG started the federal approvals process for the construction of new nuclear power plants at the Bruce site and at the Darlington site, respectively. As part of this process, applications have been made to the Canadian Nuclear Safety Commission ("CNSC") for Site Preparation licenses as part of an Environmental Assessment ("EA") required under the *Canadian Environmental*

Assessment Act ("CEAA"). This is the first of many licenses required under the federal approvals process for new nuclear units.

- The OPG initiative is in accordance with a June 2006 Ministerial Directive to OPG "to begin the work needed to enter into an approvals process, including an environmental assessment for new units to be built at an existing facility". The proposed OPG project is for up to 4,800 MW of new nuclear capacity from up to four nuclear generating stations. The proposed Bruce Power project is for the construction and operation of up to four new nuclear reactors with a total capacity of approximately 4,000 MW. In the event that either or both of these projects are implemented, Bruce Power and OPG project that site preparation and construction of the nuclear units could start as early as 2010/2011.
- Both Bruce Power and OPG will be considering various nuclear reactor technology options as part of their proposed projects. The technology options include CANDU, Advanced CANDU, Pressurized Water Reactor ("PWR"), and Boiling Water Reactor ("BWR") designs. The respective project EAs will include these technology options.

Separately, the Ontario government has recently commissioned McKinsey and Company to conduct an independent strategic assessment of the nuclear technology options available to the province. This assessment is expected to be completed later in 2007.

The OPA takes no position on the issue of a preferred nuclear reactor technology option for new nuclear generation as this is not relevant for the purpose of this Plan.

Q. How much of this baseload nuclear capacity will be from refurbished nuclear and from new build nuclear?

A. Up to 8,849 MW of nuclear capacity can potentially be acquired from the refurbishment of existing nuclear generating facilities over the term of the Plan. This consists of the units at Pickering B (2,064 MW), Bruce B (3,261 MW) and Darlington (3,524 MW).

- Case 1A includes 3,040 MW of committed refurbished nuclear from the current Bruce A Refurbishment Project and 10,249 MW of planned nuclear. The planned

nuclear assumes up to 8,849 MW of refurbished nuclear (Pickering B, Bruce B and Darlington) and 1,400 MW of new build nuclear.

- Case 1B includes 3,040 MW of committed refurbished nuclear from the Bruce A Refurbishment project and 10,185 MW of planned nuclear. The planned nuclear assumes up to 6,785 MW of refurbished nuclear (Bruce B and Darlington) and 3,400 MW of new build nuclear.

The IPSP accommodates both scenarios as demonstrated in Figures 3 to 6. As the Plan evolves, the composition of the planned nuclear resources could change with respect to actual amounts of refurbished nuclear and new build nuclear resources.

Refurbishment decisions will not be made by the OPA, but by nuclear plant owners or operators. The first refurbishment decision, expected in 2008, relates to Pickering B. If OPG decides not to refurbish Pickering B, then the Plan assumes that the associated capacity of 2,064 MW will be replaced at a later time by new nuclear resources. This constitutes Case 1B.

Similar scenarios with respect to the refurbishment of Bruce B and Darlington or replacement with new build nuclear will be considered in future Plans. These considerations do not affect the current IPSP.

The following describes considerations related to refurbished nuclear and new build nuclear assumed in the Plan:

The four units at Bruce A (3,040 MW) are currently being refurbished and are included as committed nuclear in the Plan:

- Bruce Power entered into a $4.25 billion *Bruce Power Refurbishment Implementation Agreement* with the OPA in October 2005 to refurbish and restart Units 1 and 2, refurbish Unit 3 and extend the operating life of Unit 4. The restart of Units 1 and 2, expected to be completed by 2009 to 2010, will add another 1,500 MW of nuclear capacity and extend their service lives by 25 years. This will increase the total Bruce site generating capacity to about 6,200 MW. The work on

Units 3 and 4 is expected to be completed by 2012. This will extend the service life of Bruce Unit 3 by another 25 years and that of Bruce Unit 4 to about 2016 to 2017.

- Since the *Bruce Power Refurbishment Implementation Agreement* was signed, Bruce Power has entered into an amendment (the "First Amending Agreement to the Bruce Power Refurbishment Implementation Agreement") with the OPA which will increase the scope of the original project to also include the full refurbishment of Bruce Unit 4. This is projected to be completed by 2012 and will result in the extension of the service life of Bruce Unit 4 by another 25 years.

Refurbishment is an established option, both from a technical and regulatory standpoint, as demonstrated by many completed nuclear refurbishment projects both in Canada and internationally. Specifically, refurbished nuclear units in Ontario currently in-service include Units 1 and 4 of Pickering A. Currently, Bruce Power is refurbishing all four Bruce A Units with a projected completion date of 2012 for the full project. Other relevant Canadian experience includes the refurbishment, in progress, of the 680 MW Point Lepreau nuclear generating station by New Brunswick Power with a projected completion date of 2009.

Subject to economic viability, refurbishment is an attractive option for the following reasons:

- Compared to the new nuclear build option, refurbishment provides a shorter lead-time advantage as a result of unit refurbishment outages of two years or less;
- Refurbishment utilizes existing generation infrastructure, sites and transmission infrastructure thereby minimizing the associated environmental footprint;
- Local and surrounding community support for the continued operation of the Pickering, Bruce and Darlington generating stations is strong; and
- Experience from past and current refurbishment projects, both domestically and internationally, is leveraged on an on-going basis. This could result in improved project cost and schedules.

IPSP AUTHORIZED PROCUREMENTS

1.0 INTRODUCTION

The purpose of this exhibit is to identify the resources in the Integrated Power System Plan (the "IPSP" or the "Plan") that the OPA intends to procure in accordance with the OEB-approved procurement process. The evidence with respect to the procurement process is found in Exhibit B-2-1.

Q. What resources does the OPA propose to acquire through the OEB-approved procurement process?

A. There are two types of resources to be procured under the OEB-approved procurement process in order to meet the requirements of the IPSP. They are: (1) new gas-fired generation; and (2) Lennox Generating Station ("GS"). The procurement of the resources under government Directives is not addressed in this evidence.

2.0 NEW GAS-FIRED GENERATION

Q. What is the new gas-fired generation identified in the IPSP?

A. There is approximately 2,200 MW of new gas-fired generation that is required for local area supply and transmission relief, as presented in Exhibit D-8-1. This capacity is comprised of 1,200 MW[1] that is subject to a procurement directive and 1,000 MW that is expected to be procured under the OEB approved procurement process in the near-term.

The current approximate capacity targets for the resources to be procured under the OEB approved procurement process are as follows:

[1] Northern York Region (350 MW of single cycle gas turbine generation) and Southwest GTA (850 MW of combined cycle gas turbine generation)

1. 550 MW in the Greater Toronto Area ("GTA"); this could be either combined cycle gas turbine ("CCGT") generation or single cycle gas turbine ("SCGT") generation.
2. Approximately 450 MW of SCGT generation in Kitchener-Waterloo-Cambridge-Guelph ("KWCG").

More details with respect to these plants and these two areas are provided in Exhibits E-5-1, E-5-2 and E-5-3 respectively, as well as in Exhibit D-8-1.

Q. What approvals and permits have to be acquired to construct and operate these new gas-fired facilities?

A. The approvals and permits required for new gas-fired facilities depend on various aspects, such as the type, design, location, etc. Table 1 below provides an overview of possible permits and approvals that may need to be obtained but not all of which may be required for one project:

Table 1: Permits/Approvals

PERMITS/APPROVALS FOR GAS-FIRED PROJECTS (as applicable)	PERMIT AGENCY
Canadian Environmental Assessment Act	Environment Canada/Natural Resources Canada
Air Navigation Obstruction Clearance	Transport Canada
US-Canada Transboundary Notice (Air Emissions)	Environment Canada
NEB Approvals (Gas Supply)	National Energy Board
Greenhouse Gas reporting Site	CEPA/Statistics Canada
Boating Restriction Regulation	Coast Guard
Fisheries Act Authorization or Permit	Fisheries and Oceans Canada/ Local Conservation Authority
Navigable Waters Protection Act Clearance - Request for Exemption	Canadian Coast Guard
Environmental Assessment	Ministry of the Environment (MOE)
Certificate of Approval (Air and Noise)	MOE
Certificate of Approval (Industrial Sewage)	MOE
Permit to Take Water	MOE
Waste Generator Number	MOE
Ontario Emissions Trading Registry	MOE
Notice of Project	Ministry of Labour
Pre-Start Review (Occupational Health and Safety Act)	Ministry of Labour
Clearance Letter/No Artifacts/Cultural impact	Ministry of Culture
Work Permit	Ministry of Natural Resources (MNR)
Application for Authorization of Construction	Port Authority / MNR
Permit Under the Canada Marine Act (related to dredging)	Port Authority / MNR
Application for Workplace Safety and Insurance Board Number	Workplace Safety and Insurance Board
OEB Licenses such as Generator/Wholesale license	Ontario Energy Board (OEB)
OEB Approvals/Leave-to-Construct (Gas supply)	OEB
OEB Approvals/Leave-to-Construct (Transmission connection)	OEB
Connection Impact Assessment	Hydro One
Cost Estimate Agreement	Hydro One / Transmitter
Connection Cost Recovery Agreement	Hydro One / Transmitter
Transmission Connection Agreement	Hydro One / Transmitter
System Impact Assessment	IESO
IESO Participant Authorization	IESO
Metering Installation Registration	IESO
Facility Registration	IESO
IESO Operating Procedure	IESO
Customer Impact Assessment	Local Distribution Company
Electrical Plan Approvals	Electricity Safety Authority
Electrical Equipment Approvals	Electricity Safety Authority
Electrical Installation Inspections & Approvals	Electricity Safety Authority
Wiring Permit	Electricity Safety Authority
Registration of Pressure Piping Systems	Technical Standards and Safety Authority
Registration of Natural Gas Piping	Technical Standards and Safety Authority
Registration of Pressure Equipment	Technical Standards and Safety Authority
Notification for gas/oil burning-Fuel Safety Branch	Technical Standards and Safety Authority

PERMITS/APPROVALS FOR GAS-FIRED PROJECTS (as applicable)	PERMIT AGENCY
Elevator	Technical Standards and Safety Authority
Registration of Plant under Operating Engineers Act	Technical Standards and Safety Authority
Septic Sewer System	Municipality/MOE
Storm Water Management	Municipality/MOE
Potable Water Connection	Municipality
Sewer Connection	Municipality
Road Entrance Approvals	Municipality
Plumbing Code Compliance Inspection	Municipality
Fire Code Compliance Inspection	Municipality
Other Road Allowance, Signage, etc.	Municipality
Official Plan	Municipality
Zoning	Municipality
Site Plan Approval	Municipality
Building Permits	Municipality
Tree Removal Permit	Municipality
Occupancy Permit	Municipality
Permit for Development, Interference with Wetlands and Alterations to Shorelines and Water Courses	Local Conservation Authority
T-line land acquisition and crossing approvals	Landowners/Government Agencies
Acquisition of land, easements, right of way	Crown/Landowners

Source: OPA

Q. What is the manner in which the OPA expects that these new gas facilities will be procured?

A. In obtaining these two resources, it is the OPA's current intention to use competitive procurements to acquire these facilities.

The OPA has been in contact with several proponents who have shown interest in these procurement opportunities.

Based on the OPA's contact with proponents, the OPA plans to use competitive procurements, where possible, to meet these resource requirements. The specific steps of a competitive procurement are summarized in the in Exhibit B-2-1 Procurement Process.

EVIDENCE IN SUPPORT OF THE PROCUREMENT PROCESS

1.0 INTRODUCTION

The purpose of this exhibit is to address the Procurement Process (the "Process") described in Exhibit B-2-1. Once approved, the Process will allow the OPA to enter into procurement contracts to acquire Conservation and supply resources that will not be procured under the authority of a government directive.

2.0 OVERVIEW

Q. How did the OPA develop the Procurement Process?

A. Three activities can be identified as inputs to developing the OPA's Process. First, after its inception and prior to launching any procurements, the OPA held a broad stakeholder consultation on July 26 to 29, 2005 to discuss past (i.e., procurements launched by the government of Ontario in 2004) and future procurements (to be launched by the OPA). The OPA completed and published a report, titled "Interim Report: Summary of What We Heard in OPA's Generation Procurement Stakeholder Sessions July 26 to 29, 2005" summarizing the comments heard (see Exhibit F-1-2, Attachment 4). These comments were used by a consultant, London Economics Inc. (retained by the OPA) in preparing reports to compare procurement processes of other jurisdictions and to recommend procurement processes for OPA's consideration. As a result, two reports, (i) "Analysis of Procurement Processes for Generation Capacity, Renewables, Demand Response, and Energy Efficiency"; and (ii) "Stakeholder Consultations Regarding Centralized Power Procurement Processes in Ontario", were completed by the consultant in August and September 2005, respectively, and released publicly by the OPA.

Second, the OPA developed and launched several procurements, resulting from government directives. These procurements provided actual 'hands on' experience for the OPA to develop the Process. Examples of supply procurements are:

- Combined Heat and Power ("CHP") RFP;
- Greater Toronto Area ("GTA") West Trafalgar RFP;
- Goreway Station project;
- Portlands Energy Centre project; and
- Ontario Power Generation hydroelectric supply.

Examples of Conservation procurements are:

- York Demand Response ("York DR") RFP;
- RFP for the High Performance Commercial New Construction Program ; and
- Building Owners and Managers Association ("BOMA") project.

Third, in the early development phase of the IPSP for consultation purposes, the OPA developed and published several discussion papers, including one on procurement, entitled "Discussion Paper 8: Procurement Options" found at Exhibit C-12-1. Stakeholder comments (Exhibit C-12-2) to this discussion paper were considered by the OPA prior to developing the Process.

In summary, the OPA used all of the information outlined above to develop and finalize the Process that complies with all applicable statutory obligations of the Act and O. Reg. 424/04 and 426/04.

Q. What did the OPA learn through its various stakeholder consultations?

A. The main lesson learned by the OPA was the need for appropriate selection of a procurement type (i.e., competitive procurement, standard offer procurement, non-competitive procurement) to meet the resource needs identified by the IPSP and address the needs of proponents best able to develop these resources. In addition, it is important that the appropriate design within each procurement type is developed and implemented to ensure optimal results. For competitive procurements, the main point conveyed was the desire to have discipline and robustness in the procurement, resulting in a high quality and timely process and result. For example, where a specific need is identified in the IPSP, only similar projects/programs that meet specified criteria should participate in the procurement (i.e., "apples to apples" competition). In a

circumstance where the need is not specific, a wider range of projects/programs could participate in the procurement. Furthermore, the requirements and evaluation criteria within a procurement should ensure that only qualified proponents participate and submit high-quality proposals while providing mechanisms that level the playing field between different projects/programs.

Q. What did the OPA learn from its own procurement experience?

Supply Procurements

A. The Ministry of Energy ("MOE") carried out three separate competitive supply procurements: the 2,500 MW RFP, the Renewable Energy Supply ("RES") I RFP, and the RES II RFP. The OPA, since its inception, has conducted the following competitive supply procurements:

- GTA West Trafalgar RFP (Result: TransCanada's Halton Hills Generating Station, 600 MW)
- CHP I RFP (Result: seven projects with a total capacity of 414 MW)

Since filing the original evidence, the OPA has launched several other procurement processes:

- CHP II RFP (launched December 2007)
- Northern York Region RFQ and RFP (RFQ closed March 2008; RFP launched June 2008)
- RES III RFEI and RFP (RFEI closed December 2007; RFP launched June 2008)
- CHP III RFEI and RFP (RFEI closed July 2008; RFP to be launched Fall 2008)
- Southwest GTA RFQ (to be launched Fall 2008).

The main lessons that the OPA learned from its supply procurements are as follows:

- Homogenous competitions are preferable, meaning that having similar projects compete is better than having a variety of project types (i.e., supply and Conservation, or renewables and gas-fired generation) competing. With a variety of

competing projects, the procurement becomes more complex to fairly apply all requirements and criteria and to design levelized requirements and evaluation criteria, including pricing, to ensure a fair comparison. This often leads to the "lowest common denominator" solution, which, in turn, can lead to projects being included in the competition that are not well qualified and likely should not have been eligible to participate in the competition.

- Targeted procurements that outline clear requirements for the specific resource will result in a fair procurement with a good result. Where a very specific need has been identified, the procurement should outline those specific requirements. This ensures that all participating projects can provide the needed resource.
- The procurement, in particular the requirements and evaluation criteria, should lead to a robust competition with qualified proponents. The OPA will have to use its knowledge and expertise at setting the requirements and evaluation criteria at a level that ensures those proponents that can deliver the project participate and compete on an equal footing. Ensuring quality proponents and quality projects can be further reinforced through the rated evaluation criteria. In summary, the OPA has to retain the flexibility to set the requirements and criteria for each procurement on an individual basis to ensure a robust competition.
- The OPA has to provide sufficient channels to allow proponents to communicate with the OPA to provide input and ask questions. All proponents must have equal and fair access to these channels. The OPA and proponents benefit from mutual exchange and open dialogue on issues, which will ultimately lead to a more efficient design and execution of the procurement.
- The OPA needs to remain in touch with the industry and current trends and developments to ensure that the requirements and evaluation criteria reflect the needs and abilities of proponents qualified to deliver the required resource. This will ensure that the competition is open to all viable and qualified proponents to deliver a resource.
- Many multi-project procurement processes will result in attrition of some selected projects/programs. Being a successful project/program in a procurement process does not guarantee the successful development of the project/program. There are several risks that projects/programs face after contract award, especially with respect to regulatory processes for obtaining all necessary approvals or other business reasons, such as financing or labour/equipment issues. Ensuring that only qualified proponents participate in a procurement process and including an evaluation of feasibility-related criteria are some examples of achieving greater certainty that a selected project/program will deliver the intended result on time. Setting the right level of security under the procurement contract is another way to ensure that proponents fulfill the contractual obligations. Another mechanism available to the OPA is to include a "margin for error" when setting procurement targets (i.e., procuring more projects than needed). Under those circumstances, attrition of projects/programs does not trigger the OPA to commence another

procurement to obtain the "lost" capacity. Furthermore, for procurements with a sole contract award, an option might be for the OPA to continue to negotiate with another party with the intent of moving that project development forward in case the selected project does not achieve commercial operation.

The OPA has also developed a standard offer procurement, the Renewable Energy Standard Offer Program ("RESOP"). The OPA is currently developing other standard offer programs, including the Clean Energy Standard Offer Program ("CESOP"); the Northern Hydroelectric Initiative ("NHI") for small, transmission-connected waterpower projects in northern Ontario, and an initiative to procure net electricity output from Energy From Waste ("EFW") Pilot or Demonstration Projects ("PDPs").

The main lessons that the OPA learned from its standard offer procurements are as follows:

- Contract milestones are required for standard offer program contracts – for contracts that have already been executed, there is a great deal of uncertainty whether a project will proceed and be developed. Attrition of projects is expected and more likely than with contracts executed resulting from competitive procurements.
- Uncertainty of project development creates frustration by other proponents who did not get a connection queue position.
- Challenges exist in developing standard offer program projects (that are not in the control of the OPA), such as connections, zoning, environmental and municipal approvals
- There is a wide discrepancy in proponent capability.
- Larger projects are being divided to meet the RESOP criterion of a 10 MW limit.
- Considering the high uptake in the RESOP to date, standard offer programs appear to be a viable method to develop generation projects.

Conservation Procurements

The OPA has conducted the following competitive Conservation procurements:

- York DR RFP (Result: Rodan Energy, 3 MW);
- RFP for the High Performance Commercial New Construction Program;

- RFP for the Great Refrigerator Roundup Program; and
- RFP for Aggregation Services for Residential and Small Commercial Demand Response Program

Since filing this evidence, the OPA has launched several other procurement processes:

- RFP for Multifamily Buildings Program Manager – Private Buildings Sector
- RFP for Multifamily Buildings Program Manager – Assisted and Social Housing; and Sector
- RFP for "2008 Summer Sweepstakes".

The main lessons that the OPA learned from its Conservation procurements are as follows:

- The Conservation supply chain is still developing and it is therefore difficult to acquire resources through a competitive procurement. The New Construction Program RFP yielded no compliant bids for the role of Program Manager. As a result, the OPA sole sourced the project. Procurements for Conservation resources need to be simple and, where possible, barriers to participation have to be mitigated. There is often a need to narrow the scope of the procurements, meaning that rather than seek Program Managers who will manage all elements of a project, it is sometimes preferable to divide the project into manageable pieces that allow proponents to bid on their established strengths.

The OPA recognizes the need for capability building as a priority to establish the Conservation delivery network and ensure the use of competitive procurements. The OPA has made capability building a priority in its Conservation plans.

