

# Cataline Elementary:

## Creative Collaboration for Heating Solutions



FUEL  
SWITCHING



FINANCING

*Partnering with a neighbouring institution made possible a complete mechanical upgrade and the addition of a 400kw biomass (pellet) boiler to Cataline Elementary. This has resulted in greenhouse gas (GHG) emissions reductions, costs savings and reduced offset purchase requirements not only for the school itself, but for Thompson Rivers University campus next door.*

### Project Summary

The heating system at Cataline Elementary in Williams Lake was built in 1972 and by 2013, it was showing its age. With a cracked heat exchanger, it was costly to operate and maintain. It was also not energy efficient, with high GHG emissions.

The Manager of Facilities and Transportation for School District #27 (SD#27) saw this aging infrastructure as an opportunity to plan a comprehensive heating system upgrade. SD#27 already had two pellet boilers in place at other facilities that were saving the district about \$40,000 per year. However, a pellet boiler would need more space than was available at Cataline Elementary. A required HVAC mechanical upgrade would also require additional floor space.

The creative solution: construct a separate building on the Cataline property, with space to accommodate a new state-of-the-art pellet boiler, new compact gas boilers, heat exchangers, HVAC mechanical upgrade, and fuel storage. The bigger pellet boiler would offer economies of scale and make it possible to heat not only Cataline Elementary, but also the EJ Bare Education Centre annex on the property and have heat to spare.

With that in mind, SD#27 approached Thompson Rivers University (TRU) which is located adjacent to the school. TRU was consuming a whopping 5,000 gigajoules of energy per year to heat its campus using gas boilers. SD#27 proposed that their new pellet boiler provide heat for the entire TRU campus during the winter season, and they received an enthusiastic yes.

With a plan in place and a customer on board, SD#27 assembled the project team.



### Benefits

- Classroom air quality and comfort are improved.
- Pellets are purchased locally, which contributes to local employment.
- Maintenance costs have been reduced.

### GHG Reductions

- Annual GHGs are reduced by 284 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e).
- Carbon emissions have dropped by 79%.

### Cost Savings

- Cost per square meter is down from \$16.44 in 2014 to \$5.91 in 2016.
- Total utilities costs are down \$19,326 (48%) from 2014/15 to 2016/17.
- TRU heating costs are down 15% with no capital outlay, no maintenance expenses.
- Carbon tax savings are \$7,100 (combined Cataline and TRU).



Ministry of  
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Rocky Point Engineering was contracted to design the system, identify capacity and criteria, and oversee the project. Ventek Energy Systems worked with a manufacturer in Finland from 2015 to 2016 to produce the boiler and assembled it in Quesnel. It was then installed on the Cataline site, with SD#27's maintenance team handling the piping, electrical, plumbing, welding, mechanical work, and final tie-in of the system.

The resulting GHG emissions reductions, cost savings, and other benefits are a testament to the power of collaboration.

## Making the Case

As part of the capital planning process, a business case was developed and presented to the secretary treasurer of the school district, then submitted to the board of trustees for approval. The school principal and faculty were supportive of the plan, and the numbers were conclusive. The partnership, emissions reductions, savings on utility costs, and funding availability all played a role in getting project buy-in.

The overall project cost came in at \$1.7 million. The pellet boiler cost \$416,000 and was fully covered by Carbon Neutral Capital Program funding. TRU would pay for their heat use and the maintenance on the boiler. Experience with the two existing pellet boilers at SD#27 had shown that the cost of heat would drop dramatically.

One key advantage of the project is that the wood used in the pellet boiler is sourced from pellets that have been created from sawmill waste. This reduction of waste avoids emissions from the decomposition of the wood as well as the emissions associated with fossil fuel extraction, transportation and combustion.

The project allowed for a fuel-switch from a non-renewable source, to a renewable source that supports the local economy. This, along with cost savings, made a compelling argument for the project.

## Lessons Learned

1. Think big. Partnerships and cost sharing can make possible a project that would not be feasible at a smaller scale.
2. Look for alternate funding sources. Using the school district's entire facility grant for one purpose meant that other jobs, like roofing, could not be done. It was money well spent in the long run, but it was taxing in the short term.
3. Allow more space than you think you'll need for fuel storage. In Cataline's case, pellets have to be delivered every two weeks in winter. The same crew doing deliveries is also the snowplow crew, and sometimes they have other priorities.
4. If you're sharing costs with another organization, take the administrative details into account. Currently SD#27 is working with a control company to automate the metering for simplified billing.



## Results

There were surprises along the way. When they started the mechanical upgrade, workers discovered a few asbestos ceiling tiles. A few turned into many, and the team ended up replacing the entire ceiling in the school.

Cataline had previously applied for grant money to put in a sprinkler system, which happened to come through in July. The ceiling was already out at that time, making it a good time to install it. Nevertheless, it was labour intensive at a time when labour resources were working at capacity.

The mechanical upgrade was a bit disruptive, and continued into September. Crews worked night shifts to get it done with minimal disruption for the new school year.

The launch of the pellet boiler took place on October 23, 2016, on the heels of a new school year and just in time for the onset of winter in Williams Lake. Since then, students have enjoyed more comfortable classroom temperatures, the indoor air quality has improved, and GHG emissions and costs have dropped dramatically.

Cataline's goals going into this project were as follows: reduce carbon emissions, reduce costs, improve efficiency, and simplify maintenance. With a year under their belt, it's safe to say the goals have been met.

SD#27 is now assessing solar voltaic power for Namaia Valley School, a facility that runs on diesel generators and has four times the carbon footprint of any other school in the district. Next goal: reducing it to 25% of current levels, and a further 10% reduction of the entire school district's carbon footprint.

## Technical Specs

- The project included separate heating zones for Cataline Elementary School, E.J. Bare Education Centre and TRU Campus with individual flow and energy metering for each.
- There were 760m of insulated underground heating piping for the three buildings.
- The boiler was a 400kW Arterm Bio with vertical flow convection section c/w moving grate BioJet burner, Arimatic 500CN Control System, Tosibox on-line operating system, GSM access system, PS10 Pellet Feeder, and modular K4 Walking Floor fuel storage system.
- The boiler has a 10% turn down and 3-5% up keeping and a variable frequency drive fuel feed system.

All products are certified to ISO 9001 and ISO 14001 standards. For the North American market, the pressure vessels are available with the ASME H stamp certification.



## Related Resources & Links

- Ops Talk, "Taking innovation to a new level at School District 27" Spring 2017  
[https://www.efmabc.com/images/downloads/OPSTalk/EFMA\\_Spr\\_2017\\_Web.pdf](https://www.efmabc.com/images/downloads/OPSTalk/EFMA_Spr_2017_Web.pdf)
- Spotlight on Biomass Boiler Technologies (2017)  
<https://www.canadianbiomassmagazine.ca/boilers/spotlight-on-boilers-2017-6123>
- Rede Building Energy Efficiency, "Biomass Boilers have a Bright Future"  
<https://getrede.ca/biomass-boilers-bright-future/>

## Government Funding Programs

- B.C. Government, PSO Funding Information  
<https://www2.gov.bc.ca/gov/content/environment/climate-change/public-sector/resources>

## Contact

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