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**OPG'S BIOMASS CO-FIRING TEST PROGRAM****Background**

Ontario Power Generation (OPG) will continue to explore opportunities to reduce the environmental footprint from the operation of its four coal plants for as long as they remain in service. Significant progress has been made in the reduction of emissions related to smog and acid rain and particulates. However, progress on greenhouse gas emissions to date has been limited to plant efficiency improvements.

Co-firing with biomass is an option for greenhouse gas (CO<sub>2</sub>) emissions reduction. Burning biomass is considered "carbon-neutral." Use of biomass may also result in reductions of other emissions.

Biomass is defined as renewable or sustainable materials of forest, agricultural (plant or animal) or marine origins.

Biomass provides the opportunity to generate renewable energy from existing coal plants.

Jurisdictions in Europe have significant experience with biomass co-firing. Typically, the amount of biomass co-fired varies between 5 per cent and 25 per cent of total fuel input for individual units, depending on the type and availability of biomass. Several jurisdictions including the United Kingdom and the Netherlands use a combination of regulations (mandatory renewable targets) and incentive programs (major tax incentives, GHG tax credits) to promote the generation of power using biomass. The Netherlands, considered a leader in the use of biomass, has a goal of producing 12 per cent of total energy from coal plants by co-firing with biomass. This would consume two million tonnes of biomass per year.

OPG is supporting the provincial Atikokan Bioenergy Research Centre (ABRC) program. Six projects (all academic and private sector partnerships) are proceeding. Some will involve co-firing tests at Atikokan GS before the program concludes in 2009.

**OPG Test Program**

All four OPG coal plants have a biomass program. Plants will conduct the testing, research and cost estimating required to define a biomass option.

The OPG biomass test program does not use food crops. Some agricultural by-products are used as animal feedstock. OPG monitors the market conditions to ensure that the testing program does not adversely impact market prices for these commodities. Fuel purchases for the test program have been one-off purchases. No long term fuel contracts are in place.

Tests to date have been short-term tests with a high quality biomass (high heat value, low moisture) using either pneumatic feeding through existing coal pipes or in the case of pellets, through existing coal conveyor and pulverizer systems.

## Atikokan

In 2008, Atikokan test co-fired 200 tonnes of wood pellets which was equivalent to 20 per cent of the energy input (~50 MW). Pellets were produced from British Columbia trees that were destroyed by the pine beetle.

The Atikokan plant will attempt to test co-fire increasing percentages of wood pellets in the summer of 2008 and up to 100 per cent before the end of 2008.

## Nanticoke

Starting in 2007 OPG has tested biomass co-firing at Nanticoke using wheat shorts (a by-product of the milling process) and wood pellets. Wheat shorts were acquired from southern Ontario milling operations.

In 2007, approximately 800 tonnes of biomass (primarily wheat shorts) were co-fired at Nanticoke producing 1,345 MWh of electricity – enough electricity to supply more than 1,000 homes for a month. This material was delivered to the unit either by direct injection from the delivery truck or mixed with coal before entering the boiler. This displaced approximately 1400 tonnes of CO<sub>2</sub> emissions.

A biomass storage system has been installed at Nanticoke that allows a 10 per cent (50 MW) energy input on Unit 4. This is in addition to a direct truck-based system already available on Unit 6. The combination of systems would be capable of about a 2 per cent biomass input across the Nanticoke plant. The storage system will permit longer term testing.

## Lambton

Lambton is planning on testing dried distillers' grain (a by-product of local ethanol production operations) as a fuel before the end of 2008, pending receipt of approval from the Ministry of the Environment.

## Thunder Bay

Thunder Bay tested grain screenings from local terminals in the 1980s. A test burn of 12 tonnes of grain screenings was conducted in 2006.

Atikokan and Thunder Bay boilers are known to be well suited for biomass firing as they were all built to fire high moisture lignite coal.

**Biomass Fuel**

Energy content varies by type of biomass fuel. The wheat shorts tested at Nanticoke are generally about 50 per cent of the energy value per kilogram of bituminous coal. The pelletized grain screenings at Thunder Bay have heat value almost identical to lignite. Wood pellets tested at Atikokan have heat value greater than lignite. Dried distillers' grain has a heat value very close to Powder River Basin coal (PRB). All of these coals are in OPG's current fuel mix.

Approximately 600,000 tonnes of wood pellets could produce one billion kilowatt-hours of electricity.

The types of biomass currently being co-fired at OPG plants have been limited to materials that are readily available, easy to handle and burn, and therefore require minor changes and additions to existing infrastructure.

Fuel transportation, storage and handling costs are a significant part of the costs of biomass energy production. Typically, biomass fuels are more expensive than coal per unit of energy produced. Actual costs would vary depending on financing, location, system design and fuel cost.

**Looking Ahead**

Biomass is an opportunity that OPG will continue to explore. However, there are many questions that still must be answered related to technical feasibility, fuel supply and transportation systems, and social and economic considerations. OPG, government, academics, forestry and agricultural communities, entrepreneurs and business will all have to contribute to the resolution of these issues before large-scale commercial operations can be considered.

**Quotes**

"Biomass is an exciting opportunity we will continue to explore. It is consistent with our commitment to assess and implement prudent environmental improvements at our coal plants for as long as they are needed", Jim Twomey, Executive Vice-President, Fossil

"One of our most significant environmental developments in 2007 was the launch of OPG's Greenhouse Gas Management Plan. Co-firing biomass with coal is an important part of this ambitious agenda", Cara Clairman, Vice President, Sustainable Development

Ontario Power Generation Inc. is an Ontario-based electricity generation company whose principal business is the generation and sale of electricity in Ontario. Our focus is on the efficient production and sale of electricity from our generation assets, while operating in a safe, open and environmentally responsible manner.

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