Q. As regulated by Section 1 of O. Reg. 426/04, how will the OPA assess the likelihood of investment occurring on its own and the capabilities of the IESO-administered markets to facilitate investment?

A. Before commencing procurements to acquire the resources that will not be procured under the authority of a government directive, the OPA will have to determine whether these supply resources can be met through alternative means. The alternative means of meeting resource requirements are:

1. Whether these resources are likely to be developed without revenue guarantee or cost recovery mechanisms through contracts with other government agencies and/or regulated cost recovery through the OEB; and,
2. Whether IESO-administered markets are likely to lead to the development of the required supply resources.

The assessment will include studies, which can be conducted both by the OPA or independent experts. In addition to these studies, the OPA will consult with interested parties, relevant agencies and subject-matter experts in the field. At a stakeholder session on March 6, 2008, the OPA presented some potential approaches to assessing the capabilities of the IESO-administered markets. The OPA will continue the dialogue with stakeholders on this issue.

When assessing potential generation being developed independent of an OPA procurement contract, the OPA will not take into account the first 150 MW of renewable generation resources developed through a voluntary green market prior to 2012. Any renewable resources developed prior to that date, to a maximum of 150 MW, will not be taken into account by the OPA going forward when applying this factor.

Q. What factors will the OPA consider in determining the advisability of conducting procurement processes resulting in the execution of procurement contracts?

A. In accordance with O. Reg. 424/04 and O. Reg. 426/04, the two main factors that the OPA will assess are:

- Is the resource identified in the IPSP still required?
- Will the resource be developed independent of an OPA procurement contract?

The OPA will assess the progress of the implementation of the identified projects/programs in the IPSP, including review of any completed procurements. In the event that a resource is no longer required (for example, if another procurement

provided results that also meet this identified need), the OPA will not conduct a procurement.

Regarding the second factor, it will be addressed as part of the assessment of the likelihood that resources will be developed independently of the OPA as discussed above.

Q. In accordance with O. Reg. 426/04, what are the extraordinary circumstances under which the OPA could proceed with a procurement without considering the factors?

A. The OPA would consult with the IESO, as well as other interested parties, as applicable, concerning these extraordinary circumstances. Circumstances that justify proceeding without considering the factors are those that have an urgent impact on reliability.

3.0 PROCUREMENT PRINCIPLES

Q. How does the Procurement Process reinforce environmental and sustainability elements from the IPSP? How does the OPA ensure that the environmental factors taken into account in the IPSP are actually reflected?

A. Environmental impacts and sustainability, as per the Act, Regulations and the Directive, have been addressed in the IPSP. The Process will ensure that the environmental and sustainability elements of the IPSP are reflected in the procurement by ensuring that the resources identified by the IPSP will be procured.

Q. How will the OPA meet the procurement principles listed in O. Reg. 426/04, namely (1) that the procurement process and selection criteria are fairly stated and where possible are open to a broad range of bidders; (2) the procurement process being a competitive one to the greatest extent possible; (3) there being no conflicts of interest or no unfair advantage; and (4) the procurement process not having an adverse impact on project development independent of the OPA?

A. The OPA's Process will meet the principles outlined in the regulation, as follows:

(1) *Procurement Process and selection criteria being fairly stated, open to a broad range of bidders:* all objectives, requirements, and evaluation criteria will be disclosed in the procurement documents, which will be applied and executed in an unbiased, fair and consistent manner.

For competitive procurements and standard offer procurements, the OPA will ensure that the procurements are open to a broad range of proponents by mitigating barriers to entry where needed and appropriate given the nature of the resource and the type of proponents. The OPA will endeavour to strike an acceptable balance between setting appropriate requirements and evaluation criteria and permitting a variety of capable projects/programs to participate.

For non-competitive procurements, these requirements are met by the OPA applying the Process in a fair and consistent manner. Only if the criteria in the Process are met, would a non-competitive procurement be launched. The OPA would communicate its intention and rationale for conducting a non-competitive procurement.

(2) *Preference for competitive procurements*: The OPA's default procurement type is a competitive procurement. The selection of another procurement type is based upon the conditions and circumstances outlined in the Process.

(3) *No conflicts of interest nor unfair advantage*: The procurement documents will have specific provisions to ensure that no conflicts of interest nor unfair advantages exist. Where possible, the OPA will rely on an independent evaluation team to review the proposals. An independent fairness advisor may oversee the procurement, including the evaluation and selection process.

(4) *The procurement process not having an adverse impact on project development independent of the OPA*: The OPA will undertake that its procurements will not have an adverse impact on developments taking place independent of OPA procurements. Furthermore, through its initial assessments, the OPA will ensure that where new investments/developments have taken place or likely to take place, procurements will not duplicate those efforts.

Q. How will the OPA meet the procurement principles listed in OEB Filing Guidelines, namely (1) be fair and transparent; (2) be designed to limit barriers to participation; (3) be as simple as possible; (4) restrict the use of confidentiality provisions; and (5) make provisions for the results to be disclosed?

A. (1) *Fair and transparent*:

As per the Process, the OPA is committed to fairness and transparency. For its competitive procurements, fairness and transparency are incorporated into the process as follows:

Fairness

- procurements are open to a broad range of proponents capable of meeting the identified resource requirement. Where barriers to entry exist, the procurement will aim to mitigate or limit these barriers to ensure broad participation;
- be responsive to the needs of proponents and the power system;
- the objective, requirements, evaluation criteria and selection process will be followed and applied in a consistent and unbiased manner; and
- there will be no conflicts of interest or unfair advantage in the procurement process.

Transparency

- the objective, requirements, evaluation criteria and selection process will be disclosed in the procurement documents[1], as applicable;
- engage interested parties and proponents throughout the procurement;
- provide easy and timely access to information to all proponents; and
- disclose results while safeguarding commercially sensitive information.

(2) *Limit barriers to participation*: procurements will be open to a broad range of proponents capable of meeting the identified resource requirement. Where barriers to

[1] Procurement documents refer to any documents and materials released in association with a procurement. For example, Request for Information (RFI), Request for Expressions of Interest (RFEI), Request for Qualifications (RFQ), Request for Proposals (RFP), Call for Tender (CFT) and program rules are all considered procurement documents.

entry exist, the procurement will aim to mitigate these barriers to ensure open and broad participation.

(3) *Be as simple as possible*: In the interest of having a procurement that is open to a large number of proponents, the OPA will ensure that the terms and conditions, including any qualification process, requirements and evaluation criteria, are tailored for each particular procurement. Through information gained from stakeholder activities, the OPA will design a procurement that is not overly complicated and does not limit participation. However, at the same time, the OPA will also need to ensure that the procurements target those proponents capable of delivering the needed resources.

(4) *Restrict the use of confidentiality provisions*: The OPA will restrict the use of confidentiality provisions to cover information, which is (a) internal to the proponent; or (b) could prejudice the competitive position of a proponent; and (c) is deemed to be commercially sensitive. Commercially sensitive information includes, but is not limited to:

- Detailed technical data (above what is required for EA process) with concerning:
    1. Data and methodologies
    2. Wind data/studies
    3. Fuel data/studies
    4. Energy estimates
- Fuel Supply arrangements
- Site/Project layout
- Equipment Suppliers
- Engineering, Procurement and Construction ("EPC") Arrangements
- Off-take Agreements
- Land lease/Site control arrangements/agreements
- Site suitability studies
- Cost, price, and economic information with respect to the project/program
- Financing information:
    1. Commitment letters (debt, equity and other)

2. Financing Plan

- Interconnection Studies:
  1. For municipal services
  2. For fuel supply
- Connection Costs
- Milestones
- Proposal Clarifications

(5) *Disclosing results*: Upon completion of any procurement, the OPA shall make appropriate announcements regarding the results. For competitive procurements and standard offer procurements, summary results will be disclosed. These results will typically include the number of executed procurement contracts, the identity of the contract counterparties, a brief description of these projects/programs, the total amount of capacity and/or energy resulting from the procurement (e.g., typically measured in MW or MWh), and average pricing. Average pricing will only be released if there are sufficient numbers of projects/programs (generally more than three). For non-competitive procurements, the announced results will include the identity of the contract counterparty, a brief description of the project/program, and the total amount of capacity and/or energy resulting from the procurement. Due to the lack of proponents in a non-competitive procurement or in a single contract award for competitive procurements, and the commercial sensitivity of the information, pricing will not be disclosed in these situations.

Q. How will the OPA ensure simpler procurements for supply from alternative and renewable supply resources, as required by Section 25.31 (2) of the Act?

A. Each procurement is specifically tailored to reflect the targeted projects/programs. In particular for renewable procurements, the OPA may use a standard offer procurement, which in itself is a simpler procurement type. Standardizing the program rules and the procurement contract including price helps remove barriers to investment in alternative and renewable supply resources by helping proponents manage project/program

development efforts, attain financing, and reduce the transaction costs. These procurement elements help mitigate risks to developers of alternative and renewable supply resources.

Furthermore, where competitive procurements are executed, the requirements and evaluation criteria are tailored to best capture relevant and key elements of a project/program. This means that the requirements will be tailored to ensure that the procurement is directed at those proponents qualified and capable of delivering the project/program. Where circumstances allow for it (e.g., for procurements of renewable or alternative energy or Conservation programs), the procurement can be simplified or tailored to better capture the capability and resources of the prospective proponents. For example, the requirements and evaluation criteria can be simplified; thresholds or financial commitments (such as proposal security) can be lowered to more appropriate levels. Simplification of the procurement is generally done to ensure that a sufficient number of capable and qualified proponents participate, resulting in a robust competition.

4.0 PROCUREMENT PROCESS

Q. Can the OPA switch procurement type after a procurement has commenced?

A. Yes, if the OPA initiates a certain procurement type and through the process the OPA gains more information that would make another type a more appropriate procurement mechanism, the OPA can change types, following the criteria outlined in the Process.

Q. What is the purpose of a registration or pre-qualification process?

A. The registration step ensures that only serious proponents who are committed to the procurement participate in the procurement process. This results in greater efficiency of the process, especially regarding communication with prospective proponents. The pre-qualification phase also results in a more efficient process as the OPA will pre-screen the types of proponents and projects/programs for participation. Narrowing the number of proponents to those that are capable of delivering the needed resource will ensure

that the procurement is focused and customised, resulting in a more cost effective and efficient process.

Q. What are the risks to executing a non-competitive procurement?

A. The main risk to a non-competitive procurement is the potential for a high procurement contract price. This risk exists because no competing projects/programs exist as alternatives to the resource that is to be procured through a non-competitive procurement.

Q. How will the OPA address and/or mitigate the risks associated with non-competitive procurement?

A. The OPA can address and potentially mitigate the risk of a high procurement contract price by employing some of the following means to ensure that certain controls are in place to ensure value for money:

- Open-book pricing whereby the proponent reveals all of the costs related to the project/program;
- Benchmark pricing, which sets a base amount to commence negotiations;
- Pricing caps set a top limit on the price, which is not to be exceeded;
- Independent or third party arbitration; and
- Independent expert opinion on the negotiated price (whether it reflects market pricing and provides "value for money").

Q. How does the OPA approve and document its decision to undertake a non-competitive procurement?

A. Where a specific project/program is identified in the near-term plan in the IPSP (which leads to a non-competitive procurement), the evidence will serve as documentation. After applying the Process, the OPA will need to seek approval from the OPA Board of Directors ("BoD") before commencing a non-competitive procurement. The OPA will document its decision and release information regarding the decision and rationale.

Q. What method will the OPA use to establish pricing for a standard offer procurement process?

A. The OPA will first look to any precedents or pricing levels that have been established as a result of competitive procurement processes. These pricing levels may be experience gained in Ontario, or, if not available in Ontario, from other relevant jurisdictions. The OPA will also quantify the price that developers will require to make the necessary investment to develop the project or program with an appropriate rate of return. The method includes a survey of any existing standard offer procurements and their pricing. To the extent that these procurements exist, and are applicable to the respective OPA standard offer procurement, they can help establish pricing. Furthermore, the accuracy of pricing can be assessed by the level of participation. The OPA will retain the flexibility to adjust pricing to react to any changes in market conditions as needed. The methodology will be finalized in consultation with an independent expert.

Q. How will the OPA avoid "hoarding" of standard offer procurement contracts by one or very few successful projects or programs?

A. To the extent that "hoarding" of standard offer procurement contracts becomes a problem, the OPA may develop rules to prevent such a result. For example, these rules may explicitly define how many procurement contracts and/or total quantity any one proponent or related entity may have.

Q. What are the risks to executing a standard offer procurement process?

A. Risks to executing a standard offer procurement include the possibility that the pricing may not be correct. If the contract price is set too low, either the procurement will have few proponents, or contract defaults will occur prior to the project or program becoming operational. If the contract price is set too high, electricity rate payers will essentially overpay for these investments, compared to what could potentially result from a competitive procurement.

Q. If risks exist, how are the risks associated with a standard offer procurement addressed and/or mitigated?

A. With respect to the risks identified above, the OPA could mitigate these risks by creating rules to adjust contract pricing under specific circumstances and staging procurements by setting an aggregate maximum quantity for designated locations in Ontario. The aggregate maximum quantity for designated locations can be revised over time as transmission and distribution are upgraded and expanded.

Q. What are the risks to executing a competitive procurement relative to other procurement options?

A. If a competitive procurement is not well designed, the result may not be optimal (i.e., the winning project/program may not be the best option to meet the needs identified in the IPSP). The OPA, in its procurement, evaluates a variety of important factors that affect the deliverability of the resources. However, despite the best knowledge and understanding of the proponents and the projects/programs, it may be difficult to guard against non-optimal results, including successful projects/programs not getting developed. Another risk to a competitive procurement is pricing. If the prices of the selected project/program are too low, project development could be jeopardized. Prices that are too high could mean that ratepayers are potentially overpaying for the procured resource.

Q. If risks exist, how are the risks associated with a competitive procurement addressed and/or mitigated?

A. Providing multiple opportunities to engage stakeholders and establish a constructive dialogue is crucial to ensuring that a competitive procurement is well designed. Furthermore, consultation and cooperation with other organizations (e.g., IESO, Hydro One, LDCs, etc.) will also minimize those risks. With respect to pricing, it is important that the OPA understands the variables that affect the economics of a project/program to judge whether or not the pricing is appropriate. Completed

procurements will also provide the OPA with a benchmark to assess the economics of projects and programs. Depending on how a competitive procurement is designed, the OPA may have the ability to negotiate some or all of the pricing. In addition, all procurement contracts need to be approved by the OPA BoD which will provide an additional level of accountability.

Q. How will the OPA monitor and evaluate the efficacy of the Procurement Process?

A. The OPA will use stakeholder consultation to evaluate the efficacy of the Process. Stakeholder consultation will occur on both broad-based and target-based levels. Broad-based consultation will address general topics relating to OPA procurements. Target-based consultations will necessarily be more focused and apply to specific OPA procurements (e.g., specific competitive and standard offer procurements). During these consultations, stakeholders will have a chance to provide comments on the efficacy of the particular OPA procurement. The efficacy of a procurement process can be measured by, among other matters, assessing how robust the process was (e.g., number of proponents, capability of proponents and quality of proposals), whether the result closely matched the OPA's need and whether the result was obtained in an efficient manner.

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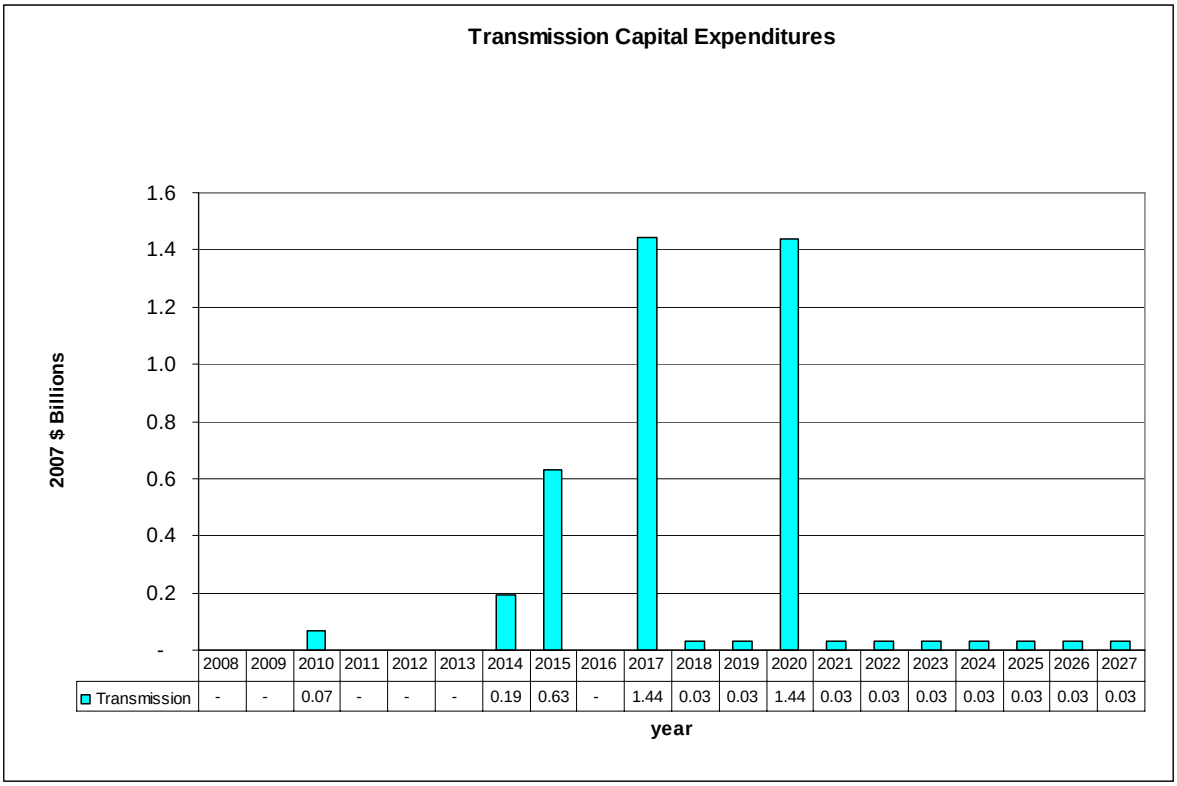
Figure 6: Forecast Expenditures on New Transmission Investments (2007 $Billions)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Transmission	-	-	0.07	-	-	-	0.19	0.63	-	1.44	0.03	0.03	1.44	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Source: OPA

Q. What assumptions were used to develop the Plan cost?

A. The assumptions used to derive these costs are set out in Table 1 which shows the capital and operating cost assumptions of planned generation.

