



Atikokan GS Biomass Conversion
presented at:
A&WMA and ONEIA Waste Conference
October 7 2015

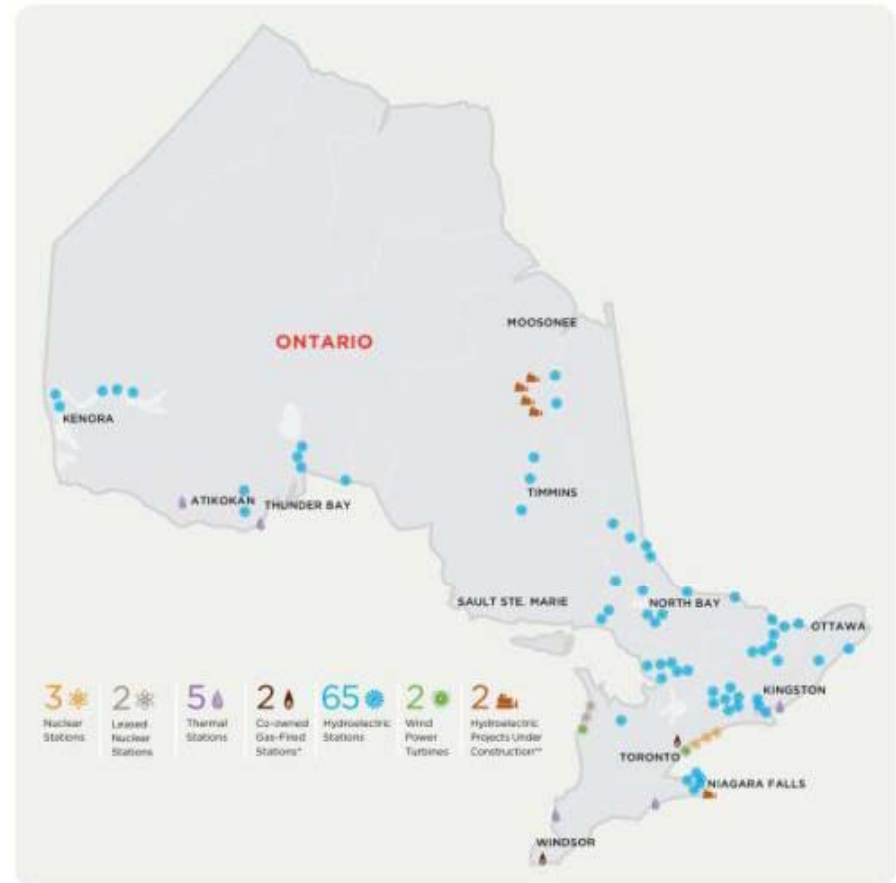
Darcey Bailey
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Atikokan Generating Station, NorthWest Operations

ONTARIOPOWER
GENERATION



OPG - Who and Where We Are

- Ontario's clean power producer
- >17,000 MW generating capacity
- Produced 82.2 TWh in 2014
- 65 hydro, 2 nuclear, 5 thermal*
- Converted Atikokan coal station to biomass
- Converted Thunder Bay coal station to advanced biomass
- Produce 50 per cent + of Ontario's electricity
- About 9,500 regular employees
- Over \$41 billion in assets
- Moderate overall price of power.



**Of the 5 thermal stations, Lambton and Nanticoke no longer operate and are being preserved for future conversion if required.*



We make Ontario stronger

- Province's clean energy provider: generating portfolio is nearly 100 per cent GHG-free.
- Produce majority of power used in homes, hospitals, schools.
- Investing hundreds of millions in clean and renewable power.
- Provide consumers with lower rates than other generators.
- Our profit goes back to the province.
- Successfully converting coal stations represents North America's largest single climate change initiative.
- Owned by you.
- Strive to ensure efficiency, value for money.



The company we are today

- **We are Ontario's low cost generator:**
 - Receive less for our power than any other generator and help moderate the price of electricity.
 - For the first 6 months of 2014, OPG's average revenue was 5.7 cents/kWh – other generators average 10.4 cents.
- **Holding costs down through business transformation:**
 - OPG continues efforts to hold down our costs.
 - By 2016, we plan to have saved an estimated \$1 billion by reducing overall headcount from ongoing operations by 20 per cent of 2011 levels, primarily through attrition.
 - Departure of 2,000 + people since January 2011 has already saved \$470 million.



