

**Budget Price Quotation**

**1.02 MBTU/h (31 BHP or 0.3 MW) BIOMASS HEATING PLANT**

for heating a workshop and a sprayline

designed for chips and dust

with a moisture content up to 35% (dry basis) and a particle size below 2"

**British Columbia Institute of Technology (BCIT)**

Burnaby, BC

FUEL SPECIFICATIONS:

wood species:	unspecified	
residue type:	<i>MDF dust, including melamine laminate covered material (up to 85%) , shavings, chips</i>	
max. particle size:	2" -	
average particle size:	1" -	
max. moisture content:	30% (wet basis)	
average moisture content:	8% - 12% (wet basis)	
bulk density:	200 kg/m <sup>3</sup>	12.5 lb/cft

PROJECT SPECIFICATIONS:

fuel supply:	from existing silo or blowline
fuel storage:	new overhead silo
firebox type:	pile burner with underfeed stoker
boiler / heater:	hot water boiler <100°C <100 kPa (14.5 PSI)
consumer(s):	campus
max. particulate matter emission:	< 18 mg/sm <sup>3</sup> (Metro Vancouver threshold)

#	pcs.	item	TOTAL
<b>1</b>		<b>Silo Discharger</b>	
1.1	1	silo discharger	21ft silo diameter, 19ft silo wall height \$6,100
1.2	1	pole-changeable motor for unloader	reverse turning option in case of jams \$400
1.3	1	connection discharge funnel to silo	\$2,000
1.4	1	second discharge chute (e.g. for unloading into truck)	\$200

#	pcs.	item		TOTAL
<b>2 Fuel Transport</b>				
				\$3,000
2.1	1	transfer screw - silo to boiler room	1m - 3 ft only	
2.2	2	add for every meter of screw extension		\$400
2.3	1	sliding valve (burn back protection)		\$1,000
2.4	1	stoker screw		\$3,100
<b>3 Firebox</b>				
3.1	1	Combustion Chamber (pile burner - underfeed stoker with moving grate)		\$14,500
3.2	1	Fluegas Recirculation	required for fuel with MDF/melamin	\$5,600
3.3	1	moving outer grate	recommended for easier deashing of firebox	\$5,000
3.4	1	auto-ignition	(electric blow torch)	included above
3.5	1	automatic deashing, directly into 200 litre (7 cft) dumpster		\$3,500
<b>4 Hot Water Boilers</b>				
4.1	1	3-pass fire-tube boiler	30 PSI, ASME Section 4, CSA appr	\$12,300
4.2	1	pressure control valves		\$800
4.3	1	water supply control valves		\$300
4.4	1	soot blower, incl. compressor	reduces manual cleaning intervals for boiler	\$9,700
4.5	1	3-way mixing valve for boiler bypass		included above
4.6		Grundfos boiler pump		included above
<b>5 Flue Gas Treatment - Emission Control (PM &lt;20 mg/sm<sup>3</sup>)</b>				
5.1	1	cyclone grit arrester, incl. 60 l (2 cft) ash bin	1,300 am <sup>3</sup> /h @ 200°C	\$5,200
5.2	1	baghouse	1,300 am <sup>3</sup> /h @ 200°C	\$43,700
5.3	1	flue gas ducting (no insulation)		\$1,400
5.4	1	flue gas fan / induced draft fan		
5.5	1	stack, attached to silo, boiler house, or existing wall	stainless steel, double walled, insulated, 6 m height, 304 mm i.d.	\$8,600
<b>6 Controls</b>				
				\$13,100
6.1	1	Control Cabinet with PLC		
6.2	1	computer control via Internet	requires LAN	\$400

#	pcs.	item	TOTAL
<b>7</b>		<b>Freight, Insurance, Brokerage</b>	
7.1	1	40' OT container	\$8,300
7.2		fuel surcharge	\$500
<b>8</b>		<b>Installation &amp; Commissioning</b>	
8.1		Overall Project Management	\$8,500
8.2		Installation Planning	\$2,400
8.3		Installation supervision	\$6,000
8.4		Installation	\$12,000
8.5		Commissioning and training of operators	\$600
8.6		Lodging	\$1,300
8.7		Travel expenses	\$2,400
		any additional time/travel at above rates and cost/material	
<b>0</b>	<b>0</b>	<b>SUB-TOTAL (excl. custom duties, excl. federal and provincial taxes)</b>	<b>\$231,752</b>

<b>9</b>	<b>Civil Works and Installation</b>	<b>ESTIMATE ONLY</b>	<b>\$74,000 *</b>
9.1	silos foundation		\$12,000 *
9.2	engineered boilerhouse, incl. steel roof		\$15,000 *
9.3	silos & silos installation	Seismic 4 silos	\$35,000 *
9.4	electrical installation		\$12,000 *
9.5	crane rental		\$2,000 *
	<i>* estimate only, requires quote of sub-contractors</i>		

<b>10</b>	<b>Civil Works and Installation</b>	<b>ESTIMATE ONLY</b>	<b>\$62,000 *</b>
10.1	pipes, valves, pumps, air separators, drains		\$10,000 *
10.2	3" pipeline from boiler to campus ring heating line		\$25,000 *
10.3	main supply and return pipe, return shunt, manifold etc		\$4,000 *
10.4	plate heat exchanger, 1.0 million BTU/h		\$8,000 *
10.5	heating installation, incl. insulation of ducts		\$12,000 *
10.6	heat meter, incl. connection to computer		\$3,000 *
	<i>* estimate only, requires quote of sub-contractors</i>		

<b>10</b>	<b>Contingencies</b>	<b>15%</b>	<b>\$46,000 *</b>
<b>0</b>	<b>0</b>	<b>TOTAL (excl. custom duties, excl. federal and provincial taxes)</b>	<b>\$413,752</b>

<b>11</b>	<b>Options</b>		
11.1	1	installation in 40' high cube container	(should installation underneath silos not be to code) \$43,230
11.2	1	3m³ heat storage tank	ASME standard \$13,600
11.3	1	3m³ heat storage tank	DIN standard (good up to 15 PSI) \$4,351
11.4	1	second ash container	200 litre \$500
11.5	1	pager	requires modem \$1,700

#	pcs. item	TOTAL
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**Items not included:**

- permits and certification
- site preparation
- chipper and connection of chipper to blowline
- fuel blowing & air treatment to silos (cyclone and/or baghouse)
- roof or wall penetrations, if any
- utilities such as telephone line (for modem), electrical, gas, water mains/distribution to the boiler.
- heat dissipater (for incinerating surplus waste in summer)

**BCIT'S RESPONSIBILITY TO PROVIDE:**

1. Power supply that is surge protected
2. Clean air supply to control panel that is conditioned to approximately interior temperature.
3. 10,000 lb forklift for duration of installation
4. Temporary electrical services for power tools
5. Three-phase electrical power services connection to control panels
6. Single-phase electrical power services connection to control panels
7. Any permits for concrete, electrical, and/or building according to local codes
8. Safe access to the roof and surrounding areas
9. Temporary weather protection for equipment delivered to site
10. Fire watch during and after field work
11. Water connection to fire suppression system max 75 PSI
12. 1 helper during installation; 1 operating personnel during training period