Table 1: Cost Assumptions for Planned Generation

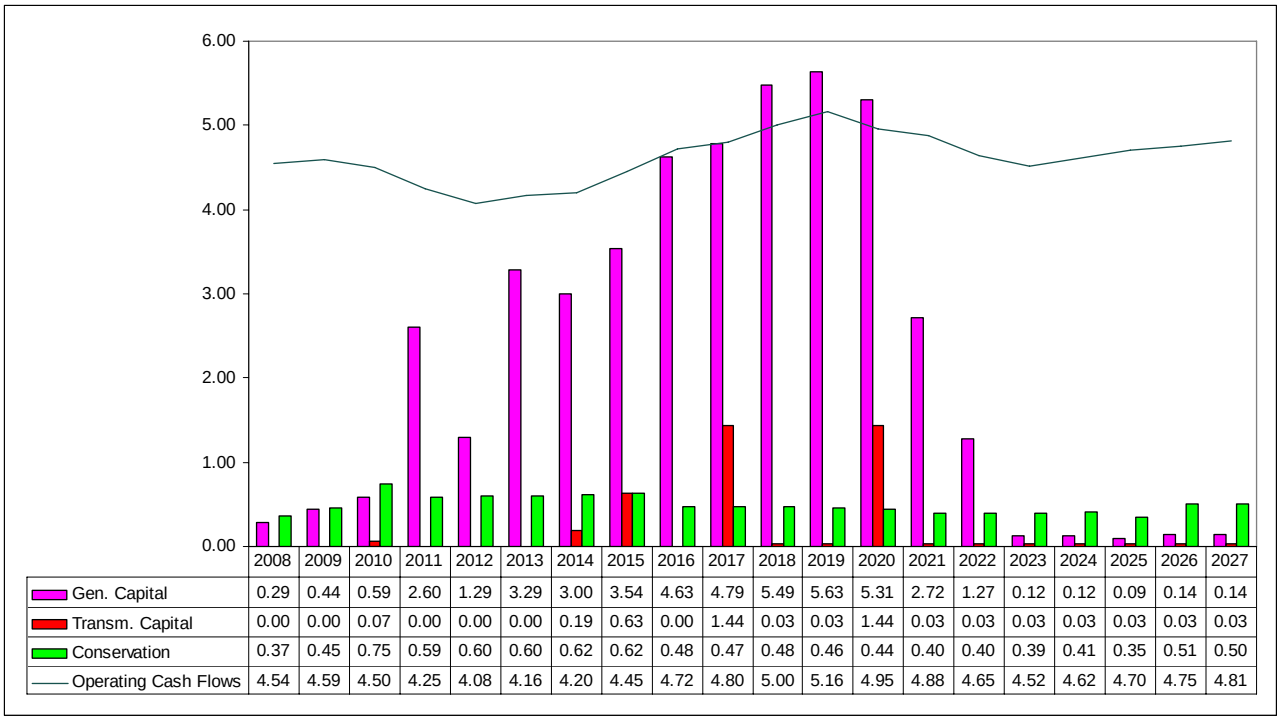
GENERATION TYPE	Capital Cost $/kw	Construction Period (years)	Fixed O&M $/kw	Variable O&M $/MWh	Heat Rate	Operating Life
CCGT	924	3	17.0	2.7	7,150	20
SCGT	665	2	16.0	3.5	9,141	20
Biogas	2,096	2	231.0	27.0	14,800	20
Cogen	1,413	3	22.0	2.7	7000	20
Hydro RR	3,570	4	41.8	0.0		50
Hydro DIS	2,550	4	41.8	0.0		50
Nuclear	2,907	6	108.1	3.1	10,500	40
Wind	1,938	1	47.9	0.0		20
NUG replacing CCGT	924	3	17.0	2.7	8011	20
Fuel Cell	5,447	3	8.3	54.1	7,930	20
Solar	5,712	2	13.3	0.0	10,280	20
Nuclear Refurbishment Cost $M per unit	1,514					

Source: OPA

Q. What are the operating costs associated with the Plan?

A. The cash flows associated with operating the existing and planned generation over the Plan period are also calculated. The annual profile of these operating expenses as well as a summary of the expenditures associated with Conservation, transmission and planned generation assets is outlined in Figure 7

Figure 7: Case 1A Forecast Period Annual Cash Flows (2007 $Billions)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Gen. Capital	0.29	0.44	0.59	2.60	1.29	3.29	3.00	3.54	4.63	4.79	5.49	5.63	5.31	2.72	1.27	0.12	0.12	0.09	0.14	0.14
Transm. Capital	0.00	0.00	0.07	0.00	0.00	0.00	0.19	0.63	0.00	1.44	0.03	0.03	1.44	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Conservation	0.37	0.45	0.75	0.59	0.60	0.60	0.62	0.62	0.48	0.47	0.48	0.46	0.44	0.40	0.40	0.39	0.41	0.35	0.51	0.50
Operating Cash Flows	4.54	4.59	4.50	4.25	4.08	4.16	4.20	4.45	4.72	4.80	5.00	5.16	4.95	4.88	4.65	4.52	4.62	4.70	4.75	4.81

Source: OPA

Q. What other cases were considered in the Plan?

A second case was also developed, referred to as Case 1B, where the refurbishment of Pickering B does not occur and is instead replaced with gas-fired capacity in the interim, until new nuclear capacity comes on-line in 2020. In 2007 dollars, a total of $46 billion in supply investments is anticipated over the 20 year Plan period in this alternative case. Expenditures for Conservation, new transmission assets and planned generation total

AFN INTERROGATORY 16

QUESTION

Source: July 29, 2008 Decision and Order on Motions, NCO, 1) arising from a motion brought by the National Chief's Office on behalf of the Assembly of First Nations.

The Board orders the OPA to provide an answer which identifies all projects within the IPSP that affect or may affect First Nations Reserve and Treaty Lands. This listing should include any projects on which work is done or money committed or for which development is expected to occur during the following three time frames:

- 2007 and 2010
- 2010 and 2013
- Beyond 2013

The listing should be divided by these time frames.

RESPONSE

Please find attached a spreadsheet providing a list of projects identified in the IPSP that affect or may affect First Nations reserve and treaty lands. To provide clarity in our response, please note that we relied on the following interpretations and definitions. The headings below correspond with columns in the spreadsheet.

"Status"

The Status column of the spreadsheet categorizes an IPSP project into one of the three categories referenced in the OEB Decision and Order on Motions (the 'Order') issued July 29, 2008 and relating to the interrogatory responses of the OPA. The OPA has defined the categories in the following manner:

i) "work is done": The proponent has started construction on the project.

ii) "money committed": With respect to generation projects, the OPA has entered into a contract with the proponent, but the proponent has not broken ground. Transmission projects and system upgrades will not be included in this category since the OPA does not procure transmission and has no knowledge as to whether proponents have allocated funds for a project and the timing of such allocation.

iii) "development is expected to occur": These are projects identified in the IPSP that do not fall into either category (i) or (ii), but which are recommended in the IPSP.

"First Nations Reserve Lands"

First Nation reserves have been identified using a map developed by Natural Resources Canada, a copy (reduced in size) of which is attached as Schedule 'A'. Answers were formulated by taking the geographic location of the project (which is approximate in most cases) and placing it, with the naked eye, on the map in Schedule A. In many cases, the First Nations Reserve Lands category will be "n/a" since an effort was made to identify only those First Nations reserve lands in which projects are located or that have projects passing directly through them (in the case of transmission lines). Given the inexact nature of locating and aligning the projects with First Nations reserve lands, proximity of reserve lands have been indicated in some cases. In some circumstances, the answer describes First Nations reserve lands as being "possibly" affected. These are cases where, due to the inexact nature of the exercise, it has been difficult to tell whether the project is located on or near reserve lands.

The list has been prepared in a limited timeframe to comply with the Order and in an effort to supply the general proximities of projects and identified First Nations reserve lands. The answers formulated are not intended to be list of communities with which the Crown has a duty to consult. Traditional territories, land claims and related issues are not addressed.

"Treaty Area"

With the exception of the Wikwemikong Unceeded Reserve territory on Manitoulin Island, federal government maps indicate that treaties cover all of Ontario. Therefore, each project will have one or more treaties associated with it. "Treaty Lands", as referenced by the Order, have been interpreted to mean the geographic areas delineated in the major treaties currently recognized by Indian and Northern Affairs Canada. They include:

i) Upper Canada Treaties (1764 – 1862)

ii) Robinson-Superior Treaty (1850)

iii) Robinson-Huron Treaty (1850, 1854)

iv) Manitoulin Island Treaty (1862)

v) Treaty 3 (1873)

vi) Treaty 5 (1875)

vii) Treaty 9 (1905, 1929, 1930)

viii) Williams Treaties (1923)

The OPA has relied on a general map of Ontario from Indian and Northern Affairs Canada to provide an overview of the treaties covering Ontario, as well as maps produced by the Treasury Board of Canada Secretariat to delineate the respective treaty areas (collectively the "Treaty Maps"), all of which are attached hereto as Schedule "B". The OPA has used the Treaty Maps to identify the treaty areas associated with the respective projects. Note that in some cases, such as an identified transmission corridor, the project could have more than one treaty area associated with it.

Please note that with respect to the Manitoulin Island Treaty Map, the largest shaded area forming part of Manitoulin Island represents the Wikwemikong Unceded Reserve Territory.

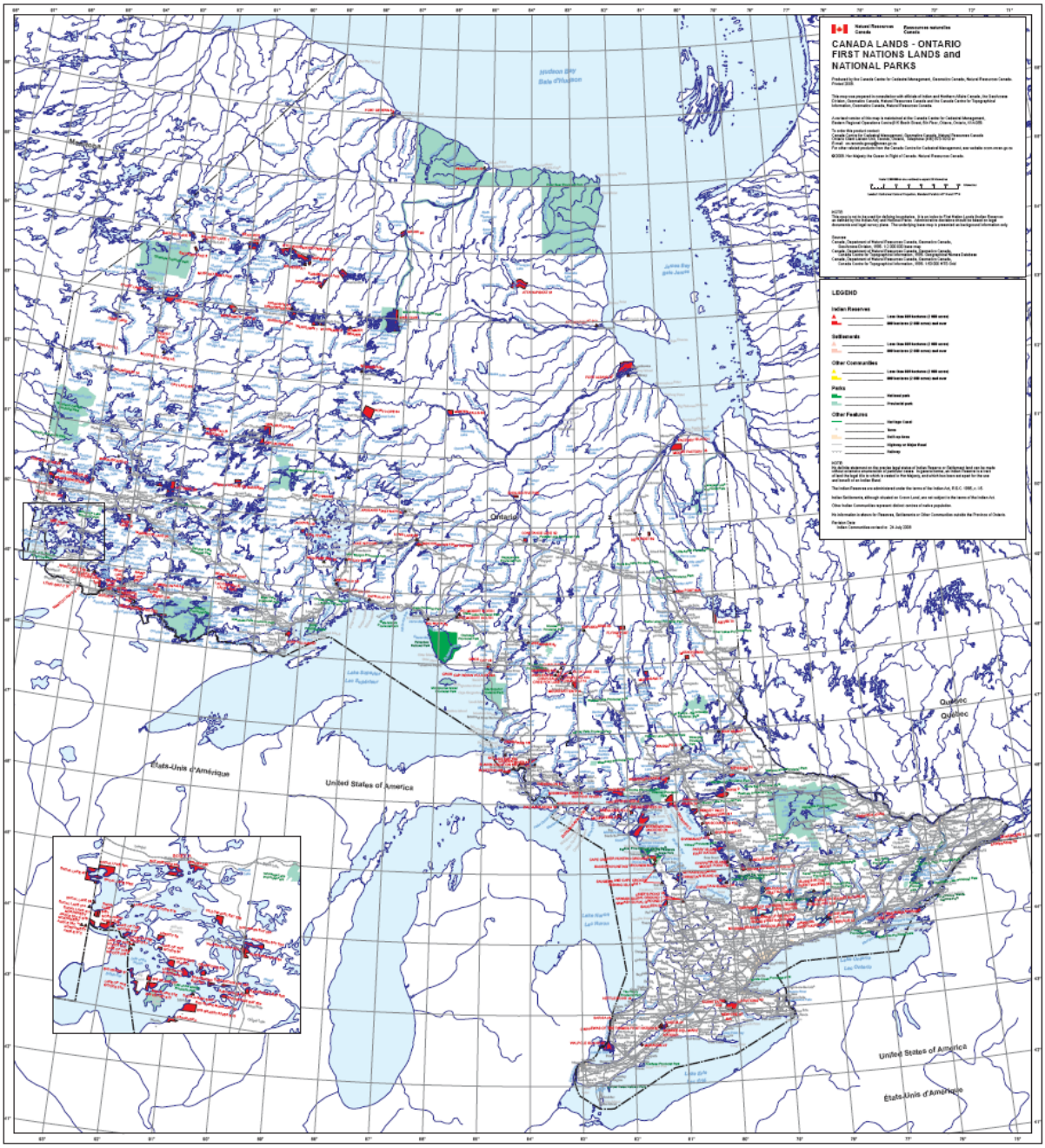
Schedule "A"

First Nation Reserves in Ontario
Canada Lands – Ontario First Nations Lands and National Parks

The map below is reproduced from Natural Resources Canada ('NRCan') and can be accessed at: http://www.lsd.nrcan.gc.ca/english/canada_lands_index_e.asp

The reproduction is not represented as an official version of the materials reproduced, nor as having been made, in affiliation with or with the endorsement of NRCan. The accompanying script (which is illegible due to size) states the following: "This map is not to be used for defining boundaries. It is an index to First Nation Lands (Indian Reserves as defined by the Indian Act) and National Parks. Administrative decisions should be based on legal documents and legal survey plans. The underlying base map is presented as background information only."

The OPA relies on this map to provide an answer to a specific question asked by the National Chief's Office in the context of the Ontario Energy Board File No. EB-2007-0707. The OPA accepts no responsibility for any errors, omissions and/or inaccuracies in the data. The representations and interpretations of the data contained in the map do not necessarily represent those of the Ontario government or the OPA. The use of the map by the OPA for the current specific purpose shall not affect future dealings between the OPA or the Ontario government and First Nations and Métis communities.


CANADA LANDS - ONTARIO
FIRST NATIONS LANDS and
NATIONAL PARKS
LEGEND
Indian Reserves
Settlements
Other Communities
Parks
Other Features
Ontario
Québec
États-Unis d'Amérique
United States of America

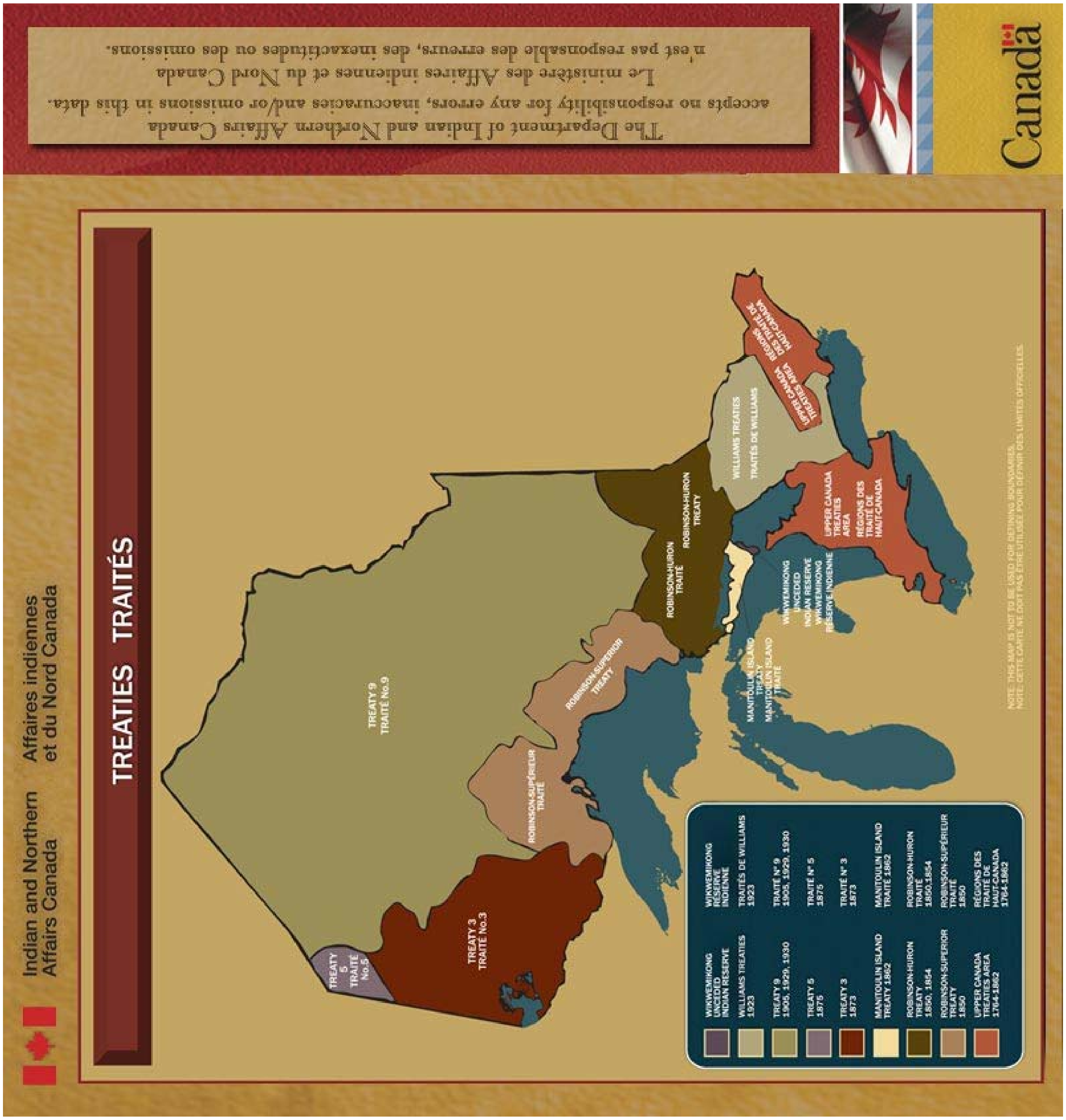
1

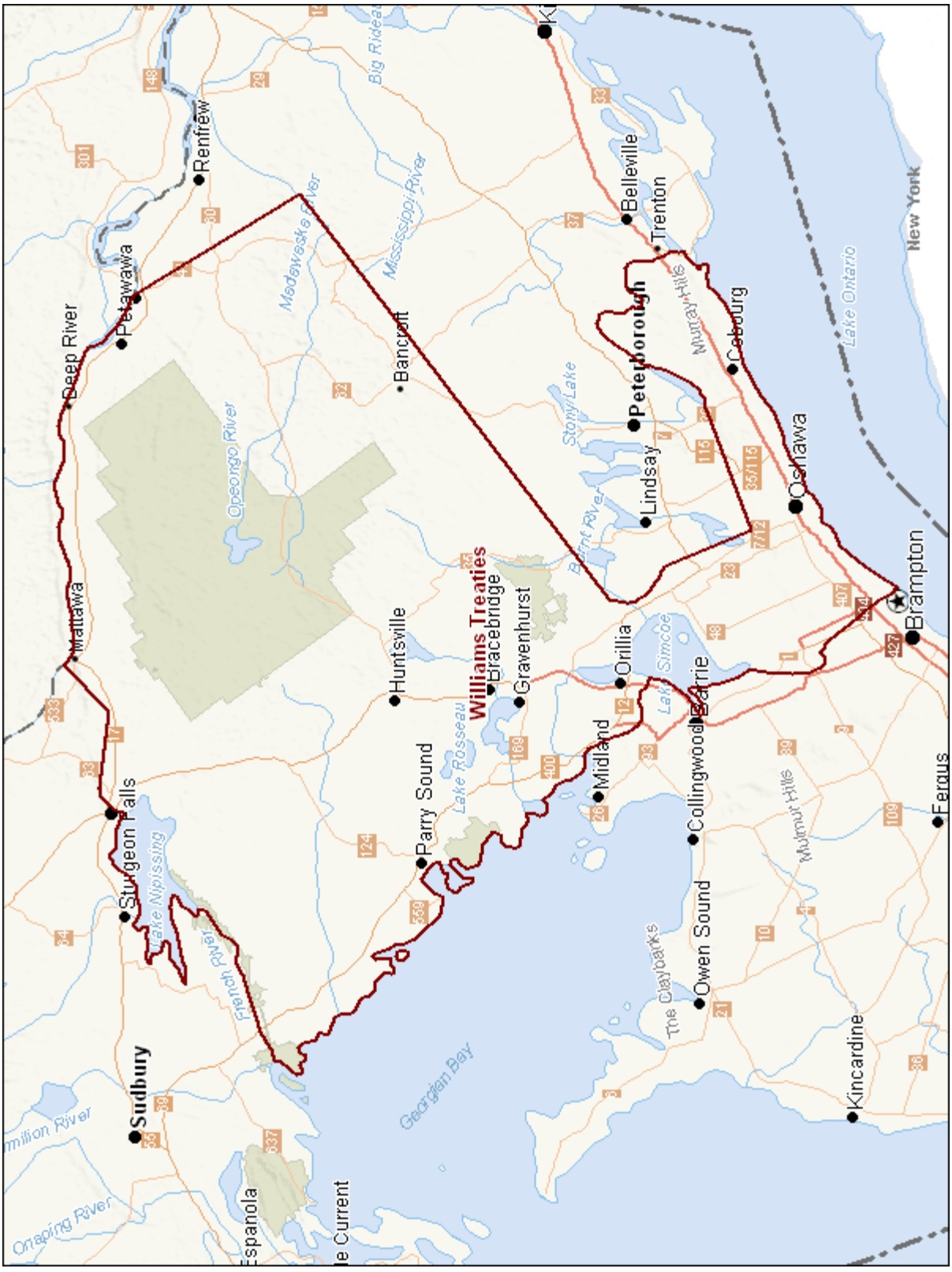
Schedule "B"

The first map below is a reproduced from the library of Indian and Northern Affairs Canada ('INAC') and can be found at the following link: http://www.ainc-inac.gc.ca/on/fnmap2_e.html. The map shows a general delineation of the boundaries of the major treaties in Ontario. The reproduction is not represented as an official version of the materials reproduced, nor as having been made, in affiliation with or with the endorsement of INAC.

The subsequent maps are reproduced from the Treasury Board of Canada website: http://www.tbs-sct.gc.ca/dfrp-rbif/treaty-traite.asp. The reproduction is not represented as an official version of the materials reproduced, nor as having been made, in affiliation with or with the endorsement of the Treasury Board of Canada.

The OPA relies on these maps to provide an answer to a specific question asked by the National Chief's Office in the context of the Ontario Energy Board File No. EB-2007-0707. The OPA accepts no responsibility for any errors, omissions and/or inaccuracies in the data. The representations and interpretations of the data contained in the maps do not necessarily represent those of the Ontario government or the OPA. The use of the map by the OPA for the current specific purpose shall not affect future dealings between the OPA or the Ontario government and First Nations and Métis communities.


Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada
TREATIES TRAITÉS
TREATY 5 TRAITÉ No.5
TREATY 3 TRAITÉ No.3
TREATY 9 TRAITÉ No.9
ROBINSON-SUPERIOR TREATY
ROBINSON-SUPÉRIEUR TRAITÉ
ROBINSON-HURON TREATY
ROBINSON-HURON TRAITÉ
MANITOULIN ISLAND TREATY
MANITOULIN ISLAND TRAITÉ
WIKWEMIKONG UNCEDED INDIAN RESERVE
WIKWEMIKONG RÉSERVE INDIENNE
WILLIAMS TREATIES
TRAITÉS DE WILLIAMS
UPPER CANADA TREATIES AREA
RÉGIONS DES TRAITÉ DE HAUT-CANADA
WIKWEMIKONG UNCEDED INDIAN RESERVE
WIKWEMIKONG RÉSERVE INDIENNE
WILLIAMS TREATIES 1923
TRAITÉS DE WILLIAMS 1923
TREATY 9 1905, 1929, 1930
TRAITÉ N° 9 1905, 1929, 1930
TREATY 5 1875
TRAITÉ N° 5 1875
TREATY 3 1873
TRAITÉ N° 3 1873
MANITOULIN ISLAND TREATY 1862
MANITOULIN ISLAND TRAITÉ 1862
ROBINSON-HURON TREATY 1850, 1854
ROBINSON-HURON TRAITÉ 1850,1854
ROBINSON-SUPERIOR TREATY 1850
ROBINSON-SUPÉRIEUR TRAITÉ 1850
UPPER CANADA TREATIES AREA 1764-1862
RÉGIONS DES TRAITÉ DE HAUT-CANADA 1764-1862
NOTE: THIS MAP IS NOT TO BE USED FOR DEFINING BOUNDARIES.
NOTE: CETTE CARTE NE DOIT PAS ÊTRE UTILISÉE POUR DÉFINIR DES LIMITES OFFICIELLES.
The Department of Indian and Northern Affairs Canada
accepts no responsibility for any errors, inaccuracies and/or omissions in this data.
Le ministère des Affaires indiennes et du Nord Canada
n'est pas responsable des erreurs, des inexactitudes ou des omissions.
Canada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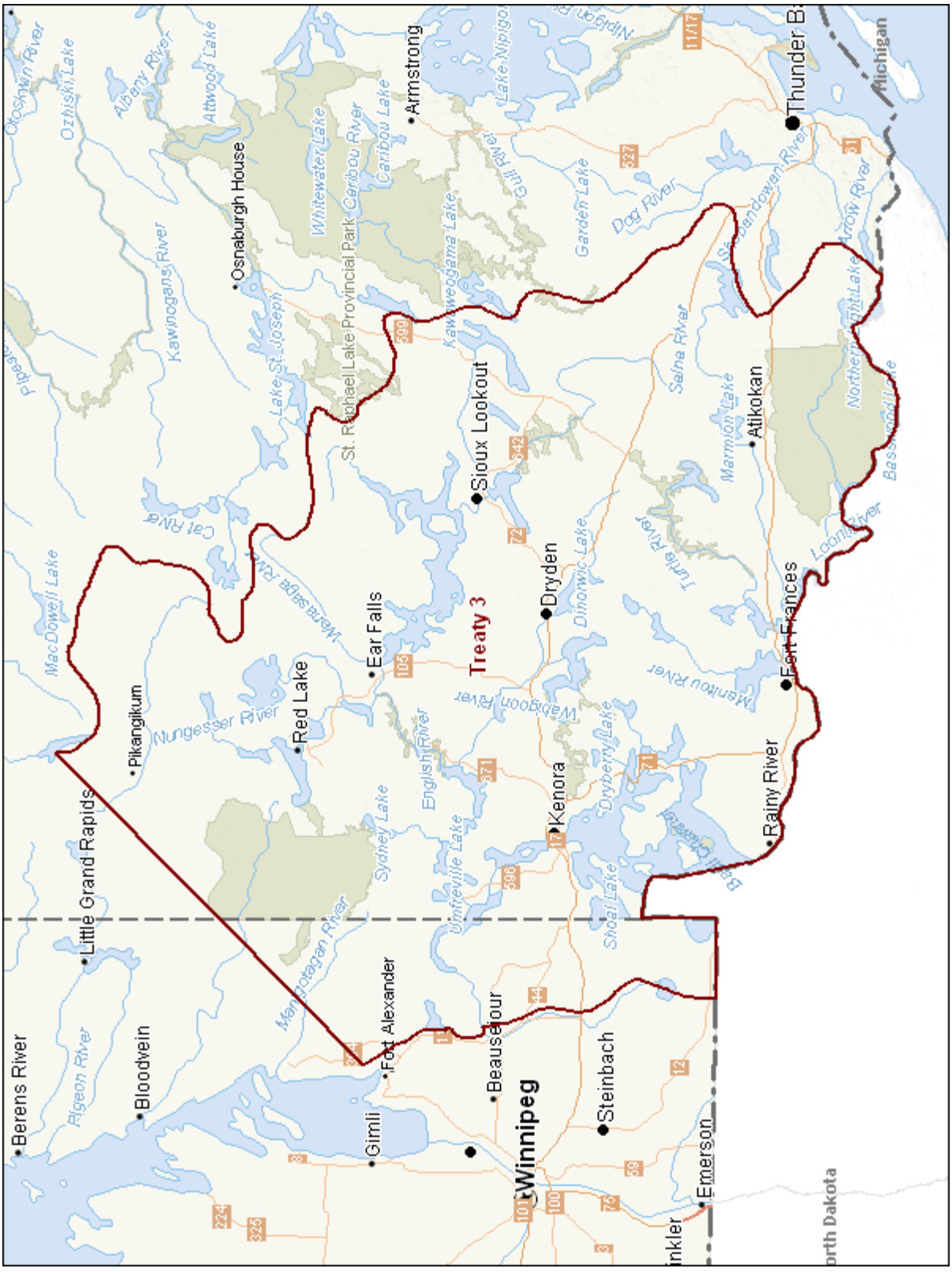
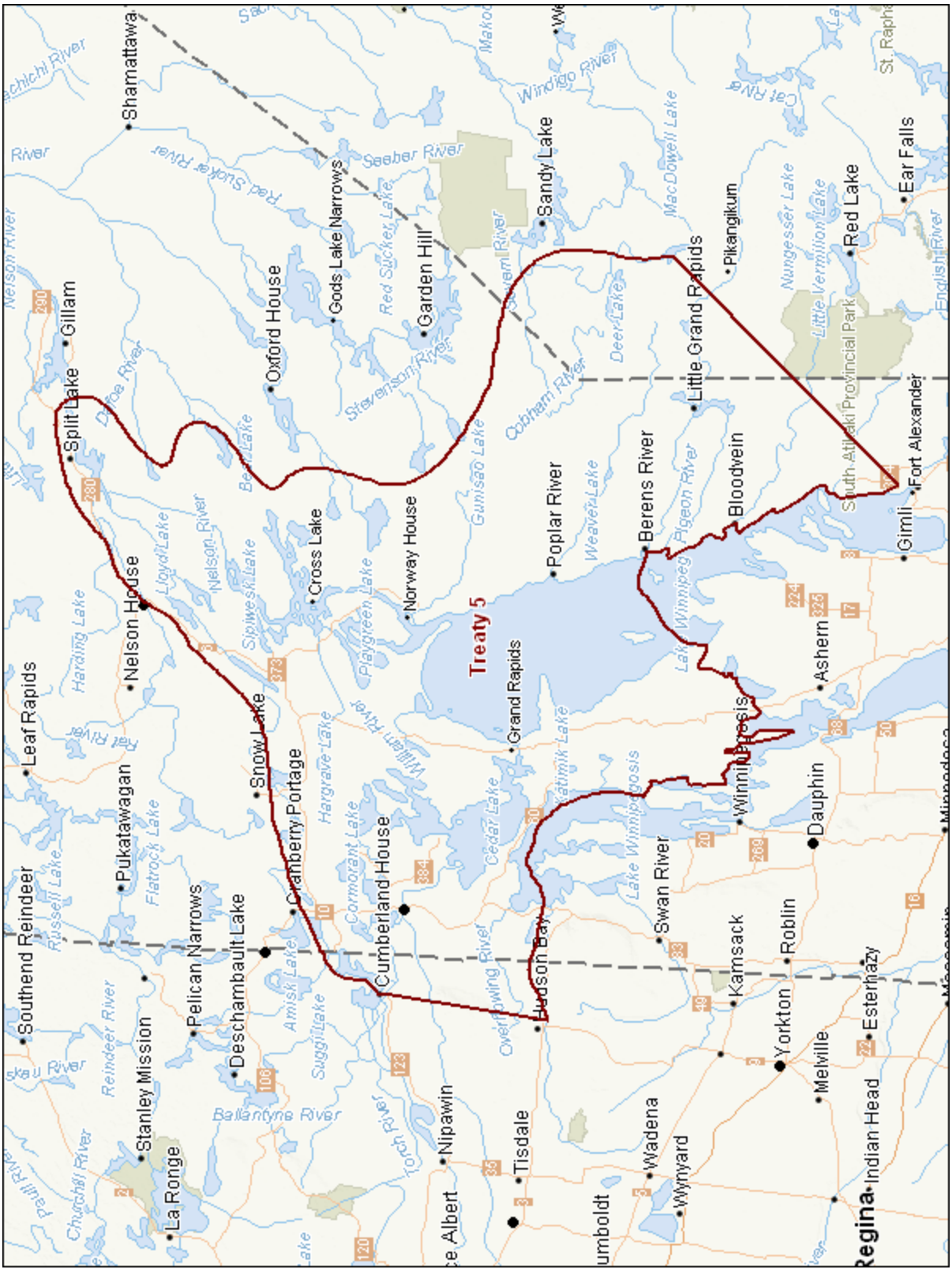
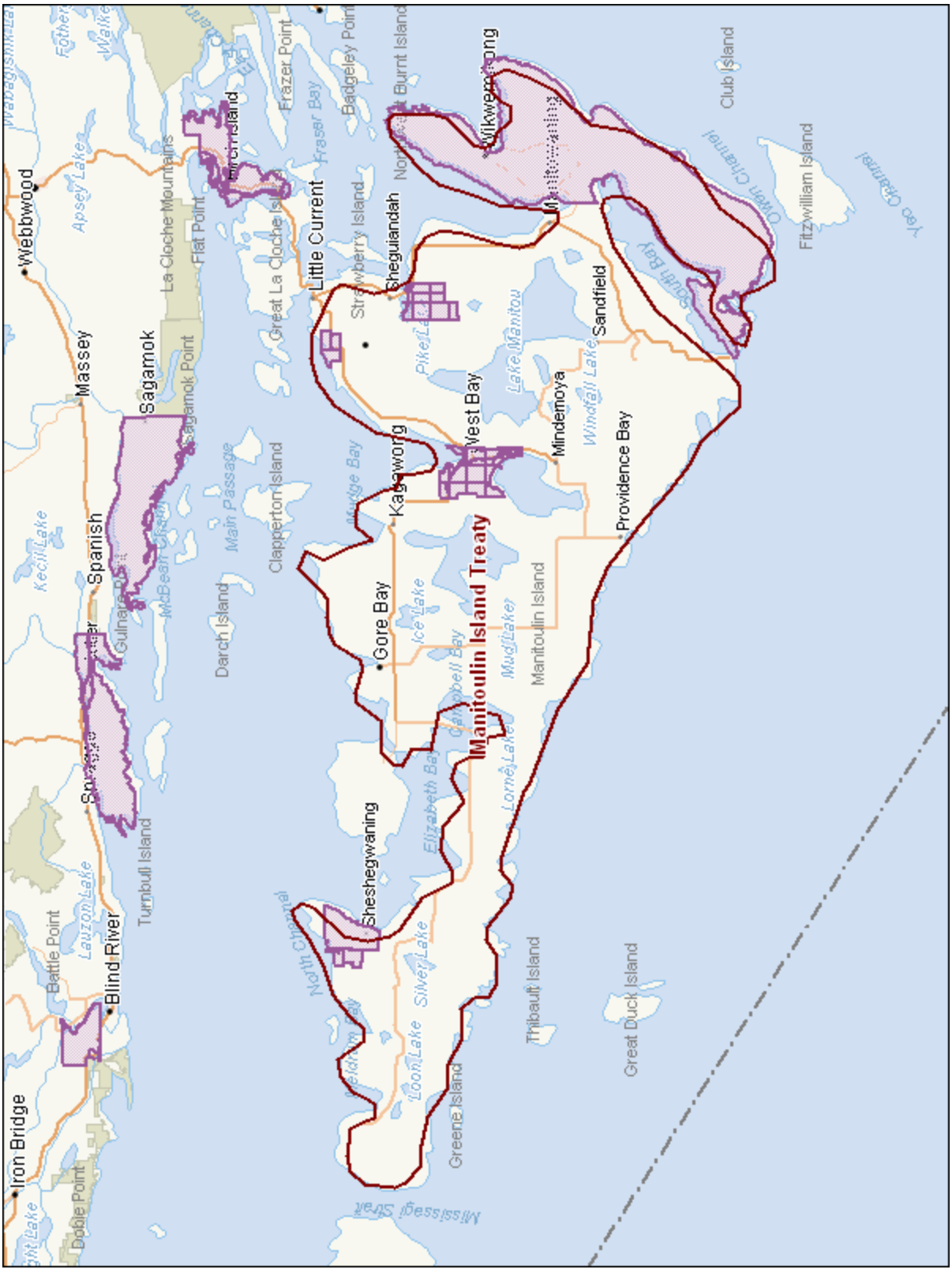
Petawawa
Renfrew
Mattawa
Bancroft
Belleville
Trenton
Peterborough
Lindsay
Cobourg
Oshawa
Brampton
New York
Lake Ontario
Huntsville
Bracebridge
Gravenhurst
Orillia
Barrie
Midland
Parry Sound
Collingwood
Owen Sound
Sudbury
Sturgeon Falls
Fergus
Kincardine
Espanola
Williams Treaties
Georgian Bay
Lake Nipissing
Lake Rosseau
Opeongo River
Madawaska River
Mississippi River
Big Rideau
Stony Lake
Trent River
Lake Simcoe
Muskoka Hills
Murray Hills
The Claybanks
French River
Onaping River


Treaty 3
Winnipeg
Thunder Bay
Armstrong
Osnaburgh House
Sioux Lookout
Dryden
Ear Falls
Red Lake
Pikangikum
Little Grand Rapids
Berens River
Bloodvein
Gimli
Fort Alexander
Beausejour
Steinbach
Emerson
Kenora
Rainy River
Fort Frances
Atikokan
Nungesser River
Wabigoon River
English River
Dog River
Garden Lake
Caribou Lake
Whitewater Lake
Lake St. Joseph
Kawinogans River
Albany River
Attawood Lake
Ozhiski Lake
Oroshwin River
MacDowell Lake
Cat River
Sydney Lake
Umfreville Lake
Shoal Lake
Dinorwic Lake
Turtle River
Marmion Lake
Sturgeon River
Loon River
Arrow River
Basswood Lake
Michigan
North Dakota


Treaty 5
Shamattawa
Gillam
Split Lake
Oxford House
Gods Lake Narrows
Garden Hill
Sandy Lake
Pikangikum
Red Lake
Ear Falls
Fort Alexander
Gimli
Little Grand Rapids
Bloodvein
Berens River
Poplar River
Norway House
Cross Lake
Nelson House
Leaf Rapids
Snow Lake
Grand Rapids
Ashern
Winnipeg
Dauphin
Swan River
Cumberland House
Cranberry Portage
Pukatawagan
Pelican Narrows
Deschambault Lake
Southend Reindeer
Stanley Mission
La Ronge
Nipawin
Tisdale
Hudson Bay
Wadena
Wynyard
Kamsack
Yorkton
Roblin
Melville
Esterhazy
Indian Head
Regina
Minnedosa
Lake Winnipeg
Lake Winnipegosis
Cedar Lake
Playgreen Lake
Gunisao Lake
Cormorant Lake
Harding Lake
Flatrock Lake
Russell Lake
Amisk Lake
Suggi Lake
Hargrave Lake
Deer Lake
Weaver Lake
MacDowell Lake
Nungesser Lake
Little Vermilion Lake
South Atikaki Provincial Park
Red Sucker River
Seaber River
Stevenson River
Cobham River
Pigeon River
Nelson River
Dauphin River
Overflowing River
Ballantyne River
Torch River
Reindeer River
Churchill River
Saskatchewan
Manitoba


Sanikiluaq
Churchill
Hudson Bay
James Bay
Lac Mi
Attawapiskat
Fort Albany
Moose R
Kenogami River
Albany River
Missisa Lake
Sutton Lake
Opinnagau River
Peawanuck
Webequie
Lansdowne House
Fort Severn
Treaty 9
Kasabonika
Moshikopaw Lake
Wapikopa Lake
Mameigwess Lake
Ozhiski Lake
Keezhik Lake
Fort Hope
Makoop Lake
Ogoki Lake
Marshall Lake
Whitewater Lake
Osnaburgh House
Bearskin Lake
Weagamow Lake
Sandy Lake
Sachigo Lake
Little Sachigo Lake
Makoop Lake
Windigo Lake
Cat Lake
Zion Lake
Bamaji Lake
Shamattawa
Hayes River
Nelson River
Gillam
Oxford House
Gods Lake Narrows
Garden Hill
Deer Lake
Little Grand Rapids
Pikangikum
Nungesser Lake
Little Vermilion Lake
Red Lake
Ear Falls
Sydney Lake


