



NEXTERRA SYSTEMS CORP. PROJECT



Project Proponent:
Nexterra Systems Corp.

Project Description:
A two-phase project to develop and demonstrate a transformative renewable biomass heat and power solution that combines Nexterra’s gasification and syngas conditioning technologies with General Electric’s Jenbacher internal combustion gas engines. With higher electrical efficiencies and lower operating costs this solution is working to make biomass combined heat and power (CHP) economic at smaller scale of 2–10 MWe size plants.

Project Benefits:
The unique Nexterra syngas conditioning technology results in a number of efficiencies and cost savings for improved economics at small scale:

- Higher electrical efficiency – 24% greater than for steam and 14–20% more than ORC, which reduces fuel costs;
- Engine heat recovery enables high efficiency cogeneration – 36% for thermal heating and 60% for total CHP;
- Better balance of electrical and thermal output – more suitable for customers who may not have sufficient thermal loads to justify traditional steam-based CHP system;
- Lower emissions and particulate matter – make it ideally suited to urban communities; and
- Lower operating costs – as full time steam engineers are not required and less water is utilized.

BCBN Funding:
Total \$3.0 million*

- Partners:**
- BC Bioenergy Network
 - GE Jenbacher
 - BC Ministry of Forests
 - Sustainable Development Technology Canada (SDTC)
 - National Research Council Canada (NRC)

Bioenergy Value Stream:
Solid Wood Residues

Bioenergy Feedstock:
Woody biomass residues, including urban wood waste and woodchips

Total Project Costs:
Total of \$ 27.1 million

- Nexterra Systems Corp.
- University of British Columbia
- BC Innovative Clean Energy (ICE) Fund
- Natural Resources Canada (NRCan)
- City of Vancouver
- FPIInnovations

Bioenergy Application:
Thermochemical biomass gasification solutions for renewable heat and power

Bioenergy End Product:
Renewable heat and power for institutional and industrial customers



Nexterra's Product Development Centre in Kamloops, BC

*Phase 1 – \$1.5 M, for development of pilot scale production and for work related to the commercial demonstration of syngas clean-up. Phase 2 – \$1.5 million to support the design, procurement, construction and commissioning of a demonstration plant, including \$500,000 for research conducted in BC universities.

Nexterra System Corp. and GE Energy are collaborating to develop, demonstrate and commercialize a new, transformative biomass power solution that combines Nexterra’s gasification and syngas conditioning technologies with GE’s Jenbacher internal combustion engines. The resulting power system will be significantly more efficient, cost-competitive and cleaner than conventional biomass combustion-to-steam or combustion-to-ORC power plants. This will make the system economically viable at a scale one-tenth the size of conventional biomass-to-steam power systems.

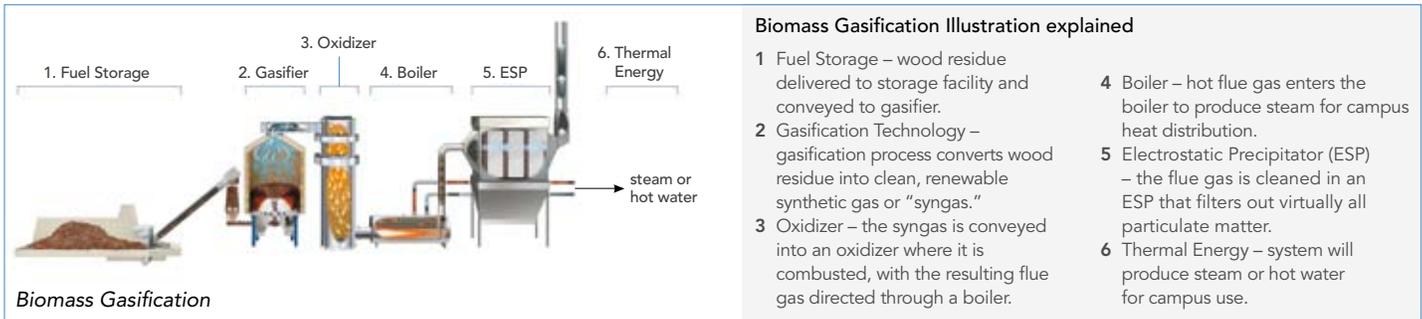
This biomass gasification system is ideally suited for inside-the-fence cogeneration at public institutions (e.g. universities), industrial facilities (e.g. sawmills) and community-based power plants. It works by first gasifying biomass using Nexterra’s patented system to produce syngas. The syngas is then treated to remove impurities, before directly firing the gas into an internal combustion engine to generate heat and power. The system is expected to establish a new standard in efficiency for converting biomass to electricity.

The Nexterra/GE Energy system is presently in the “early commercial” phase of its product lifecycle. Nexterra has done extensive testing of the gas cleaning technology at its Product Development Centre in Kamloops, BC. Nexterra has also undertaken extensive testing of the total system package at pilot scale utilizing a 239 kW Jenbacher engine. Testing and optimization have been ongoing, successfully, for over 3000 hours.

Key development milestones for the gasification-IC engine system since 2008 have included:

- Installed and commissioned the complete syngas conditioning train of equipment (syngas heat exchangers, syngas cracker, pre-coat filter, condenser, etc) at the pilot plant;
- Installed and commissioned a Jenbacher 208 engine at Nexterra’s Product Development Centre and integrated the engine with the syngas conditioning technology; and
- Over 5000 hours of testing completed on syngas conditioning system and over 3000 hours on the total system including engine. Gas stability, syngas quality, engine cleanliness and output all meet and exceed the syngas fuel specification for GE’s Jenbacher engines.

The first commercial demonstration of this technology will be commissioned at the University of British Columbia, in Vancouver in 2012. This 2 MW Combined Heat and Power (CHP) project will require 12,500 bone-dry metric tonnes of locally-sourced urban wood waste per year, averaging 2-3 trucks per day. Gross power output is 2 MW of electricity and net thermal is 9,600 lbs/hr steam. Thermal CO2 reduction is expected to be the equivalent to taking 1,100 cars off the road. The thermal output will displace up to 12% of the campus’ natural gas consumption and 4% of peak electrical consumption.



About the BC Bioenergy Network

Established in April 2008 with a \$25 million grant from the BC government, BC Bioenergy Network is an industry-led association that acts as a catalyst for deploying near-term bioenergy technologies and organizing mission-driven research for the development and demonstration of sustainable technologies to build a world class bioenergy capability in BC. For more information about the BCBN, visit www.bcbioenergy.ca

Major Value-Streams for Collaboration and Development

FOREST	Solid Wood Residues
	Pulp and Paper Residues
	Harvesting and Pelleting (Local Use or Export)
MUNICIPAL	Small and Large Community Heating Systems
	Municipal Wastewater
	Municipal Existing Landfill Waste
	Municipal Solid Waste
AGRICULTURE	Agriculture Residues (Crop Residues and Animal Waste)

About Nexterra Systems Corp.

Nexterra Systems Corp. is a leading supplier of biomass gasification solutions that generate renewable heat, power and syngas for institutional and industrial customers. Working to the highest standards with world leading partners, such as General Electric, Nexterra has successfully supplied commercial gasification systems for projects at the US Department of Energy, University of South Carolina, Dockside Green, Kruger Products, the University of Northern BC and Tolko Industries.

For more information about Nexterra Systems Corp., visit www.nexterra.ca