The company we are today

- Our history includes more than 100 years of operations.
- Commitment to public, environmental and employee safety.
- Values set out in a Code of Conduct – safety, integrity, excellence, people and citizenship.
- Building long-term mutually beneficial relationships with First Nations and Métis communities.
- Enjoy strong relations with site communities.
- Focused on continuous improvement and development in project management and operational excellence.
- Environmental Management Systems registered to ISO 14001 standard.



NWO Hydro/Thermal

- On Jan. 20, 2014, OPG merged its Northwest Hydro and Thermal operations under one regionalized management team.
- **Hydro operations :**
 - 11 hydroelectric generating stations (39 units) on five river systems; Aguasabon, Nipigon, Kaministiquia, English and Winnipeg
 - all fully automated and remotely controlled from the NW Control Centre in Thunder Bay
 - 4 Work Centers: Thunder Bay, Kenora/Ear Falls and Cameron Falls
 - Combined capacity is over 680 megawatts (MW)
- **Thermal operations:**
 - Atikokan Generating Station converted from coal to white wood pellet biomass.
 - Thunder Bay Generating Station converted from coal to advanced wood pellet biomass.



Legend

- Hydro Generating Station
- Control Dam
- Thermal Generating Station (biomass)
- Work Centre
- City or Town

Note: NWPG manages 62 dams of which only some are shown.

Northwest Operations



Atikokan Generating Station

- Atikokan Generating Station is one of two thermal plants in OPG's Northwest Operations.
- Located about 200 km west of Thunder Bay, Ontario.
- Built in 1985, the Station has one generating unit with the capacity to produce just over 200 MW of electricity.
- Plant entered Commercial Operation July 2014.





Project Scope

- New fuel handling and storage system to ensure safety.
- Modifications to furnace and new Distributed Controls System.
- 10,000 tonnes of wood pellets storage - two 5,000 tonne silos.
- New truck receiving and transfer tower.





VISION: Sustained Excellence in Health and Safety

- 3rd Party Industrial hygiene study assessed handling wood dust hazards
- Developed new housekeeping standards.
- Benchmarked industry best practices around wood pellet inventory management and silo fire prevention and management.
- Management field visibility; regular field visits.





Health & Safety

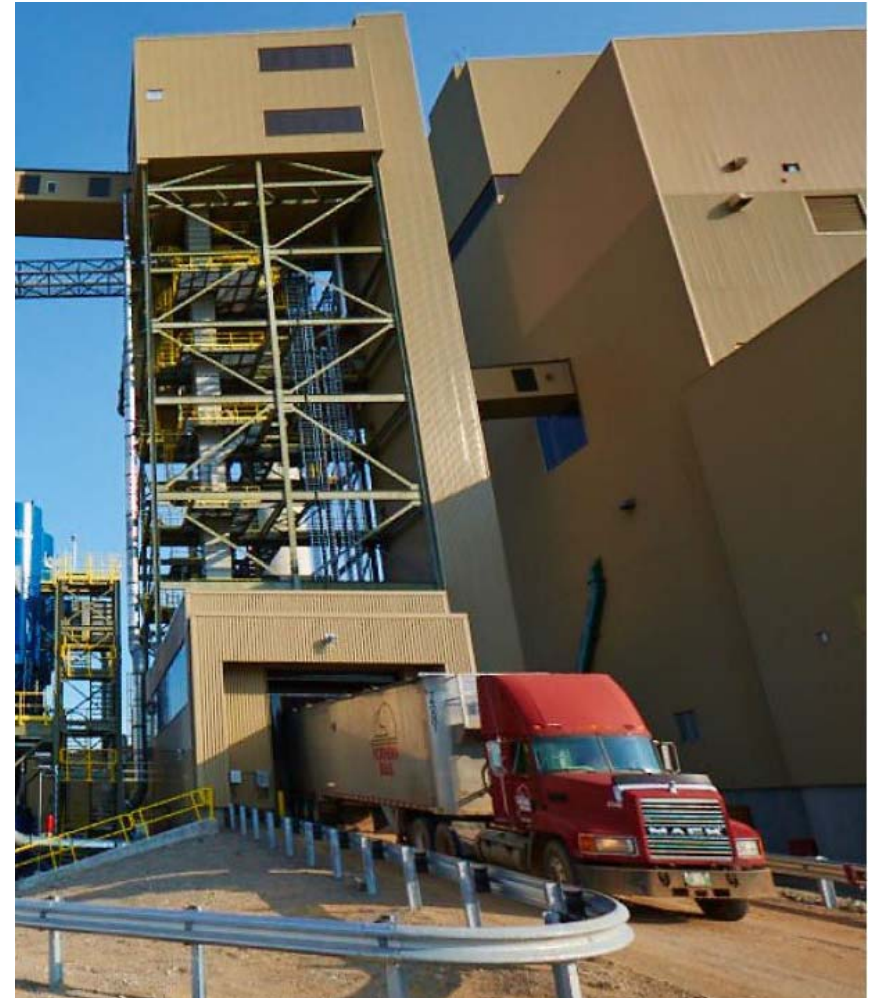
- **Fire and Explosion Risk**
 - Regular cleaning of horizontal surfaces and conveyor systems to prevent the accumulation of settled dust.
 - Monitor temperature in storage to take appropriate action if self-heating or auto ignition.
 - Protect wood pellets from sources of heat and flame.
 - Hot work permits with fire safety / suppression measures required for all hot work.