Treaty 9
Eastmain
Waskaganish
Attawapiskat
Fort Albany
Moosonee
Kasabonika
Webequie
Lansdowne House
Fort Hope
Weagamow Lake
Bearskin Lake
Osnaburgh House
Sioux Lookout
Armstrong
Nakina
Geraldton
Hearst
Hornepayne
Smooth Rock Falls
Iroquois Falls
Timmins
Kirkland Lake
Foleyet
Gogama
Chapleau
Dubreuilville
Wawa
Sudbury
Schreiber
Nipigon
Thunder Bay
Atikokan
Lake Superior
Michigan
Minnesota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Massey
Sagamok
Spanish
Blind River
Iron Bridge
Little Current
Sheguiandah
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West Bay
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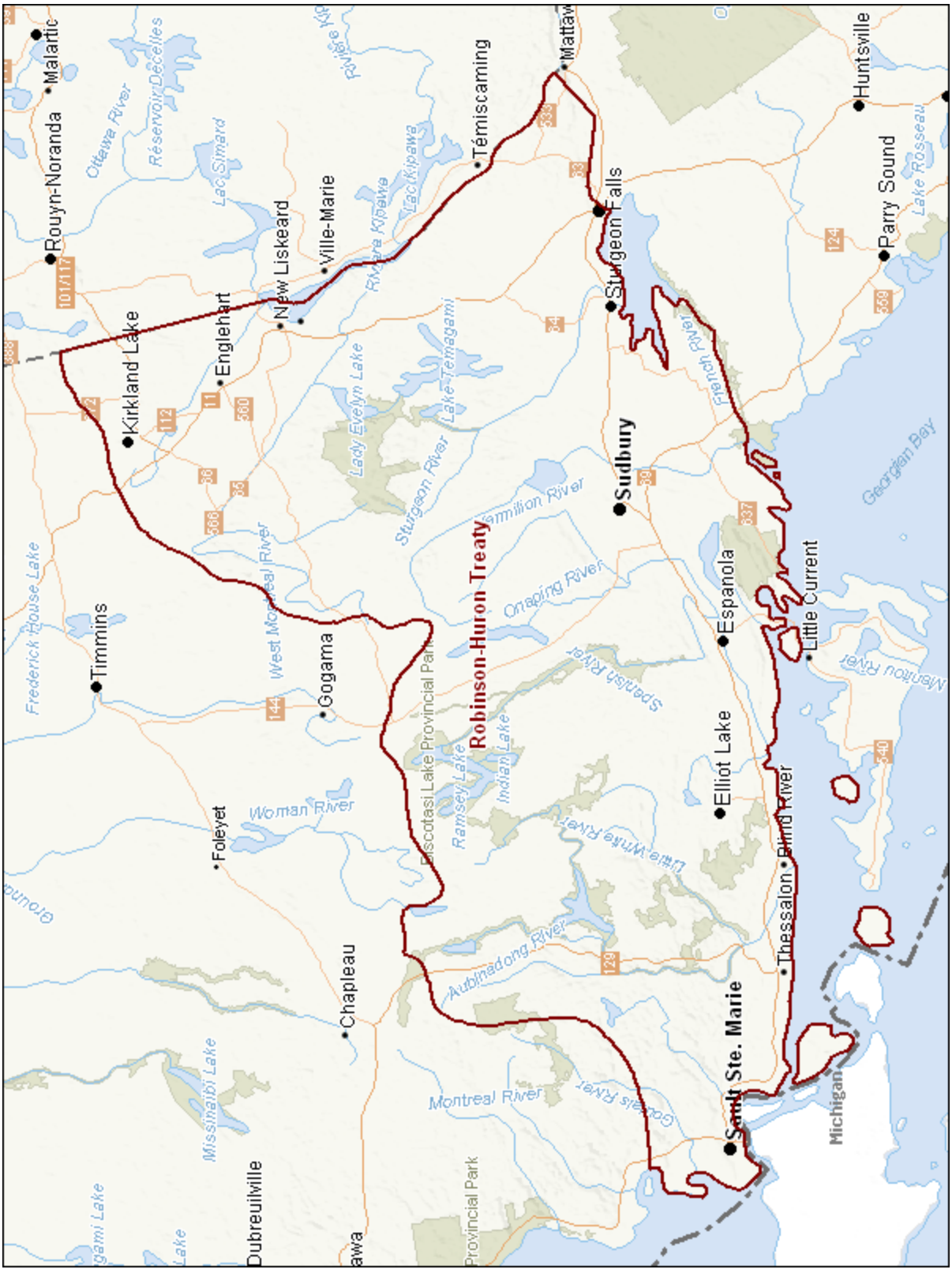
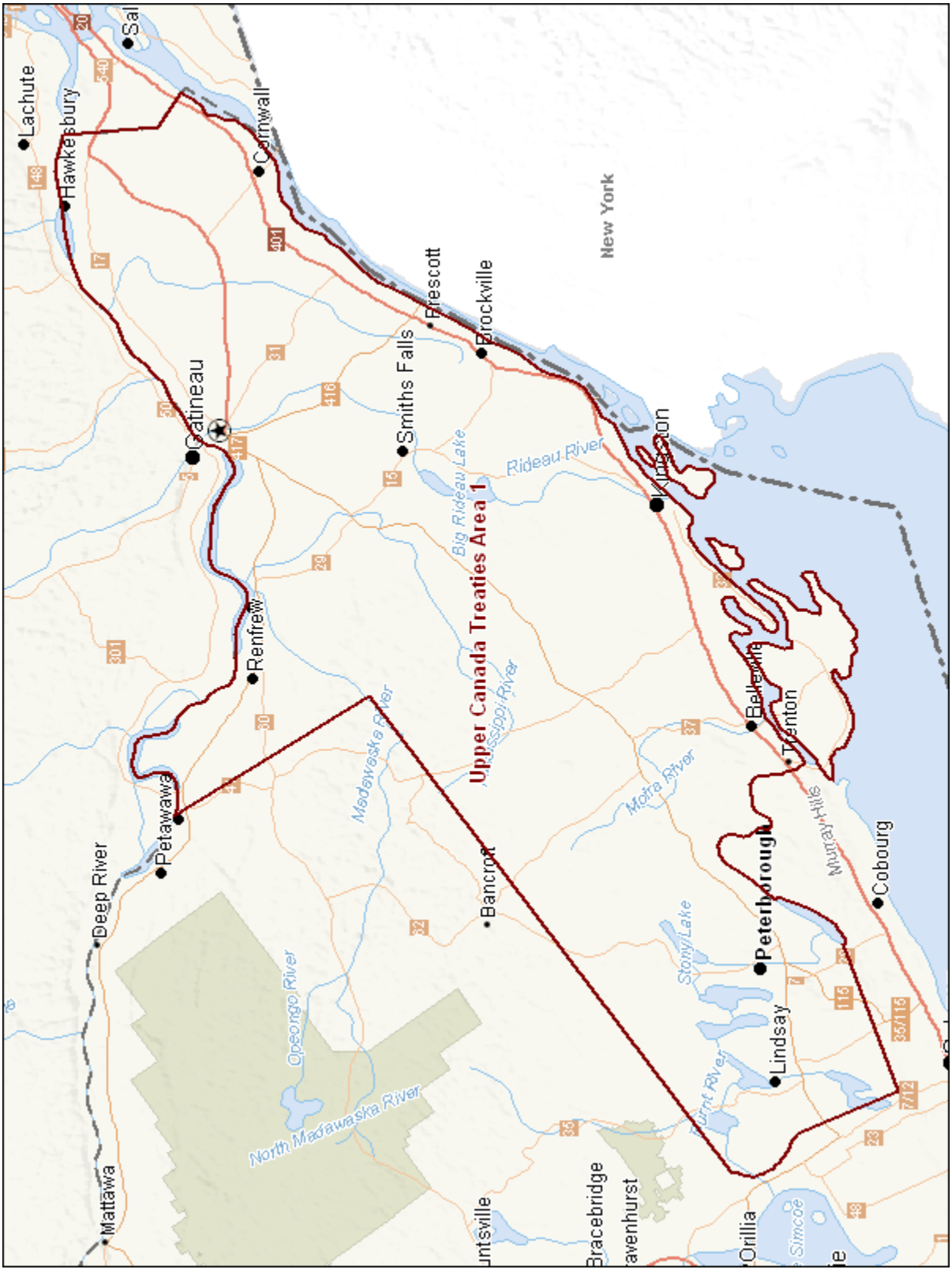
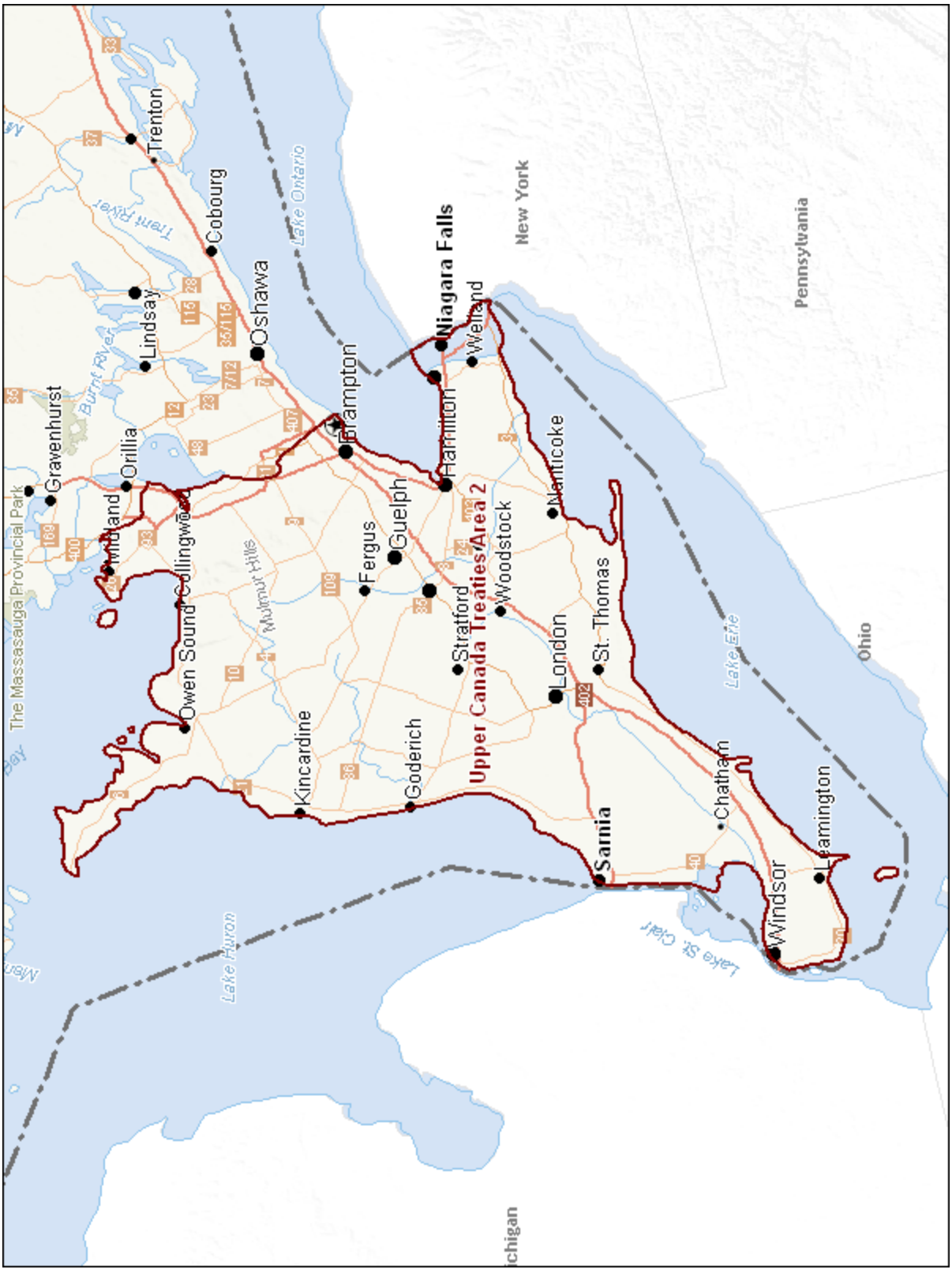
Mindemoya
Sandfield
Providence Bay
Manitoulin Island Treaty
Manitoulin Island
Thibault Island
Great Duck Island
Greene Island
Turnbull Island
Darch Island
Clapperton Island
Fitzwilliam Island
Club Island
Lake Manitou
Ice Lake
Mud Lake
Lorne Lake
Silver Lake
Loon Lake
Elizabeth Bay
Campbell Bay
Mudge Bay
Main Passage
North Channel
Owen Channel
Georgian Bay
Mississagi Strait
Apsey Lake
Kecil Lake
Lauzon Lake
Battle Point
Dobie Point
La Cloche Mountains
Sagamok Point
Flat Point
Great La Cloche Island
Fraser Point
Fraser Bay
Badgeley Point
Strawberry Island
Burnt Island
Gulnare Inlet
McBean Creek
Windfall Lake


Malartic
Rouyn-Noranda
Kirkland Lake
Englehart
New Liskeard
Ville-Marie
Témiscaming
Mattawa
Huntsville
Parry Sound
Sturgeon Falls
Sudbury
Timmins
Gogama
Foleyet
Chapleau
Dubreuilville
Espanola
Little Current
Elliot Lake
Thessalon
Blind River
Sault Ste. Marie
Robinson-Huron Treaty
Ottawa River
Réservoir Decelles
Lac Simard
Rivière Kipawa
Lac Kipawa
Lake Temagami
Lady Evelyn Lake
Sturgeon River
Vermilion River
French River
Lake Rosseau
Georgian Bay
Frederick House Lake
West Montreal River
Onaping River
Spanish River
Manitou River
Biscotasi Lake Provincial Park
Ramsey Lake
Indian Lake
Woman River
Little Whale River
Aubinadong River
Montreal River
Gourlais River
Michigan
Missinaibi Lake
Provincial Park

Robinson-Superior Treaty
Sault Ste. Marie
Chapleau
Wawa
Dubreuilville
White River
Hornepayne
Manitouwadge
Marathon
Schreiber
Nipigon
Thunder Bay
Geraldton
Nakina
Hearst
Kapu
Armstrong
Osnaburgh House
Lake Superior
Lake Nipigon
Michigan
Minnesota
Wisconsin
Michipicoten Island Provincial Park
Missinaibi Provincial Park
Missinaibi Lake
Montreal River
Little White River P
Osawin River
Kabinakagami River
Nagagami River
Pagwachuan River
Kenogami River
Ogoki River
Nipigon River
Roslyn River
Aguasabon River
Dog River
Whitewater Lake
Caribou River
Caribou Lake
Allan Water
Garden Lake
Gull River
Kaministiquia River
Arrow River
Onaman Lake
Opasatika River
Groundhog River
Pukaskwa River
Esnagami River


Upper Canada Treaties Area 1
Lachute
Hawkesbury
Cornwall
Gatineau
Renfrew
Petawawa
Deep River
Mattawa
Smiths Falls
Prescott
Brockville
New York
Rideau River
Big Rideau Lake
Madawaska River
Mississippi River
Bancroft
Opeongo River
North Madawaska River
Trenton
Belleville
Peterborough
Lindsay
Cobourg
Stony Lake
Trent River
Bracebridge
Orillia
Simcoe


Upper Canada Treaties/Area 2
Trenton
Cobourg
Oshawa
Lindsay
Gravenhurst
Orillia
Midland
Collingwood
Owen Sound
Brampton
Niagara Falls
Welland
Hamilton
Guelph
Fergus
Stratford
Woodstock
Kincardine
Goderich
Sarnia
London
St. Thomas
Chatham
Leamington
Windsor
Lake Ontario
Lake Erie
Lake Huron
Lake St. Clair
New York
Pennsylvania
Ohio
The Massasauga Provincial Park

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2007 - 2010							
	Project Type	**Fuel/Voltage**	**Project**	**Site (generation) or Route (Trx)**	**Status**	**Treaty Area**	**First Nations Reserve Lands**
	Tx	115kV	Toronto Downtown Cable	Toronto	"work is done"	UCT 2 and possibly Williams	Map indicates Settlements[4]
	Tx	500kV	Cherrywood to Claireville Unbundling	GTA	"work is done"	UCT 2 and possibly Williams	Map indicates Settlements
	Tx	500kV	Hydro Quebec Interconnection	Ottawa	"work is done"	UCT 1	Map indicates Settlements
	Tx	230kV	Southern Georgian Bay	Barrie to Stayner	"work is done"	UCT 2	n/a
	Tx	230kV	Cambridge (KWCG)	Cambridge	"development is expected to occur"	UCT 2	n/a
	Tx	230kV	Windsor-Essex		"development is expected to occur"	UCT 2	Map indicates Settlements
	Supply	Nuclear	Bruce A Refurbishment (2 Units)	Bruce	"work is done"	UCT 2	n/a
	Supply	Gas	St. Clair Energy Centre	Sarnia	"work is done"	UCT 2	n/a; Proximity of Sarnia noted
	Supply	Gas	Greenfield Energy Centre	Sarnia	"work is done"	UCT 2	n/a; Proximity of Sarnia noted
	Supply	Gas	Greenfield South Power Plant	Mississauga	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas	Goreway Station Project	Brampton	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas	Portlands Energy Centre	Toronto	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas	Halton Hills Generating Station	Halton Hills	"work is done"	UCT 2	n/a
	Supply	Gas	Great Northern Tri-Gen Facility	Kingsville	"work is done"	UCT 2	n/a
	Supply	Gas	East Windsor Cogeneration Centre	Windsor	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas	Durham College District Energy Project	Oshawa	"work is done"	Williams	n/a
	Supply	Gas	Thorold Cogeneration Project	Thorold	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas	Countryside London Cogeneration Facility	London	"work is done"	UCT 2	Map indicates Settlements
	Supply	Gas (actually biomass, but labelled gas in Plan)	Algoma Energy Cogeneration Facility	Sault Ste. Marie	"work is done"	Robinson-Huron	Whitefish Island FN; Map indicates Settlements
	Supply	Gas	Warden Energy Centre	Markham	"work is done"	UCT 2 and possibly Williams	n/a
	Supply	Wind	Melancthon II Wind Project	Townships of Amaranth and Melancthon	"work is done"	UCT 2	n/a
	Supply	Wind	Kingsbridge II Wind Power Project	Huron County, Ontario	"money committed"	UCT 2	n/a
	Supply	Wind	Enbridge Ontario Wind Farm	Bruce County	"work is done"	UCT 2	n/a; Proximity of Chippewas of Saugeen noted
	Supply	Wind	Ripley Wind Power Project	Township of Huron-Kinloss	"work is done"	UCT 2	n/a
	Supply	Wind	Kruger Energy Port Alma Wind Power Project	Chatham Kent, Ontario	"work is done"	UCT 2	n/a
	Supply	Wind	Wolfe Island Wind Project	Wolfe Island, Township of Frontenac, Or	"work is done"	UCT 1	n/a
2011- 2013							
	Project Type	**Fuel/Voltage**	**Project**	**Site (generation) or Route (Trx)**	**Status**	**Treaty Area**	**First Nations Reserve Lands**
	Tx	230kV	GTA West Reinforcemer	GTA	"work is done"	UCT 2 and possibly Williams	Map indicates Settlements
	Tx	115kV	Leaside to Bridgman Reinforcement	Toronto	"development is expected to occur"	UCT 2 and possibly Williams	Map indicates Settlements

	Tx	230kV and Station Work	Woodstock Area Reinforcement	Woodstock	"work is done"	UCT 2	n/a
	Tx	230kV and Station Work	Bruce to Milton Near-Term Measures	Nanticoke and and London	"development is expected to occur"	UCT 2	n/a
	Tx	500kV	Bruce to Milton Line	Bruce to Milton	"development is expected to occur"	UCT 2	n/a
	Tx	Station Work	West of Sudbury Near-term Upgrade	Sudbury to Sault Ste. Marie, Station work being done at Algoma TS and Mississagi TS	"development is expected to occur"	Robinson-Huron	Serpent River; Proximity of Mississauga and Thesselon
	Tx	Station Work	North-South Tie Near-Term Upgrade	Barrie to Sudbury to Timmins; Station work being done at Porcupine TS, Kirkland Lake TS and Nobel SS.	"development is expected to occur"	UCT 2, Williams, Robinson-Huron and Treaty 9	n/a
	Tx	230kV and 115kV line and station work	Guelph (KWCG)	Map: E-5-2 Figure 9 (Both options are in Guelph, Option 1 rejected)	"development is expected to occur"	UCT 2	Map indicates Settlement area in Guelph
	Supply	Nuclear	Bruce A Refurbishment (2 Units)	Bruce	"money committed"	UCT 2	n/a
	Supply	Gas	Northern York Generation	Northern York Region	"development is expected to occur"[1]	UCT 2 and Williams	n/a
	Supply	Gas	Kitchener-Waterloo-Cambridge-Guelph Generation	Cambridge	"development is expected to occur"	UCT 2	Map indicates Settlements
	Supply	Gas	Southwest GTA Generation	Southwest GTA	"development is expected to occur"	UCT 2 and possibly Williams	Map indicates Settlements
	Supply	Gas	Lennox Replacement	Lennox (Lennox is assumed to replace Lennox)	"development is expected to occur"	UCT 1	n/a
	Supply	Wind	Port Burwell (S21)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	Robinson Huron	Rankin Location, Garden River
	Supply	Wind	Bruce (S36)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a; Proximity of Saugeen noted
	Supply	Wind	Windsor (S31)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a; proximity of Walpole Island noted
2014 and beyond							
	Project Type	**Fuel/Voltage**	**Project**	**Site (generation) or Route (Trx)**	**Status**	**Treaty Area**	**First Nations Reserve Lands**
	Tx	500kV	North-South Transmission Reinforcment	Map: E-3-1 Att 3 pg. 31-46 Study Area (File is very big, area is defined roughly by Sudbury to North Bay to Minden to Clarington to Toronto to Barrie to Sudbury)	"development is expected to occur"		Nipissing, Dokis, French River, Henvey Inlet, Whitefish Lake, Magnetawan, Naiscoutaing, Shawanaga, Parry Island, Chippewa Island, Moose Point, Indian River, Wahta Mohawk, Christian Island, Mnjikaning
	Tx	230kV	Subdury West	Map: E-3-2 Figure 1 from Sudbury to "Mississagi TS" ; Northern Route	"development is expected to occur"	Robinson Huron	Serpent River, Sgamon, Mississagi River; Proximity of Whitefish noted
	Tx	500kV	Transmission for Albany	Map: E-3-3 Figure 4 from "Hanmer TS" to "Hat Island and Chard" Sites	"development is expected to occur"	Treaty 9, Robinson Huron	Possibly Wahnapetei; Proximity of Mattagami, Matchewan, New Post noted
	Tx	500kV	Transmission for Moose Basin	Map: E-3-3 Figure 4 from "Hanmer TS" to "Moose Basin" Sites	"development is expected to occur"	Treaty 9, Robinson Huron	Possibly Wahnapetei; Proximity of Mattagami, Matchewan, New Post, Moose Factory, Factory Island noted
	Tx	230kV	East Lake Superior Renewable Development	Map: E-3-4 Figure 1 from "Third Line TS" to "Mackay TS"	"development is expected to occur"	Robinson Huron, Robinson Superior	Possibly Whitefish Island; Proximity of Rankin Location, Garden River, Goulais Bay and Obadjiwan noted.
	Tx	230kV	Little Jackfish Hydro and East Nipigon Wind Development	Map: E-3-7 Figure 2 from "Nipigon" to "Little Jackfish" site	"development is expected to occur"	Robinson Superior	Lake Helen, Red Rock, Rocky Bay; proximity of Lake Nipigon noted

