

CANADIAN GAS TURBINE NEWSLETTER



Welcome to a new issue of the IAGT's Canadian Gas Turbine Newsletter, your information window to the gas turbine industry in Canada. The Newsletter is planned as a semi-annual publication to address issues pertinent to the gas turbine industry in Canada and to inform you, the reader, about upcoming events and new developments of interest to all of us connected to the industry. The newsletter will be available on the IAGT website at iagtcommittee.com. Contributions, feedback and suggestions to the Symposium and to the Newsletter are welcome and can be sent via e-mail to the addresses on the back page.

The Industrial Application of Gas Turbines (IAGT) Committee, formed in 1973 under the sponsorship of the National Research Council of Canada, is a Technical Advisory Group to Canadian industry and government. The group provides a forum for the exchange and dissemination of ideas and the communication of new developments related to the industrial application of gas turbines in Canada (see Appendix 1).

I would like to express the Committee's thanks to all of those who have been involved with and contributed to the success of the Committee and the Biennial Symposium since its inception in 1974. In particular, we would like to thank the outstanding efforts of Herb Saravanamuttoo of Carleton University as the founding member of IAGT, and our past two Chairmen, Jim Noordermeer and Lloyd Cooke, for their dedication and effort in expanding and diversifying the membership within the Canadian Gas Turbine Industry.

The Committee also welcomes the renewed membership of the National Research Council as an organizational partner along with the Canadian Gas Association. Wajid Ali Chishty of the Combustion Lab is the new NRC committee rep, supported by Ian Campbell, and Bob Hastings, Director of the newly opened Gas Turbine Laboratory.

[Recent IAGT Activities](#)

[2005 IAGT Symposium Banff, Alberta](#)

The 16th Symposium which was held in Banff in October, 2005 was a resounding success with over 100 delegates in attendance. The variety, quality, and technical scope of the papers and the presentations were excellent. Papers on a wide range of relevant topics including gas turbine technology and applications; operations and maintenance; performance; cogeneration and combined cycle; and emissions and environmental were presented over the three day session. Documents are available in the 'Papers' link at the IAGT homepage.

The "Best Paper" award went to Dan Wolanick of Talisman Energy for his paper on the "*Talisman Energy Edson Cogeneration Plant - Bumpless Steam and Power Switching.*"

WHAT'S NEW

2006 IAGT Gas Turbine Course, Toronto

About 60 people attended a successful 2 day course in October 2006 near Pearson Airport dealing with many relevant topics offered by IAGT members.

Gas Turbine Design Fundamentals
Gas Turbines for Cogeneration
Heat Recovery Steam Generators
Overhaul and Maintenance Practices
Air Pollution and GHG Emissions

Component Repair
Research and Testing
Microturbines for Distributed Energy and CHP
Gas Compressor Station Design and Operation

The course featured a site tour of the brand new 117 MW GTAA combined cycle cogeneration plant, hosted by John Souther of SNC Lavalin. We recognize the excellent efforts of our members, especially Tracy Soyka in organizing all of the course logistics, and Jim MacArthur of IST for helping with the plant tour.

Mark your calendars, the 17th IAGT Symposium will be held in Banff, Alberta on October 15-17, 2007. The theme for the Symposium will be "***Clean and Reliable Energy Solutions***". The "Call for Papers" has already gone out and the agenda has been set. If you have not received your notification, please call any of the Committee members to get your name and Company affiliation put on our mailing list. Through our Sponsor, The Canadian Gas Association, a block of rooms at the Banff Springs Hotel has been reserved and details will follow with the preliminary program in the Spring of 2007.