- **Worker Exposure Risk**
 - Maintain exposures below occupational limits (dust and off-gassing products).
 - Personal and area air monitoring to determine exposure profiles and confirm adequacy of control methods.



Receiving Strategy

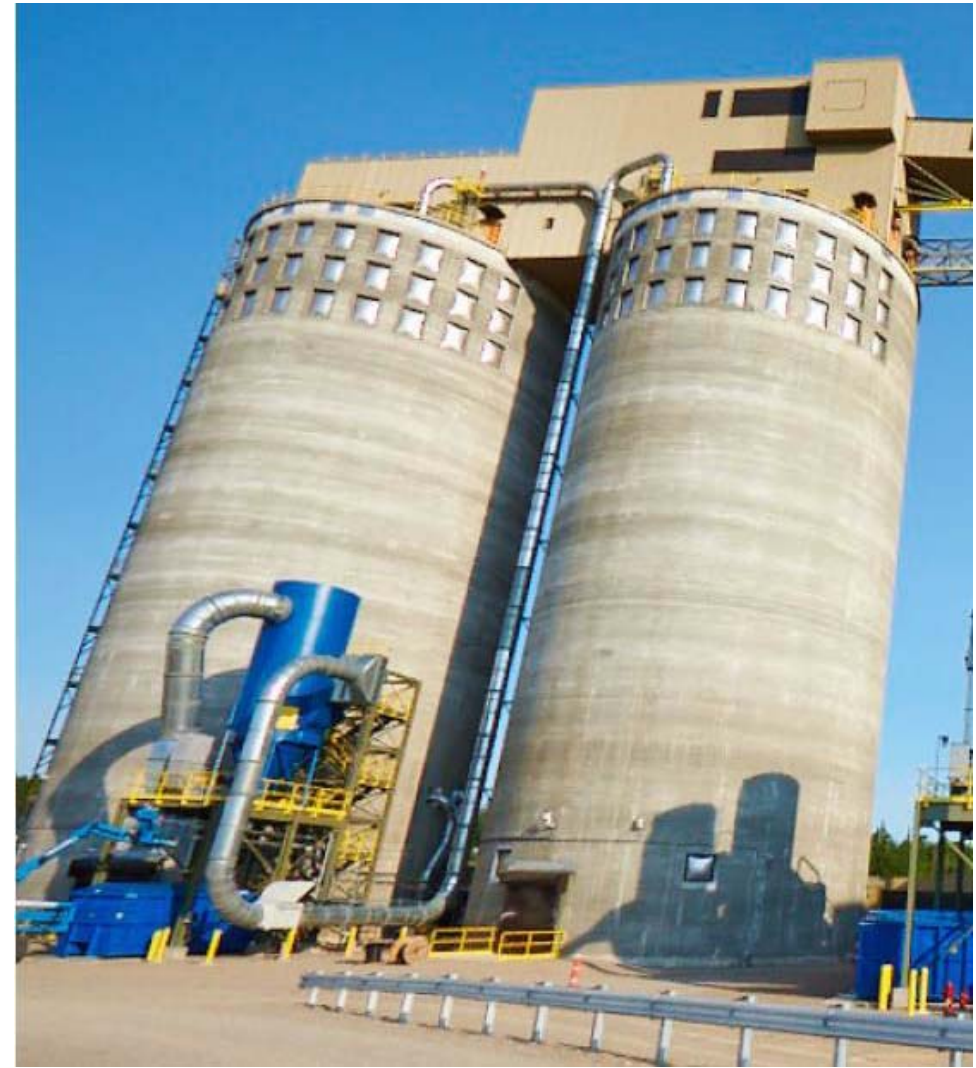
- Truck delivery of pellets - 200 km radius.
- 10 trucks/day, 35 tonne/truck, 5 days/week, self-unloading.
- One unloader system on to belt feeding storage.
- 15 minutes unload time.
- Rejection capabilities.
- Capable of direct feed from truck unloading bypassing silos.