	Tx	230kV or 115kV	Goderich Area Wind Development	Map: E-3-8 Figures 4-6 "Goderich Area"	"development is expected to occur"	UCT 2	n/a
	Tx	230kV or 115kV	Bruce Peninsula Wind Development	Map: E-3-9 Figure 4 "Owen Sound to South of Cameron Lake"	"development is expected to occur"	UCT 2	Saugeen, Nawash Burial Grounds 1 and 2, Chief's Point, Neyaashiinigming, Saugeen and Cape Croker Fishings Islands, Saugeen Hunting Grounds, Cape Croker Hunting Grounds,
	Tx	230kV	Manitoulin Island Wind Development	Map: E-3-10 Figure 4 "Espanola TS to Manitowaning"	"development is expected to occur"	Robinson Huron, Manitoulin Island and possibly Wikwemikong Unceded Territory	Wikwemikong Unceded, Sheguiandah, Audeck Omni Kaning, Whitefish River; Proximity of Point Grondine, Whitefish Lake and Sagamon noted
	Tx	230kV station work	KWCG	Map: Somewhere between Kitchener Waterloo and Orangeville	"development is expected to occur"	UCT 2	Map indicates Settlement Areas in Kitchener and Guelph; Proximity of Six Nations,Glebe Farm noted
	Tx	230kV	Central and Downtown Toronto Supply	Map: E-5-5 Appendix E Page V (shows three options)	"development is expected to occur"	UCT 2 and possibly Williams	Map indicates Settlements
	Tx	230kV	GTA West Reinforcement	Map: E-5-6 Figure 2, Both options are in Milton/Halton Hills/Brampton/Mississauga Area	"development is expected to occur"	UCT 2	Map indicates Settlements
	Tx	Station Work	Oshawa Area TS	Map: E-4-1 Figure 1 "Oshawa Area TS"	"development is expected to occur"	Williams	Map indicates Settlements
	Tx	230kV	Lakehead to Birch	Map: E-6-1 Figure 2 "Lakehead TS to Birch TS"	"development is expected to occur"	Robinson Superior	Fort William
	Supply	Nuclear	Pickering B Refurbishment	Pickering	"development is expected to occur"[0]	Williams	n/a
	Supply	Nuclear	Bruce B Refurbishment	Bruce	"development is expected to occur"[1]	UCT 2	n/a
	Supply	Nuclear	Darlington Refurbishment	Clarington	"development is expected to occur"[1]	Williams	n/a
	Supply	Gas	GTA Generation	GTA	"development is expected to occur"	UCT 2 and possibly Williams	Map indicates Settlements
	Supply	Wind	Wallace (S45)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	Williams	n/a
	Supply	Wind	Wallace (S23)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	Williams	n/a
	Supply	Wind	Picton (S53, S54)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a; Proximity of Tyendinaga Mohawk Territory noted
	Supply	Wind	Bruce Peninsula (S5, S46)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	Cape Croker Hunting Ground, Saugeen Hunting Grounds, Saugeen and Cape Croker Fishing Islands; Proximity of Neyaashinigmiing noted
	Supply	Wind	Goderich (S58)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a
	Supply	Wind	Stratford (S60)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a
	Supply	Wind	Kent (S16)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a; Proximity of Moravian noted
	Supply	Wind	Kingsville (S1)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a
	Supply	Wind	Stratford (S59)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	UCT 2	n/a

	Supply	Wind	Manitoulin Island (S22, S35)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	Manitoulin Island and possibly Wikwemikong Unceded Territory	S22: Wikwemikong Unceded; Proximity of Sheguiandah, Aundeck Omni Kaning, M'Chigeeng noted; S35 Possibly Aundeck Omni Kaning, Sheguiandah or M'Chigeeng; Proximity of Wikwemikong, Whitefish River noted
	Supply	Wind	East Lake Superior (S2, S6, S25)[2]	Map D-5-1 Att 1 pg. 46 Map	"development is expected to occur"[3]	Robinson Superior	S2: n/a; S6: n/a; Proximity of Obadjiwan noted; S25: n/a
[0]Pickering B refurbishment is assumed in case P01A							
[1]these projects are committed by the government outside of the IPSP, but will have an impact on other projects in the IPSP							
[2]The site location described by the map at pg.46 of the D-5-1 atachment 1. "S" refers to a selected site whicha re shown with small bubble regions. "D" Refers to the category of projects called " projects being developed".							
[3]These sites are only one example of the sites that could develop through a compettive procurement process. Each site listed may or may not be developed.							
[4]The map of Ontario First Nations Reserves (see Schedule "A" of the interrogatory response) identifies Indian Settlements and indicates that "Indian Settlements, although situated on Crown land, are not subject to the Indian Act."							
Other Notes							
-No RESOP projects have been listed.							
-Projects that are assumed to contribute to the RES 3 target are still assumed to be in the 'development is expected to occur' category. They are not considered 'money committed' because they do not have a contract.							
Wind projects identified by the OPA as "D" projects in the Helimax Wind Study, see Map D-5-1 Att 1 pg. 46 Map, have not been listed. The "D" projects were publicly announced wind power projects in Ontario that Helimax included in their study such that the OPA might be aware of them as it develops its IPSP. Only approximate locations of these projects are available.							

Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	**Location**	**Latitude (Degrees)**	**Longitude (Degrees)**	**Coordinate Source**	**Status**	**Treaty Area**	**First Nations Reserve Lands**
	Umbata Falls Hydroelectric Project	Marathon, Ontario			OPA Procurement Site	"work is done"	Robinson Superior	n/a; Proximity of Ojibways of Pic River noted
	Island Falls Hydroelectric Project	Smooth Rock Falls, Ontario			OPA Procurement Site	"work is done"	Treaty 9	New Post
	Healey Falls		44.3767	-77.7867	MNR	"money committed" - Dec.20, 2007 Directive	Williams Treaty or UCT 1	n/a
	Ranney Falls GS		44.3033	-77.8	MNR	?	Williams Treaty or UCT 1	n/a; Proximity of Sugar Island, Alderville and Hiawatha on Trent River noted
	Trent University	Near Trent University, Peterborough				?	UCT 1	Map indicates Settlements[4]
	Hound Chute		47.27766	-79.67322	MNR	"money committed" - Dec.20, 2007 Directive	Robinson Huron	n/a
	Gibson		43.116	-79.262	MNR	?	UCT 2	Map indicates Settlements
	Lower Sturgeon		48.4842	-81.2924	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9	n/a
	Wawaitin		48.2048	-81.284	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9 or possibly Robinson Superior	n/a; Proximity of Mattagami and Mattchewan noted
	Sandy Falls		48.3042	-81.263	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9 or possibly Robinson Superior	n/a; Proximity of Mattagami and Mattchewan noted
	Espanola		46.2693	-81.77049	MNR	"development is expected to occur"	Robinson Huron	n/a; but promximity of Whitefish River noted
	Lac Seul		50.63072	-93.22209	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 3	n/a; Proximity of Wabauskang noted
	Alexander		49.1359	-88.3579	Fred's Dec.12 2006	"development is expected to occur"	Robinson Superior	Possibly Red Rock and Lake Helen
	Cameron Falls		49.1533	-88.3467	MNR	"development is expected to occur"	Robinson Superior	Possibly Red Rock and Lake Helen
	Rideau Falls		45.43991	-75.69704	MNR	"development is expected to occur"	UCT 1	Maps indicate Settlement Area
		Site Location or Coordinates						
	Project	**Location**	**Latitude (Degrees)**	**Longitude (Degrees)**	**Coordinate Source**	**Status**		
	Casselman		45.32161	-75.09215	MNR	"development is expected to occur"	UCT 1	n/a

Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	Location	Latitude (Degrees)	Longitude (Degrees)	Coordinate Source	Status	Treaty Area	First Nations Reserve Lands
	Larder		47.85705	-79.78882	MNR	"development is expected to occur"	Robinson Huron	n/a
	Lady Evelyn Lake Dam		47.46083	-79.99444	MNR	"development is expected to occur"	Robinson Huron	n/a
	Mistinikon Lake Dam		48.03972	-80.70472	MNR	"development is expected to occur"	Robinson Huron and possibly Treaty 9	Possibly Matchewan
	North Bala		45.0135	-79.6145	MNR	"development is expected to occur"	Williams	Possibly Wahta Mohawk and Indian River
	Schikluna		43.152	-79.248	MNR	"development is expected to occur"	UCT 2	Map indicates Settlement Area
	Otter Rapids		50.1817	-81.6267	MNR	"development is expected to occur"	Treaty 9	Possibly New Post Creek
	Gravelle Chute		46.1471	-78.9338	MNR	"development is expected to occur"	Williams	n/a
	Timmins South		48.35824	-81.43706	MNR	"development is expected to occur"	Treaty 9	n/a
	Big Beaver Falls		49.2987	-82.5267	MNR	"development is expected to occur"	Treaty 9	n/a
	Harmon		50.1139	-82.20891	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9	n/a; Proximity of New Post noted
	Little Long		50.00476	-82.16636	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9	n/a; Proximity of New Post Creek noted
	Kipling		50.0842	-82.123	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9	n/a; Proximity of New Post Creek noted
	Smoky Falls		50.06136	-82.16176	MNR	"money committed" - Dec.20, 2007 Directive	Treaty 9	n/a; Proximity of New Post Creek noted
	Ragged Chute		47.27766	-79.67322	MNR	"development is expected to occur"	Robinson Huron	n/a; Proximity of Bear Island noted
	Newpost Creek		49.9903	-81.5305	Hatch Acres (assuming it's newpost creek at mouth)	"development is expected to occur"	Treaty 9	Possibly New Post Creek
	Mileage19.2/25.6		48.936	-87.049	MNR	"development is expected to occur"	Robinson Superior	n/a, Proximity of Pays Plat noted
	At Hwy 17		48.9073	-88.3808	MNR	"development is expected to occur"	Robinson Superior	n/a
	Bentley Creek		45.101	-77.748	MNR	"development is expected to occur"	Robinson Superior	Actual location of potential project unknown

Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	Location	Latitude (Degrees)	Longitude (Degrees)	Coordinate Source	Status	Treaty Area	First Nations Reserve Lands
	N. Thunder Bay		48.4564	-89.1885	MNR	"development is expected to occur"	Robinson Superior	Map indicates Settlement area. Proximity of Fort Williams noted.
	Throwbridge Falls		48.48912	-89.1873	MNR	"development is expected to occur"	Robinson Superior	Map indicates Settlement area; n/a wrt reserve; Proximity of Fort Williams noted.
	Hume		48.4333	-89.55	MNR	"development is expected to occur"	Robinson Superior	Map indicates Settlement area; n/a wrt reserve; Proximity of Fort Williams noted.
	Lot 2 Block 'A' Twp. Paipoonge		48.3658	-89.5692	MNR	"development is expected to occur"	Robinson Superior	Map indicates Settlement area; n/a wrt reserve; Proximity of Fort Williams noted.
	Mokoman Falls		48.448	-89.5796	MNR	"development is expected to occur"	Robinson Superior	Map indicates Settlement area; n/a wrt reserve; Proximity of Fort Williams noted.
	Pine Portage		49.3083	-88.3083	MNR	"development is expected to occur"	Robinson Superior	n/a; Proximity of McIntyre Bay and Rocky Bay noted
	Calabogie		45.3200	-76.7100	Fred's Dec. 12 2006	"development is expected to occur"	Williams or UCT 1	n/a
	Mountain Chute		45.19594	-76.90734	MNR	"development is expected to occur"	Williams or UCT 1	n/a
	Chaudiere		45.41917	-75.71331	MNR	"development is expected to occur"	UCT 1	Map indicates Settlement Area
		Site Location or Coordinates						
	Project	Location	Latitude (Degrees)	Longitude (Degrees)	Coordinate Source	Status	Treaty Area	First Nations Reserve Lands
	Bark Lake Dam		45.41639	-77.78806	MNR	"development is expected to occur"	Williams	n/a
	Otto Holden		46.37856	-78.72835	MNR	"development is expected to occur"	Robinson Huron or Williams	Possibly Nipissing
	Bying Inlet		45.77063	-80.5461	MNR	"development is expected to occur"	Robinson Huron	Possibly French River and Henvey Inlet
	Lower Burnt Chute		45.7159	-79.9308	MNR	"development is expected to occur"	Williams	n/a

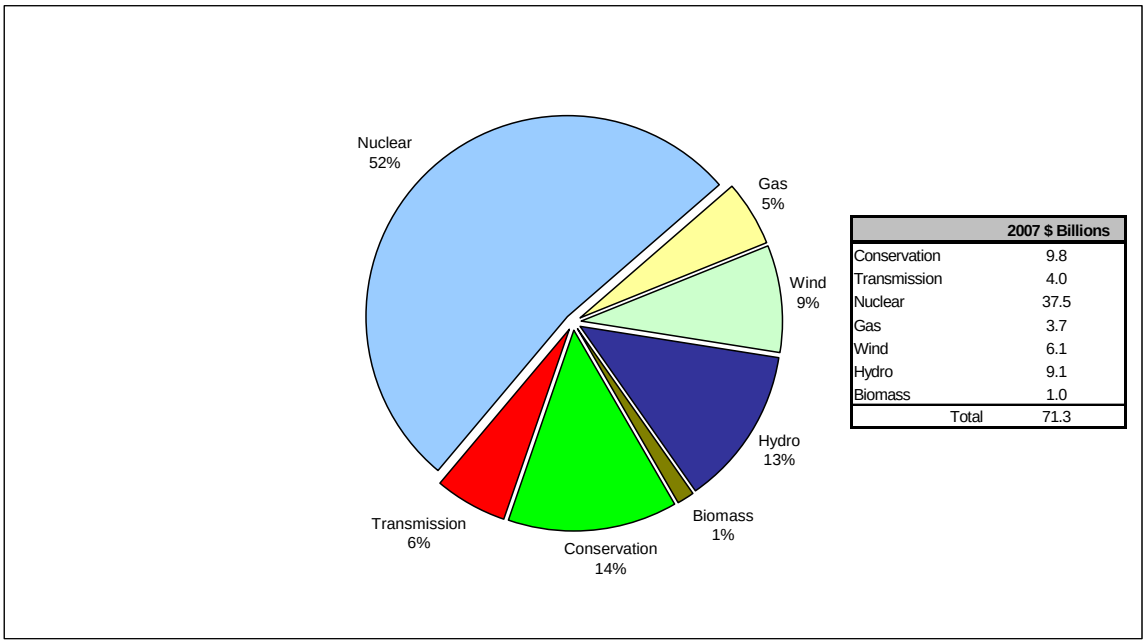
Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	Location	Latitude (Degrees)	Longitude (Degrees)	Coordinate Source	Status	Treaty Area	First Nations Reserve Lands
	Sir Adam Beck No. 1 (# 9, 3-6, 8, 10)	Niagara Falls	43.14783	-79.04558	MNR	"development is expected to occur"	UCT 2	Map indicates Settlement Area
	DeCew Falls - NF23		43.11	-79.265	MNR	"development is expected to occur"	UCT 2	Possibility of Settlement Area
	Allan Rapids		51.053	-80.9074	MNR	"development is expected to occur"	Treaty 9	Possibly Moose Factory; Proximity of Factory Island noted;
	Black Smith Rapids		50.6113	-81.4079	MNR	"development is expected to occur"	Treaty 9	n/a
	Frederick House Lake Dam		48.79222	-81.01389	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Nine Mile Rapids		50.38116	-81.58599	MNR	"development is expected to occur"	Treaty 9	n/a
	Sand and Adjacent Rapids		50.8502	-81.1084	MNR	"development is expected to occur"	Treaty 9	Possibly New Post
	Sextent Rapids		50.2039	-81.6444	MNR	"development is expected to occur"	Treaty 9	Possibly New Post
	Chard		51.29265	-85.00785	MNR	"development is expected to occur"	Treaty 9	Possibly Marten Falls
	Hat Island		51.34332	-83.80505	MNR	"development is expected to occur"	Treaty 9	n/a
	Neelands Rapids, Twp. Fournier		49.03327	-81.13879	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Rapids, Twp. S. Clute And Leitch		49.1859	-81.1373	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Wanatango Falls, Twp. Mann		48.8533	-81.0695	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Wakusini		48.143	-82.233	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of Flying Post noted
	Wakusini Near Junction		48.242	-82.161	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of Flying Post noted
	Grand Rapids		50.4029	-81.8162	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Mattagami Lake Dam		48.01333	-81.5833	MNR	"development is expected to occur"	Treaty 9	Possibly Mattagami
	Poplar		49.5884	-81.7896	MNR	"development is expected to occur"	Treaty 9	n/a; Proximity of New Post noted
	Renison		51.01892	-81.03179	MNR	"development is expected to occur"	Treaty 9	Possibly Moose Factory; Proximity of Factory Island noted;
	Breakneck Falls		50.1036	-82.4184	MNR	"development is expected to occur"	Treaty 9	n/a

Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	Location	Latitude (Degrees)	Longitude (Degrees)	Coordinate Source	Status	Treaty Area	First Nations Reserve Lands
	Christopher Rapids		50.0523	-82.4735	MNR	"development is expected to occur"	Treaty 9	n/a
	Mariva Falls		50.0023	-82.4708	MNR	"development is expected to occur"	Treaty 9	n/a
	Opasatika Rapids	(not found, but must be near other sites on the Opasatika River, e.g. Christopher Rapids)				"development is expected to occur"	Treaty 9	n/a
	Mccarthy Chute		46.3007	-82.4395	MNR	"development is expected to occur"	Robinson Huron	Possibility of Serpent River
	Red Cedar Lake Dam		46.67861	-79.99444	MNR	"development is expected to occur"	Robinson Huron	n/a; Proximity of Bear Island and Nippissing noted
	Km 4.8 - Mcvittie S		46.2676	-80.8758	MNR	"development is expected to occur"	Robinson Huron	n/a; Proximity of Whitefish Lake, French River, Henvey Inlet and Point Grondine noted
	Wanapitei Lake Dam		46.66389	-80.67389	MNR	"development is expected to occur"	Robinson Huron	Possibly Wahnapetei
	Below Cross Lake		46.1469	-81.6775	MNR	"development is expected to occur"	Robinson Huron	Possibly Whitefish River and Whitefish Lake; Proximity of Sagamon and Aundeck Omni Kaning noted
	Lang Lake (La Cloche Mts.)		46.1549	-81.6758	MNR	"development is expected to occur"	Robinson Huron	Possibly Whitefish River and Whitefish Lake; Proximity of Sagamon and Aundeck Omni Kaning noted
	Long Lake Dam		49.06778	-87.06889	MNR	"development is expected to occur"	Robinson Superior	n/a
	Lower Lake	Aguasabon River (NW Ontario between Geraldton and Terrace Bay)	Approximate location indicates 16 km north of Terrence Bay			"development is expected to occur"	Robinson Superior	n/a
	Shabaqua Corners		48.6194	-90.0624	MNR	"development is expected to occur"	Robinson Superior	n/a
	Mileage 7.9	Little Jackfish (E-3-7 Figure 2)			Evidence	"development is expected to occur"	Robinson Superior	n/a

Hydro Sites								
2007-2010								
		Site Location or Coordinates						
	Project	**Location**	**Latitude (Degrees)**	**Longitude (Degrees)**	**Coordinate Source**	**Status**	**Treaty Area**	**First Nations Reserve Lands**
	7.2Km From Mouth		48.8421	-86.6153	MNR	"development is expected to occur"	Robinson Superior	n/a
	Hay Rapids/High Falls		48.4508	-92.3125	MNR	"development is expected to occur"	Treaty 3	Neguagon Lake
	Myrtle Falls		48.41167	-92.18722	MNR	"development is expected to occur"	Treaty 3	Neguagon Lake
	Dragonfly Lake		49.67229	-88.03526	MNR	"development is expected to occur"	Robinson Superior	n/a; Proximity of Rocky Bay and Lake Nipigon noted
	High Falls		44.5643	-77.3273	MNR	"development is expected to occur"	Robinson Superior	Lake Nipigon
	Km 8 & Km 12.8 (#286 & 288)		49.7096	-87.9679	MNR	"development is expected to occur"	Robinson Superior	n/a; Proximity of Lake Nipigon and Rocky Bay noted
	1.6Km Below Chicagonce Falls		48.59862	-85.8807	MNR	"development is expected to occur"	Robinson Superior	Possibly Pic River
	3.2Km Below White Lake		48.6399	-85.7677	MNR	"development is expected to occur"	Robinson Superior	Possibly Pic River

The aggregate spending on the plan is shown in Figure 8, below.

Figure 8: Capital Spending under Capacity Unchanged Scenario



	2007 $ Billions
Conservation	9.8
Transmission	4.0
Nuclear	37.5
Gas	3.7
Wind	6.1
Hydro	9.1
Biomass	1.0
Total	71.3

Source:OPA

The aggregate capital spending on generation resources includes IDC at 8%. This results in some changes relative to Figure 1 in Exhibit G-2-1 despite the planned resources being the same.