Examples of Some New Canadian Gas Turbine Projects since Year 2000

Natural gas, electricity and industrial energy topics are high on the priority list in air pollution, greenhouse gases, energy conservation and security objectives. Gas turbines fueled by natural gas (or by liquids and waste gases) can provide a clean and efficient source of power and heat for many industrial and utility energy applications. Oilsands gasification, Arctic & offshore pipelines, Distributed Energy and Liquid Natural Gas supplies are upcoming investment topics all involving gas turbine engine systems. About \$12 billion has been invested in eighty such plants over recent years in Canada, and more is planned. Here are some of the recent example projects;

- The Irving Saint John refinery in New Brunswick and the Imperial Oil Sarnia refineries each receive a **90 MW cogeneration plant**, the former with two LM6000s added to existing HRSG boilers, and the latter with a GE Frame 7EA.
- Canada's first bio-fueled gas turbine facility is installed in West Lorne Ontario, with Erie Flooring using the waste heat from a **2 MW Magellan Orenda OT2500**, fueled by pyrolysis oil made from woodwaste.
- Solar Turbines supplies two **6 MW Taurus Solonox** units each to CHP plants, at the Talisman gas processing plant in Edson Alberta, and to the Hospital at Queens University in Kingston Ontario. York University receives a second Taurus for their CHP plant.

- Rolls Royce has provided two new **28 MW RB211G** units to the Cochrane Extraction Plant in Alberta, three RB211s to the Husky White Rose floating offshore production platform near Newfoundland, and another to the expanded SableGas Thebaud platform in Nova Scotia.
- Large new combined cycles have been completed at the 580 MW ATCO Brighton Beach repowering project (with 3 **GE Frame 7FA** units) near Windsor Ontario, and to the 250 MW Calpine Calgary Energy Center using a Siemens **Westinghouse W501F unit**. Three **W501F** units will be used by Calpine in new construction of the 1000 MW Courtwright Greenfield plant in SW Ontario, and two **Frame 7Fs** at the Portlands Energy Center at the Toronto waterfront.
- Several large oilsands cogen projects in Alberta have featured **85 MW GE Frame 7EA** gas turbines at Syncrude Aurora, Shell Muskeg and Scotford upgrader, Esso Cold Lake and Encana Foster Creek, as well as a **180 MW GE Frame 7F** at the PetroCan MacKay River plant.
- High efficiency **45 MW GE aeroderivative LM6000** gas turbines were installed at the Emera Tufts Cove power plant in Dartmouth, the GTAA Pearson Airport CHP plant, with the City of Medicine Hat, and with TransCanada Power at the Carseland and Redwater processing facilities in Alberta. A **50 MW Rolls Royce Trent** is operating at the Grande Prairie Weyerhaeuser paper mill.
- Four **20 MW GE LM2000** and four **28 MW LM2500+** gas turbines provide new compression service to the Duke Westcoast gas pipeline in BC, and some waste heat recovery projects are planned. The new Alliance pipeline system in Alberta and Saskatchewan has since 2000 been operating seven **LM2500+ units**, and two smaller **Alstom Tornado** units. TransCanada installs pipeline waste heat recovery at the Calstock plant in N. Ontario, integrated with a nearby forest product biomass steam system.
- Alstom provides three large **110 MW GT11N** units to TransAlta for the SUNCOR Millenium oilsands plant expansion, and another three to the Sarnia Regional Cogen plant expansion integrated with the existing DOW Chemical facility. Two **180 MW GT24** units provide peaking power in Brandon Manitoba, and another at the Duke Bayside combined cycle repowering in Saint John NB.
- Projects planned for the next few years include several large oilsands projects, an innovative bitumen gasification cogen project with OPTI Nexen at Long Lake Alberta, a new **GE LMS100** and a **LM6000** for the Clover bar site in Edmonton, and new Ontario cogen projects at Thorold Paper, Ford Windsor and in London.