Storage

- Spiral chute reduces fuel drop.
- Gravity feed to unloading system (hopper bottom).
- Multi-level and location temperature monitoring and trending of the storage silos.
- Aeration capability on the silos.
- Inert gas injection capability on the silos.
- Recycling/recirculation capabilities to cool pellets and reuse.
- Explosion panels.





Fuel Processing

- Replace existing in-plant bunkers (each has 750 tonnes capacity) with surge bins (each has 45 tonnes) to reduce the quantity of in-plant fuel.
- Ports on the surge bins to allow for injection of fire fighting media.
- Isolation valves above the mills to prevent migration of any event .
- Modified MPS 75 Pulverizers to increase velocity and reduce classification.





Primary Air Cooler

- Included PA Cooler to temper the PA to required temperature and avoid pre-ignition of fuel.
- Main difference is low moisture content of wood versus coal.
- Reduces heat losses and avoids back-end expansion problems.
- Improved efficiency via heat transfer to feedwater system.





Burner Replacement

- New purpose-built burners installed
- Based on operating experience of burners used in European Biomass conversions.
- Full use of existing Gas Recirculation Fan to achieve steam temperatures.
- Includes new Class I igniters and flame scanners.
- No changes to boiler openings.





Ash Handling

- New Drag-Chain conveyors to replace pneumatic conveying system (fire prevention).
- Aggressive rapping strategy.
- Continuous evacuation of collection hoppers.
- Eliminate air in-leakage to reduce O₂ (fire prevention).





Construction July 2012





October 2012

Conversion Project Generates Jobs and Renewable Electricity



- OPG proceeded with construction of the \$170-million Atikokan Generating Station biomass conversion project
- Largest capacity, 100% biomass fuelled plant in North America
- Generates renewable, dispatchable, peak capacity power
- The project created over 300 construction jobs



September 2014

Conversion Project Generates Jobs and Renewable Electricity



- Two new wood pellet manufacturing facilities were built to support the generating station fuel requirements
- Locally sourced fibre supply and transportation
- Local Engineering services and construction forces utilized:
 - Nordmin Engineering
 - Aecon Industrial



December 2012 Project coming together





April 2013 Transfer Tower & Silos





May 2013 Silo Slipform Construction





May 7, 2013 Pour complete



- Silos design and built by FWS Group
- Both Silos poured simultaneously, 24 hours per day for nine days
- 43m Height of each silo
- 1375m³ Volume of concrete in each silo
- 305 Number of trucks delivering the concrete
- 205,000 kg Mass of rebar in each silo
- 120 Number of workers
- 1" Height the slipform raises each minute
- 28 Number of hydraulic jacks
- 4' Height of the forms
- 500 mm Wall thickness of the silos



15 Burners Installed





Surge Bin Modifications





Controls Console Demolition & Replacement





September 2013





Controls /Control Room Commissioning Kick Off





May 12, 2014 First Pellets Fired





July 23, 2014 Commercial Operation





10 years and over 20,000 trees planted on site

100% biomass fuelled power plant

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