The deterministic present value of the plan over the study period is $84.2 billion, $111 billion including the terminal value.

Cost Analysis (Capacity Revised Scenario)

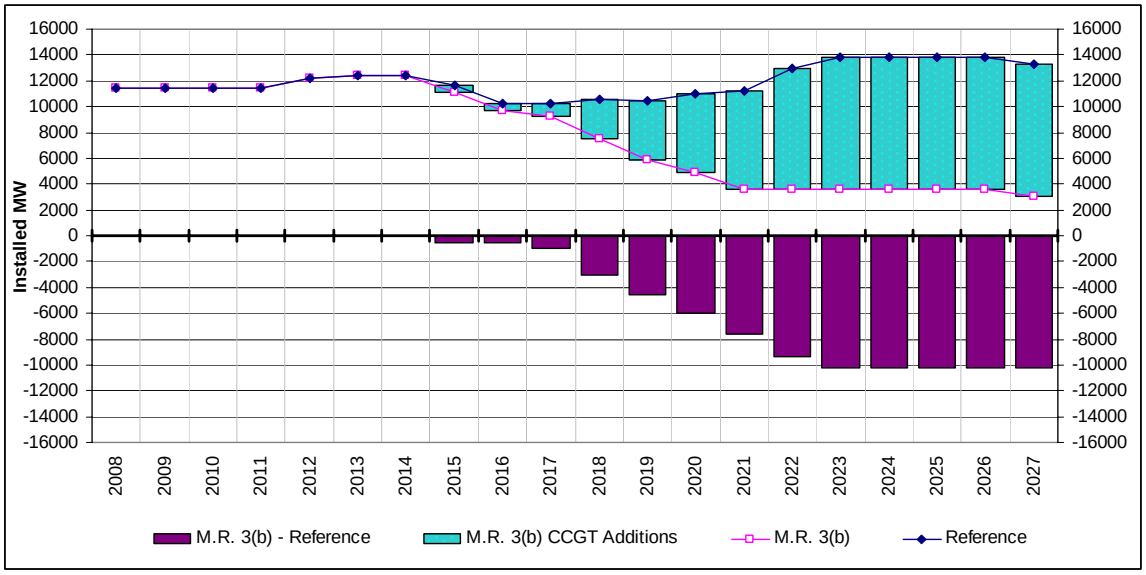
As the breakeven analyses show, under these assumptions new nuclear is not economic, though some nuclear should be maintained to mitigate gas price risk. For the purpose of this exercise it was assumed that the committed refurbishments would continue (i.e. Bruce A), but no new nuclear would be built and uncommitted refurbishments would be halted.

The nuclear capacity was replaced with combined cycle plant gas, as shown in the following Figures.

Figure 9 below compares the total amount of installed nuclear resources between 2008 and 2027 under IPSP reference Case 1A and Model Run 3(b). It is seen that installed nuclear resources would total approximately 3,000 MW by 2027 under Model Run 3(b), or approximately 10,200 MW less than under IPSP Case 1A. Figure 9 also illustrates that the

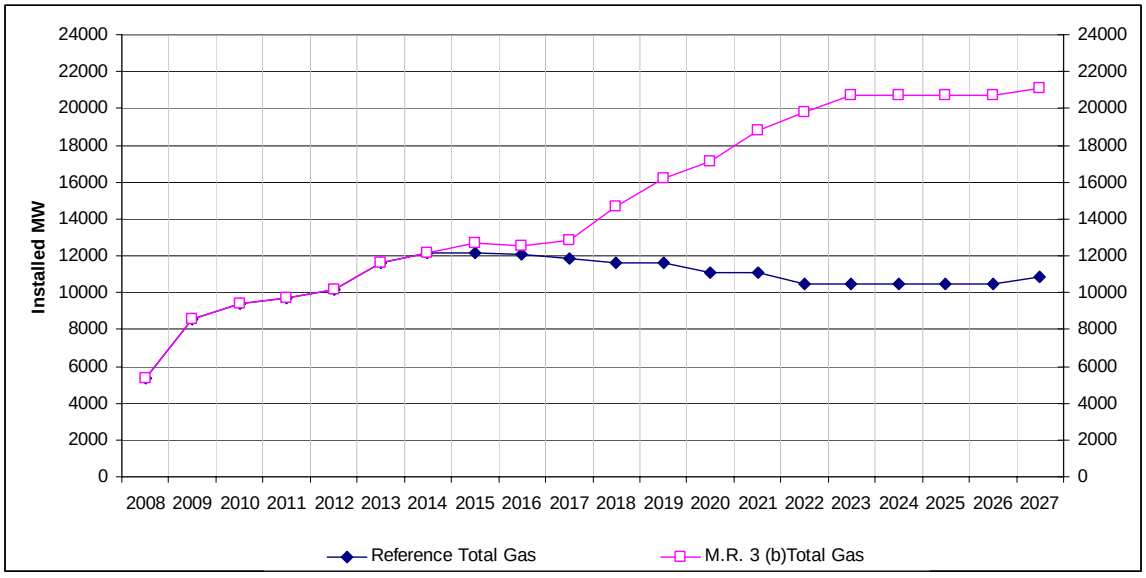
additional amount of combined cycle gas plant under Model Run 3(b) would be about 10,200 MW. Total amounts of installed natural gas-fired resources under IPSP Case 1A and Model Run 3(b) are illustrated in Figure 10. It will be seen that Model Run 3(b) would contain approximately 21,100 MW of installed natural gas-fired resources by 2027, or about 10,200 MW more than IPSP Case 1A.

Figure 9: Comparison of Total Installed Nuclear Resources: IPSP Reference Case 1A vs. Model Run 3(b)Changes in Planned resources



Source: OPA

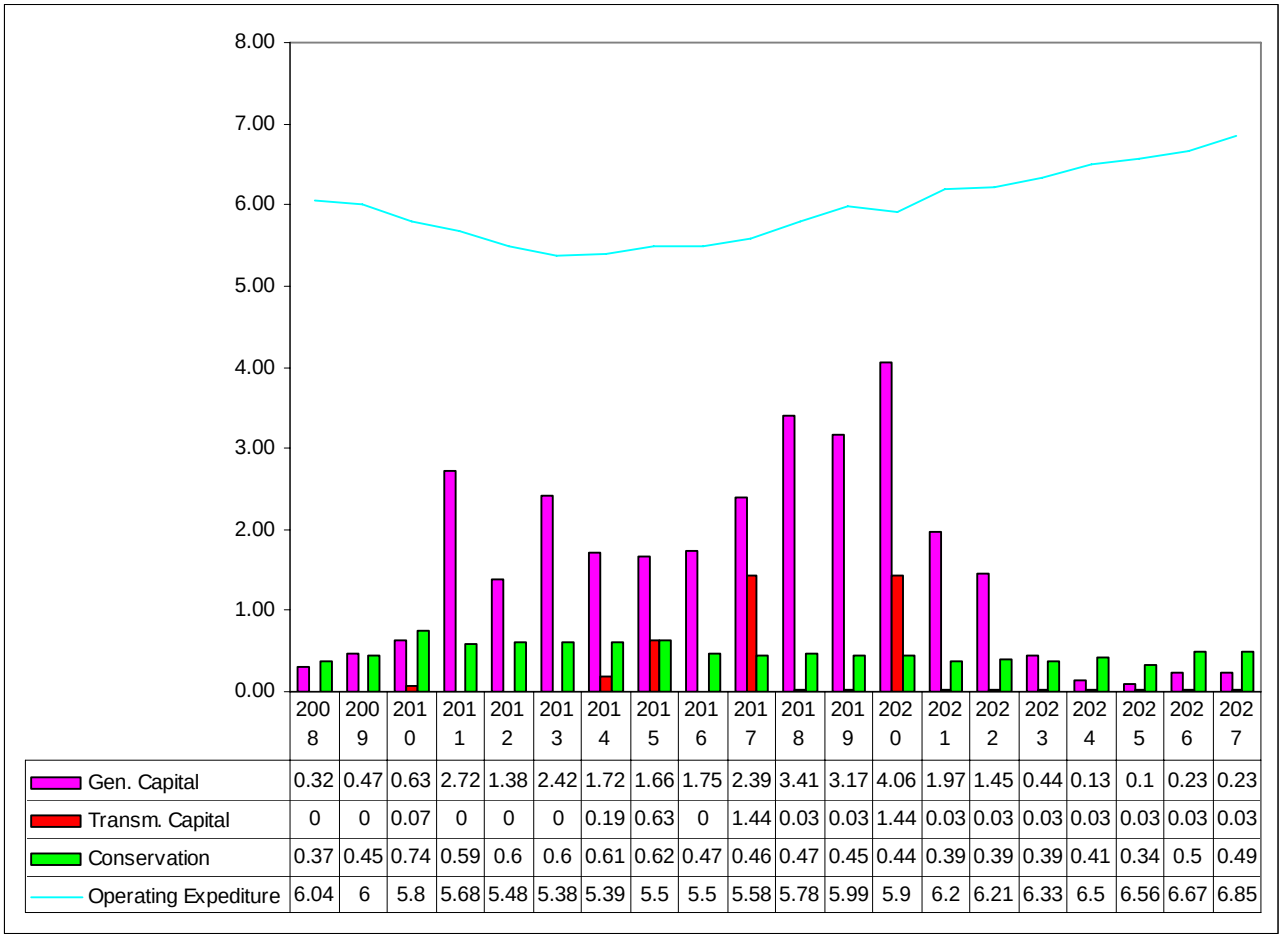
Figure 10: Comparison of Total Installed Natural Gas-Fired Resources: IPSP Reference Case 1A vs. Model Run 3(b)



Source: OPA

The forecast annual cash flows that result, comparable to those in Figure 7 in Exhibit G-2-1 are shown below in Figure 11

Figure 11: Annual Cash Flows in Capacity Revised Scenario

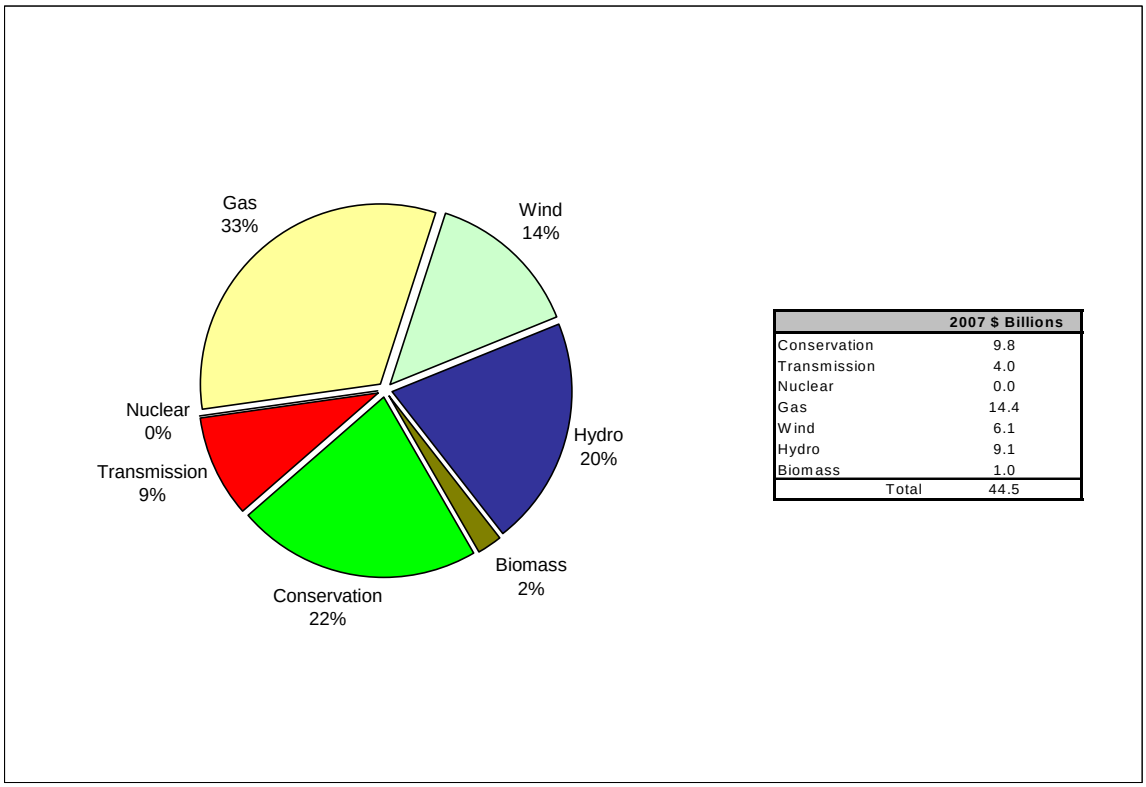


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Gen. Capital	0.32	0.47	0.63	2.72	1.38	2.42	1.72	1.66	1.75	2.39	3.41	3.17	4.06	1.97	1.45	0.44	0.13	0.1	0.23	0.23
Transm. Capital	0	0	0.07	0	0	0	0.19	0.63	0	1.44	0.03	0.03	1.44	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Conservation	0.37	0.45	0.74	0.59	0.6	0.6	0.61	0.62	0.47	0.46	0.47	0.45	0.44	0.39	0.39	0.39	0.41	0.34	0.5	0.49
Operating Expediture	6.04	6	5.8	5.68	5.48	5.38	5.39	5.5	5.5	5.58	5.78	5.99	5.9	6.2	6.21	6.33	6.5	6.56	6.67	6.85

Source:OPA

Figure 12 below shows the aggregate spending.

Figure 12. Aggregate Spending in Capacity Revised Scenario

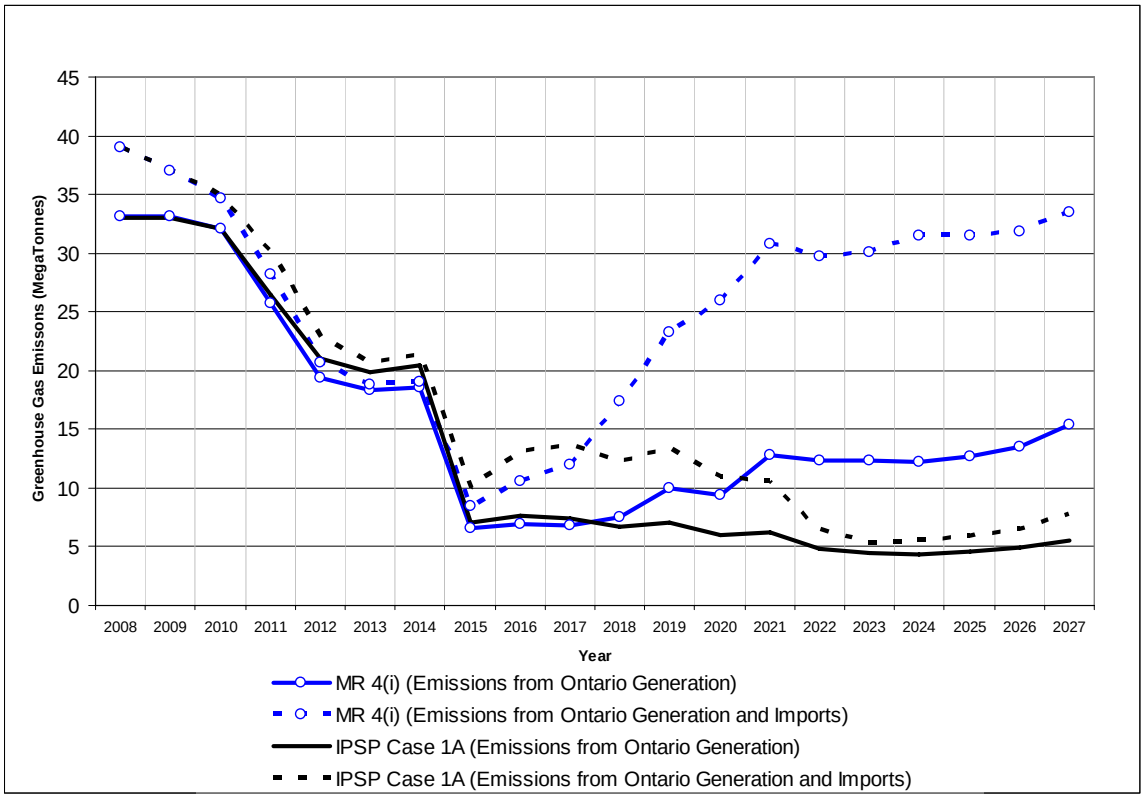


	2007 $ Billions
Conservation	9.8
Transmission	4.0
Nuclear	0.0
Gas	14.4
Wind	6.1
Hydro	9.1
Biomass	1.0
Total	44.5

Source: OPA

The deterministic present value of the plan over the study period is $71.6 billion, $95 billion including the terminal value.

Figure 2.1.3: Plan Scenario 4(i) GHG Emissions



Source: OPA

The OPA has not evaluated this outcome in light of its planning criteria and specifically has not conducted an analysis to evaluate the feasibility, societal acceptance or environmental performance of such an increased use of gas. However, the resulting emissions from this scenario are so dramatic that it is questionable whether such an outcome would be consistent with government policy respecting emissions reductions. The summary of green house gas emissions under this scenario is set out below.

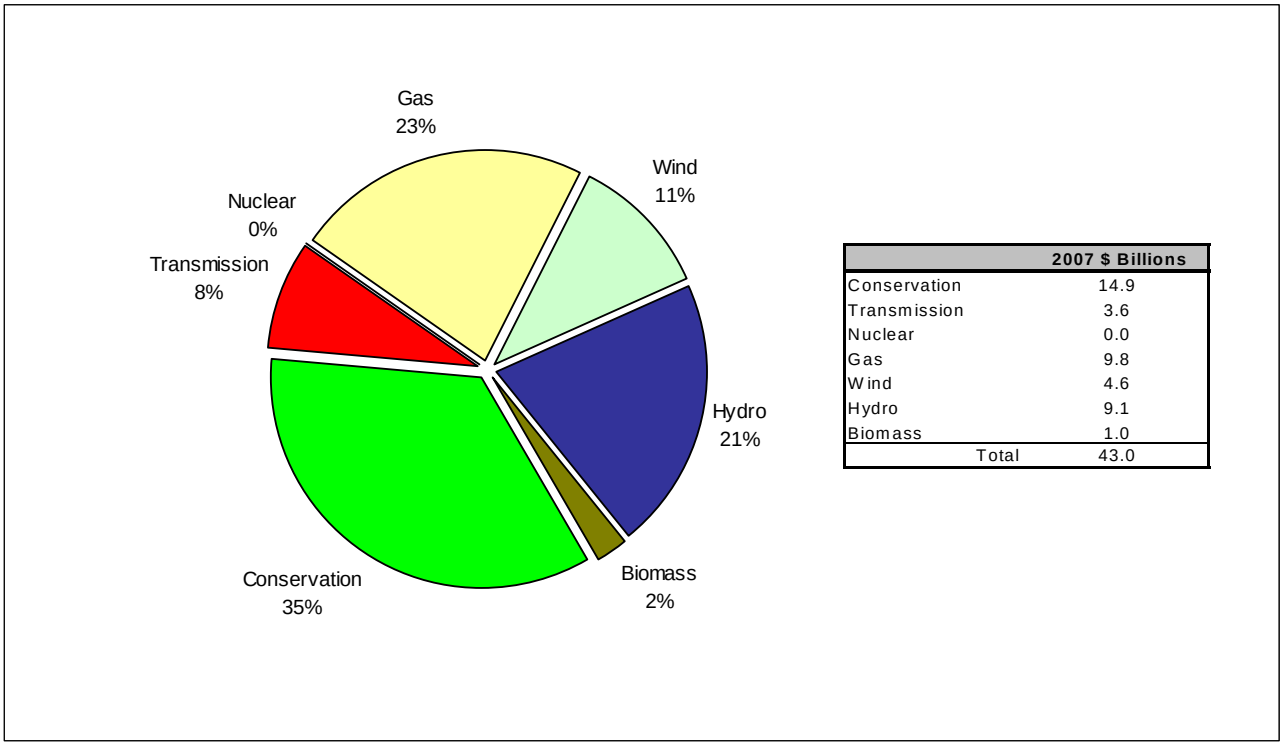
Costs

Expenditures for Conservation, new transmission assets and planned generation for Plan Scenario 4(i) total $43 billion over the Plan Scenario period. The total spending on each of these three components, plus a breakdown of planned generation by major technology type is outlined in Figure 2.1.4.

The cash flows associated with operating the existing and planned generation over the Plan Scenario period are also calculated. The annual profile of these operating expenses as well as a summary of the expenditures associated with Conservation, transmission and planned generation assets is outlined in Figure 2.1.5.