Some Detailed Project Descriptions

HEALTH CANADA

Enbridge Gas Distribution Inc., Public Works and Government Services Canada, Health Canada and the Distributed Generation group of the CANMET Energy Technology, have cost shared the installation and operation of a microturbine-based Combined Heat and Power (CHP) system based on the **Ingersoll-Rand PowerWorks LM70 microturbine**. The primary objective of this project is to demonstrate reliable and efficient on site power generation, with heat recovery and ultra low emissions (expected NO_x emissions are 80 g/MWh). Secondary objectives are: acquiring necessary equipment certification (CSA), reaching an interconnection agreement with Toronto Hydro, and obtaining approval of the microturbine system by the regulatory authorities TSSA and ESA. A successful outcome of this project would be the eventual equipment transfer of the CHP system to the staff at Health Canada on 1st April 2008.

The system was commissioned and is in operation since April 2006. The 70LM forms a compact, completely integrated package, including an on-board fuel gas compressor and an exhaust gas heat recovery heat exchanger, thus its installation was simple and straightforward. The LM70 is installed outdoors, so it was supplied housed in an enclosure rated to -23°C. The system performance will be monitored over the next two years.



Capstone Microturbine & Heat Recovery, Minto



Heath Canada Microturbine CHP

Minto Suites Hotel

A microturbine-based Combined Heat and Power (CHP) system was installed at the Minto Place Suites Hotel, in Ottawa, Ontario, in August 2004. The system is based on the **30 kW Capstone microturbine**, model 330. Important ancillary equipment includes a Copeland Scroll Fuel Compressor, and a Unifin International Flue Gas Heat Recovery Unit. Overall the project demonstrated that a small CHP plant could be integrated into the existing physical plant in a commercial building. Considerable experience was gained through dealings with the various regulatory authorities, construction contractors, and consultants. This project received support from Enbridge Gas Distribution. On average, about 23 kW electrical and 60 kW thermal, energy are provided to the building, resulting in a total CHP system efficiency of about 75%. The system contributes only a small fraction of the building electrical energy requirement, but provides about 50% of the thermal energy required for the domestic hot water load.

TCPL Becancour Combined Cycle Cogeneration

TransCanada is completing a 550-megawatt (MW) cogeneration plant in the Bécancour Industrial Park, located beside Bécancour and near Trois-Rivières, Québec. Under long-term contracts, the facility will supply electricity to Hydro-Québec Distribution to help the utility meet growing electricity demands and provide an important source of competitively priced steam for Norsk Hydro and Pioneer Companies Inc. (PCI) industrial processes.

The facility will generate approximately 4.5 terawatts per year of power, enough to meet the needs of about 500,000 homes. The following equipment is being utilized:

- Two gas turbines with low NOx burners (combined output: 366 MW)
- Two heat recovery steam generators
- One steam turbine (output : 167 MW)
- Main building that will house turbines
- Evaporative cooling towers



HRSGs Under Construction at Becancour



Steam System at GTAA Cogen Plant

GTAA Cogeneration Plant

GTAA Cogeneration Plant is a 117-megawatt natural gas-fired combined cycle cogeneration facility that is built on federal land under the control of Greater Toronto Airports Authority at the Toronto Pearson International Airport. Major equipment consists of two combustion turbines (**45-megawatt GE LM6000**), two *Innovative Steam Technologies* heat recovery (“once-through”) steam generators and one steam turbine. The 117 megawatt plant will provide electricity to the airport complex and steam and chilled water to the airport facilities for heating and air conditioning. The plant layout has allowed space for the possible future installation, if required, of Selective Catalytic Reduction (SCR) equipment for emissions reduction and control. The facility is connected to the existing Toronto Pearson International Airport’s Central Utility Plant that provides both heating and cooling of the airport complex and has been in operation since 2005.