If all of the cash flows associated with Conservation, planned generation assets, transmission investments, and operating costs for existing and planned generation supply are discounted back at the real discount rate of 8%, the total present value of the Ontario electricity system under Plan Scenario 4(i), including an additional amount representing terminal value (infinite replacement), is approximately $88 billion.

Figure 2.1.4: Scenario 4(i): Aggregate Planned Generation, Transmission and Conservation Spending 2008-2027 (2007 $Billions)



	2007 $ Billions
Conservation	14.9
Transmission	3.6
Nuclear	0.0
Gas	9.8
Wind	4.6
Hydro	9.1
Biomass	1.0
Total	43.0

Source: OPA

Table 2.2.1: Plan Scenario 4(ii) Energy (TWh)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Nuclear	83	80	80	82	90	92	90	82	71	68	55	42	35	24	25	25	25	25	25	21
Renewables	38	40	41	43	45	46	48	49	51	52	53	54	60	60	62	63	63	63	63	63
Gas	15	17	18	17	17	17	17	20	21	22	23	31	28	36	33	31	29	29	30	34
Coal	29	28	27	21	14	13	14	0	0	0	0	0	0	0	0	0	0	0	0	0
Conservation	4	5	10	17	19	22	25	28	30	32	34	37	41	44	47	51	55	58	62	65
Imports	7	6	4	4	2	1	1	3	6	8	14	17	21	23	21	21	22	21	21	21
Exports	17	17	20	23	25	29	30	17	12	11	8	8	8	9	8	8	7	8	9	9

Source: OPA

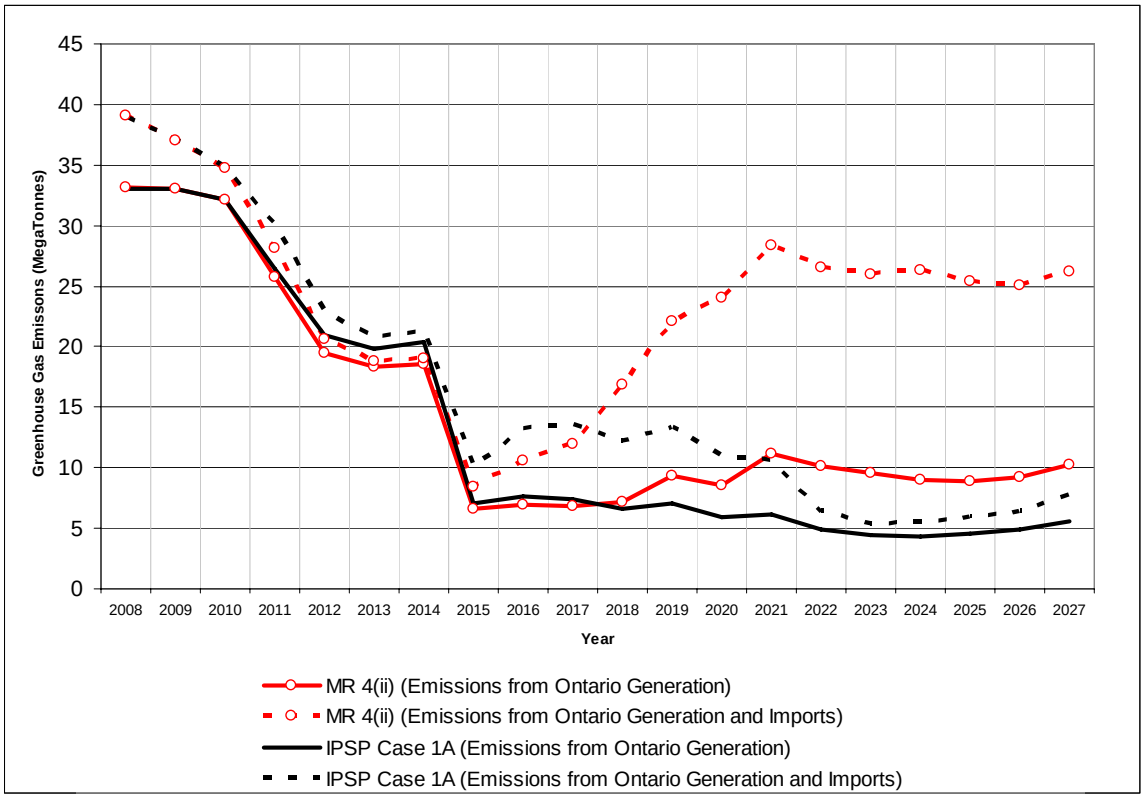
As with Plan Scenario 4 (i) above, the OPA has not considered this outcome in light of its planning criteria and specifically has not conducted an analysis to consider the feasibility or environmental impacts of such an increased use of gas.

GHG Emissions

Greenhouse Gas ("GHG") emissions are summarized in Figure 2.2.3. By 2027, Plan Scenario 4(ii) results in approximately 10.3 MT of GHG emissions from Ontario-based generation sources. If imports are also considered, the result is approximately 26.2 MT of GHG emissions by 2027. Figure 2.2.3 also illustrates GHG emissions under IPSP Case 1A. It will be seen that Ontario-based GHG emissions under Plan Scenario 4 (ii) are approximately 4.7 MT higher by 2027 than under IPSP Case 1A and approximately 18.4 MT greater by 2027 if imports are considered.

By 2027, total GHG emissions under Plan Scenario 4(ii) (i.e. Ontario-based emissions plus import emissions) are comparable to total GHG emissions estimated for the year 2011 under IPSP Case 1A (where coal-fired generation in Ontario was forecast to generate approximately 21 TWh of electricity).

Figure 2.2.3: Plan Scenario 4(ii) GHG Emissions



Source: OPA

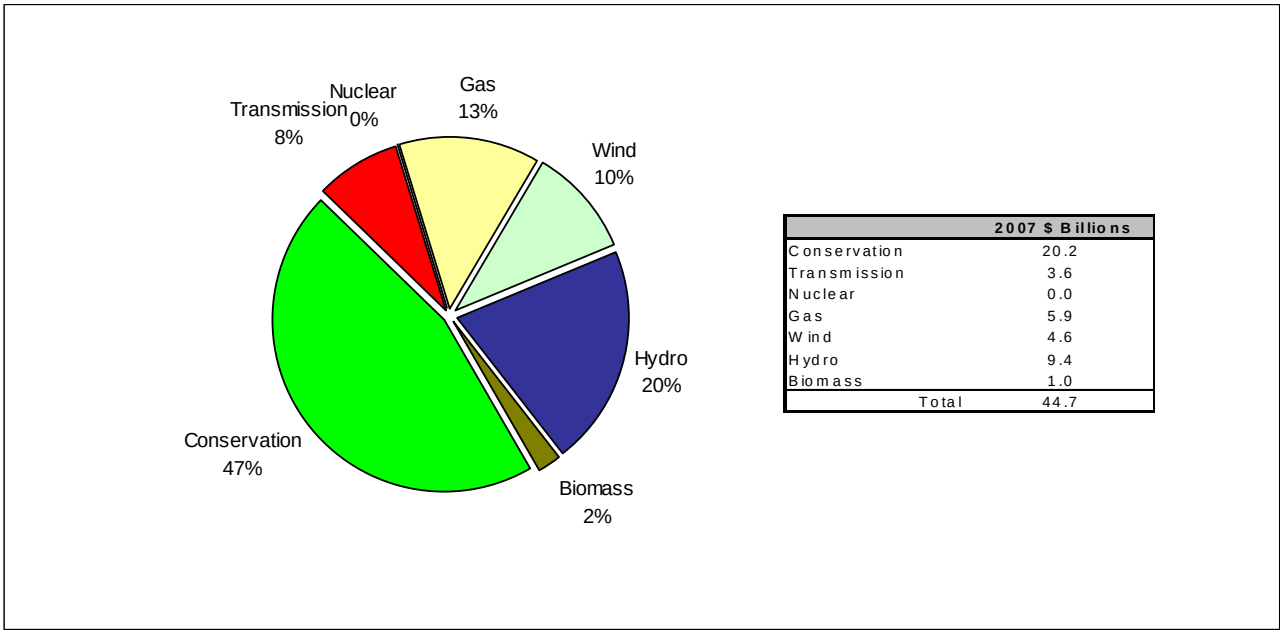
Costs

Expenditures for Conservation, new transmission assets and planned generation for Plan Scenario 4(ii) total $44.745.8 billion over the Plan Scenario period. The total spending on each of these three components, plus a breakdown of planned generation by major technology type is outlined in Figure 2.2.4.

The cash flows associated with operating the existing and planned generation over the Plan Scenario period are also calculated. The annual profile of these operating expenses as well as a summary of the expenditures associated with Conservation, transmission and planned generation assets is outlined in Figure 2.2.5.

If all of the cash flows associated with Conservation, planned generation assets, transmission investments, and operating costs for existing and planned generation supply are discounted back at the real discount rate of 8%, the total present value of the Ontario electricity system under Plan Scenario 4(ii), including an additional amount representing terminal value, is approximately $85 billion.

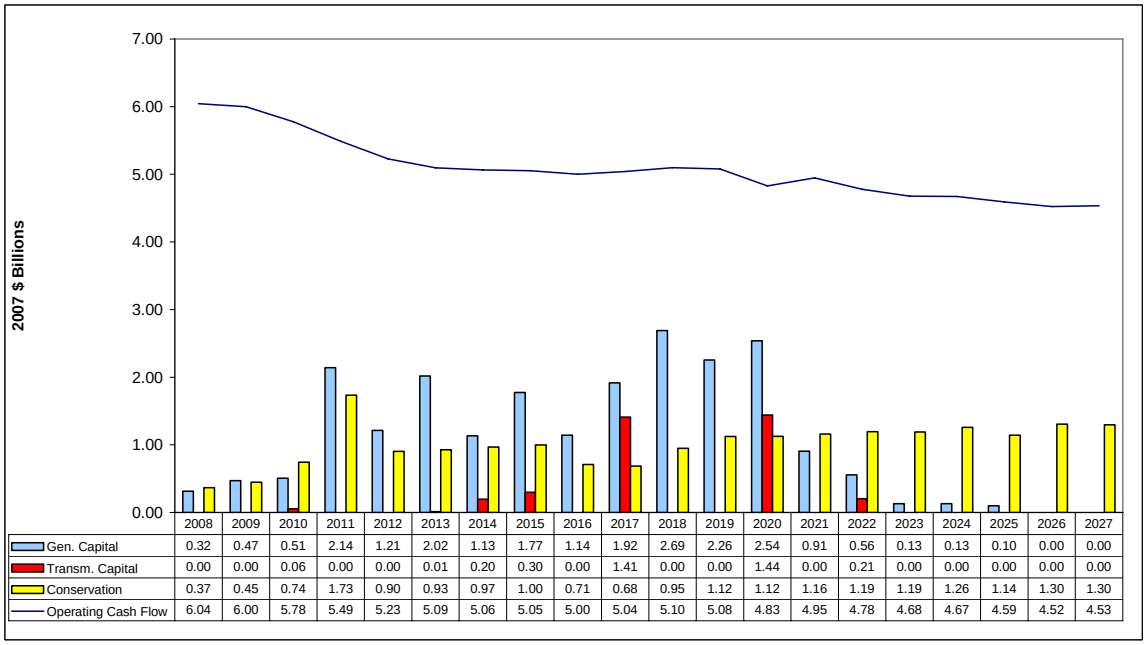
Figure 2.2.4: Scenario 4(ii): Aggregate Planned Generation, Transmission and Conservation Spending 2008-2027 (2007 $Billions)



	2007 $ Billions
Conservation	20.2
Transmission	3.6
Nuclear	0.0
Gas	5.9
Wind	4.6
Hydro	9.4
Biomass	1.0
Total	44.7

Source: OPA

Figure 2.2.5: Plan Scenario 4(ii) Forecast Period Annual Cash Flows (2007 $Billions)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Gen. Capital	0.32	0.47	0.51	2.14	1.21	2.02	1.13	1.77	1.14	1.92	2.69	2.26	2.54	0.91	0.56	0.13	0.13	0.10	0.00	0.00
Transm. Capital	0.00	0.00	0.06	0.00	0.00	0.01	0.20	0.30	0.00	1.41	0.00	0.00	1.44	0.00	0.21	0.00	0.00	0.00	0.00	0.00
Conservation	0.37	0.45	0.74	1.73	0.90	0.93	0.97	1.00	0.71	0.68	0.95	1.12	1.12	1.16	1.19	1.19	1.26	1.14	1.30	1.30
Operating Cash Flow	6.04	6.00	5.78	5.49	5.23	5.09	5.06	5.05	5.00	5.04	5.10	5.08	4.83	4.95	4.78	4.68	4.67	4.59	4.52	4.53

Source: OPA

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IPSP - CASE 1B

CASH FLOW SUMMARY (1000 x 2007 $Can)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Gen. Capital	0.29	0.44	0.59	2.60	1.29	2.53	2.24	3.33	4.42	4.68	6.31	6.01	6.40	3.27	1.27	0.12	0.12	0.09	0.04	0.17
Transm. Capital	0.00	0.00	0.07	0.00	0.00	0.00	0.19	0.63	0.00	1.44	0.03	0.03	1.44	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Conservation	0.37	0.45	0.75	0.59	0.61	0.60	0.62	0.62	0.48	0.46	0.48	0.46	0.45	0.39	0.40	0.39	0.42	0.35	0.51	0.50
Variable Costs	2.0	2.1	2.1	1.9	1.8	1.9	2.0	1.8	2.0	2.1	2.2	2.3	2.1	2.2	1.9	1.9	1.9	1.9	2.0	2.1
Fixed O&M	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.9	3.0	3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.2
Net Exports	-0.5	-0.7	-0.9	-0.8	-0.9	-1.1	-1.1	-0.4	-0.1	0.0	0.1	0.1	-0.3	-0.7	-0.9	-1.0	-0.9	-0.9	-1.0	-0.9
Operating Cash Flows	4.38	4.33	4.13	4.01	3.81	3.78	3.80	4.28	4.68	4.84	5.20	5.41	5.03	4.74	4.27	4.15	4.23	4.32	4.32	4.44

	Case 1B	Terminal Value
PV of Capital	$14.6	$22.7
PV of Conservation	$6.9	$5.1
PV of Transmission	$2.6	$2.6
PV of Operating Cash Flow (expediture)	$59.5	$29.6
Terminal Value	$60.0	$60.0
	$143.6	

IPSP - CASE 1B

Annual Production [GWh]

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Load	158,119	158,526	159,410	160,558	162,197	162,880	164,053	165,236	167,695	169,181	171,189	173,222	175,803	177,990	180,745	183,543	186,944	189,273	192,206	195,186
Coal	29,130	28,400	27,212	21,365	15,743	14,491	15,039	-	-	-	-	-	-	-	-	-	-	-	-	-
Nuclear_Existing	82,679	79,852	79,528	82,189	89,839	92,342	89,743	81,886	70,698	67,745	61,209	53,815	54,012	57,140	69,842	76,910	77,525	76,624	77,746	73,653
Nuclear_New	-	-	-	-	-	-	-	-	-	-	4,906	9,811	17,019	24,134	24,725	24,878	25,539	25,623	26,652	26,806
Hydro	35,252	35,820	36,739	36,963	38,507	38,621	39,009	39,216	39,695	39,658	39,770	40,178	44,379	44,792	46,853	47,315	47,457	47,853	47,848	47,891
IGCC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OPG Lennox	76	20	-	7	4	-	-	27	42	79	83	90	31	7	-	-	-	-	-	-
Biomass_Atikokan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biomass_Other	618	614	611	611	953	1,135	1,395	2,014	3,246	3,328	3,420	3,449	3,783	3,753	3,566	3,413	3,456	3,453	3,514	3,633
CCGT	3,769	5,561	5,536	4,958	5,226	4,978	5,166	9,827	13,793	15,313	16,773	18,059	14,859	15,254	10,087	8,982	8,525	8,994	9,997	11,469
Cogeneration	115	727	1,587	1,587	1,591	3,639	3,639	3,639	3,649	3,639	3,639	3,639	3,649	3,639	3,639	3,639	3,649	3,639	3,639	3,639
SCGT	-	-	-	23	51	4	7	279	475	847	1,030	1,310	754	502	86	49	70	112	91	306
CDM	3,576	4,722	9,027	11,515	13,424	15,211	17,028	18,818	19,975	21,050	22,141	23,209	24,254	25,090	25,966	26,829	27,733	28,419	29,604	30,759
Fuel Cell	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HQ_Interconnection	-	616	430	519	356	472	419	405	1,524	1,524	2,102	2,102	1,886	1,886	1,124	1,124	968	968	1,042	1,042
NUG_Must Run	11,033	11,000	11,000	11,000	11,037	9,881	9,878	7,819	7,111	5,697	2,611	2,611	2,619	2,611	1,723	1,723	1,728	1,722	1,723	1,723
NUG_Dispatchable	-	-	-	-	-	2	3	184	565	938	1,734	1,899	1,471	1,180	341	214	232	352	405	802
Solar	30	71	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Wind	1,641	3,562	4,047	5,510	5,527	6,418	7,372	7,942	8,527	8,686	9,778	10,142	11,547	11,513	11,513	11,513	11,547	11,513	11,513	11,513
PGS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saunders_HQ	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139	- 1,139
Surplus Energy	-	-	-	-	19	38	33	4	-	-	-	-	1	26	168	446	449	543	458	230
Unserved Energy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exports																				
Hydro_Quebec	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139
Others	15,901	16,184	18,626	19,216	21,327	24,262	24,674	10,675	8,485	7,505	7,899	7,769	10,810	16,266	19,231	22,603	21,169	19,979	21,546	19,037
Total Exports	17,040	17,323	19,765	20,355	22,466	25,401	25,813	11,814	9,624	8,644	9,038	8,908	11,949	17,405	20,370	23,742	22,308	21,118	22,685	20,176
Imports																				
Hydro_Quebec	-	616	430	519	356	472	419	405	1,524	1,524	2,102	2,102	1,886	1,886	1,124	1,124	968	968	1,042	1,042
Others	7,239	4,884	3,368	4,576	2,335	1,034	1,112	4,907	7,927	9,231	10,942	11,725	7,399	3,831	1,725	1,051	1,180	1,571	1,485	2,266
Total Imports	7,239	5,500	3,798	5,095	2,691	1,506	1,531	5,312	9,451	10,755	13,044	13,827	9,284	5,717	2,849	2,175	2,148	2,539	2,527	3,308
Load+NetExports+Surplus	167,920	170,349	175,377	175,818	181,991	186,813	188,369	171,741	167,868	167,069	167,183	168,303	178,469	189,705	198,433	205,556	207,553	208,395	212,823	212,284
Total Generation+Energy Not Served	167,920	170,349	175,377	175,818	181,991	186,813	188,369	171,741	167,868	167,069	167,183	168,303	178,469	189,705	198,433	205,556	207,553	208,395	212,823	212,284

IPSP - CASE 1B

IMPORT & EXPORT CASH FLOW SUMMARY (1000 x 2007 $Can)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Export_Revenue	801,124	879,664	991,871	966,382	1,044,407	1,124,375	1,153,337	609,453	580,949	540,451	572,307	570,494	712,916	954,164	1,042,860	1,128,883	1,034,522	995,823	1,083,567	1,032,725
Net_Export_Revenue	376,744	407,513	486,124	561,880	686,506	759,558	773,436	273,514	180,155	153,589	145,034	136,163	213,555	380,895	611,152	726,650	646,924	581,808	647,532	547,669
Import_Cost	264,345	176,098	110,376	142,308	83,515	40,331	42,850	224,136	341,164	401,829	512,472	557,147	335,895	174,893	83,543	51,846	57,382	76,386	74,025	108,199

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IPSP - CASE 1B

Operating Costs

	Weighted Average by Capacity ($/MWh - 2007 USD)	
Technology	**VOM**	**FOM**
CCGT	$2.39	$17.48
SCGT	$3.24	$14.02
BIOGAS	$21.35	$177.56
COGEN	$2.15	$9.30
COAL	$6.10	$13.95
NUCLEAR	$3.61	$154.89
WIND	$0.00	$42.00
SOLAR	$0.00	$11.62
HYDRO RR	$0.00	$36.63
HYDRO DIS	$0.00	$36.63
NUG Replace CCGT	$2.48	$14.89
* Values are for Existing/Comitted and Planned Resources		

IPSP - CASE 1B

Coal Fleet Outages

	2008	2009	2010	2011	2012	2013	2014
EFOR Weighted Average (%)	12.8%	12.8%	12.8%	12.8%	12.8%	12.8%	12.8%
POF Weighted Average (%)	16.2%	18.7%	15.9%	15.5%	14.8%	14.8%	14.8%

*** Weighted by Capacity**

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