Halton Hills Combined Cycle Power Plant

Siemens Power Generation has entered into a contract to supply two gas turbines for the proposed TransCanada Halton Hills combined cycle power plant, just west of Toronto. The 680 MW combined cycle power plant will use Siemens low emissions technology in order to meet high environmental standards. The Siemens scope of supply consists of **two SGT6-5000F** high-efficiency gas turbines and generators, each with a capacity of 200 MW, as well as the advanced SPPA-T3000 instrumentation & control system. The gas turbines will be made in the Siemens PG gas turbine manufacturing plant in nearby Hamilton. Delivery is scheduled for late 2008, and the plant is expected to go on stream in the second quarter of 2010. Halton Hills is being constructed by the independent power producer TransCanada under a contract with the Ontario Power Authority (OPA). The new project will help to address the specific power demands of the area and gives the security of a reliable local electricity supply to the western part of the greater Toronto area.

Technology Showcase for the New NRC Gas Turbine Laboratory

Through the National Research Council the Government of Canada has embarked on a strategic plan to promote the development of the gas turbine industry in Canada. The long-term goals are the creation of jobs and wealth for Canadians, and the environmentally responsible development of gas turbine manufacturing in Canada to serve the international transportation and power generation sectors. This strategy, under the NRC Aerospace Initiative, recognizes the importance of gas turbine technology in society, the need for efficiency in fuel burn and the need to minimize environmentally damaging emissions.

For its part the National Research Council of Canada has built new world class facilities for gas turbine and combustion research and testing, and entered into strategic partnerships with Canadian industry to develop and apply its facilities and expertise. Recently, NRC consolidated all of its activities in gas turbine technology in a single laboratory, the Gas Turbine Laboratory.



Robert Hastings, Director NRC Gas Turbine Laboratory, welcoming the guests at the Technology Showcase.

A technology showcase for the new NRC Gas Turbine Laboratory was held on September 2006 at the NRC Montreal Road Campus. The purpose of this event was to demonstrate the work of the newly formed Laboratory, to showcase its new facilities, and demonstrate the value to Canada of the partnerships taking place between the Canadian Government, industry and the academic community. The very successful event was attended, in large number, by senior representatives of government departments and gas turbine industry, members of Aerospace Industries Association of Canada, representatives of collaborating Canadian Universities and members of NRC Governing Council and the IAR Advisory Board. The highlight of the occasion was the signing of a long-term Memorandum of Understanding between F136 Joint Strike Fighter engine team, comprising General Electric and Rolls-Royce, and NRC Institute for Aerospace Research.

Appendix 1

The IAGT Committee

The Industrial Application of Gas Turbines (IAGT) Committee, formed in 1973 under the sponsorship of the National Research Council of Canada, is a Technical Advisory Group to Canadian industry and government. The group provides a forum for the exchange and dissemination of ideas and the communication of new developments related to the industrial application of gas turbines in Canada.

Presently under the sponsorship of the Canadian Gas Association and the National Research Council, the IAGT Committee's specific functions relate to the organization of a biennial technical symposium. This provides the venue for the presentation of technical papers and discussion panels covering all aspects of industrial gas turbine operation as well as providing a forum for reviewing directives, guidelines, codes and practices, as issued by Regulatory Agencies, which impact directly on the application of gas turbines.

The IAGT Committee includes the following members who volunteer their time and effort to the Canadian Gas Turbine Industry:

Manfred Klein,	Environment Canada (Chair)
Steve Robinson,	Rolls-Royce Canada Ltd. (Vice-Chair)
John Barrie,	Fluor Canada Ltd.
Rob Brandon,	Natural Resources Canada
Steve Caldwell,	TransCanada Turbines
Wajid Chishty,	National Research Council
Paul Colwell,	Duke Energy Gas Transmission
Lloyd Cooke,	Liburdi Engineering Ltd.
Martine Gagne,	Rolls Royce Canada Ltd
Lawrence Kaempffer	Siemens Westinghouse
Ken Leier,	TransCanada PipeLines
Jim McArthur,	Innovative Steam Technologies
Jim Noordermeer,	Gryphon International Engineering
Jeff Sansome,	Standard Aero
Tracy Soyka,	WDYS Events Services
Ken Walls,	Solar Turbines Canada Ltd.
Steve Uren,	Canadian Gas Association