



Retrofit case study

Internship case study

Biomass Innovation Centre

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Introduction

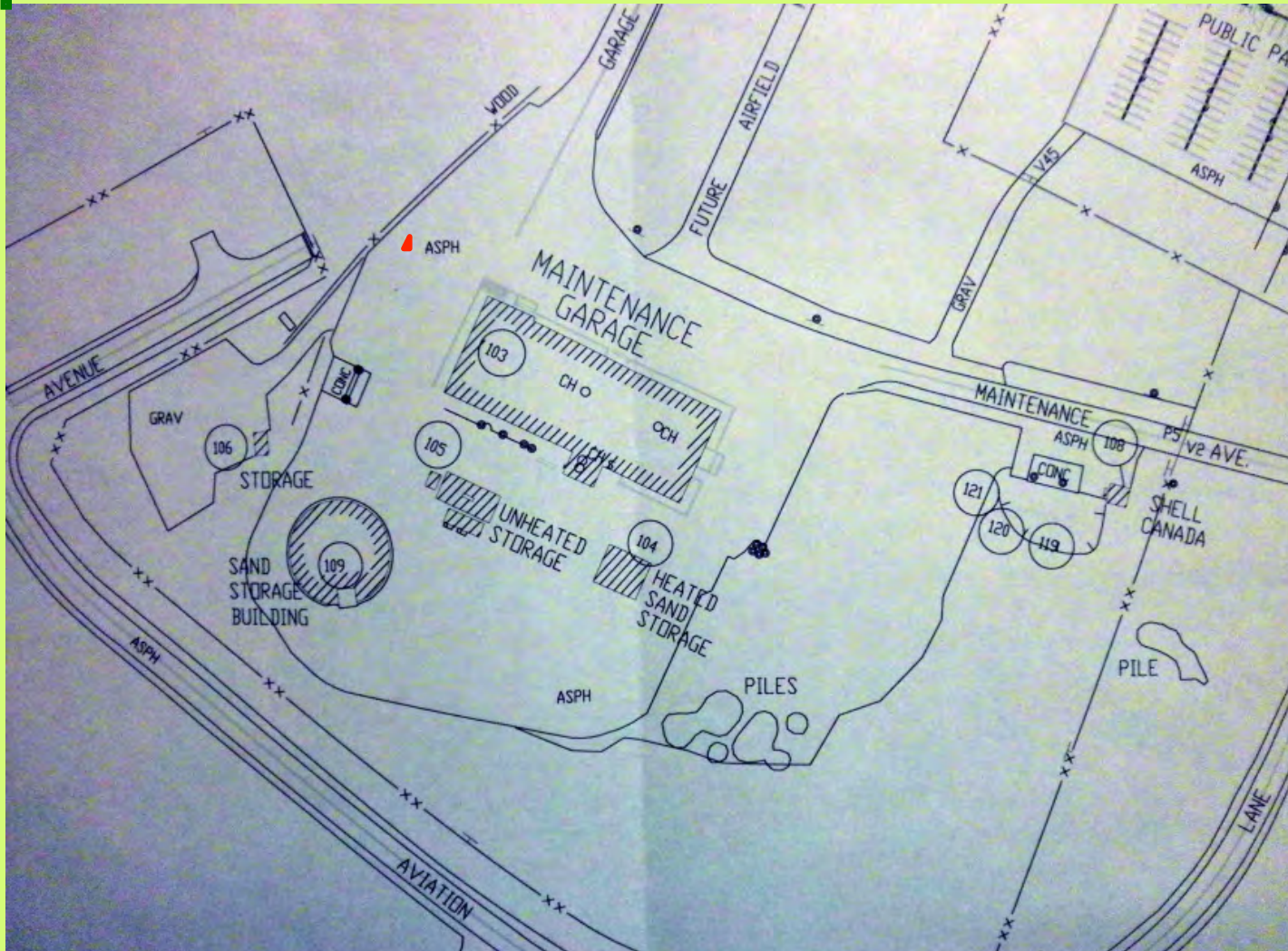
- Maintenance building of North Bay Jack Garland Airport
- Conversion from fossil fuel heating to biomass heating
- Technology
- Economics and viability conditions
- Recommendations

Maintenance building (MB) of Jack Garland Airport

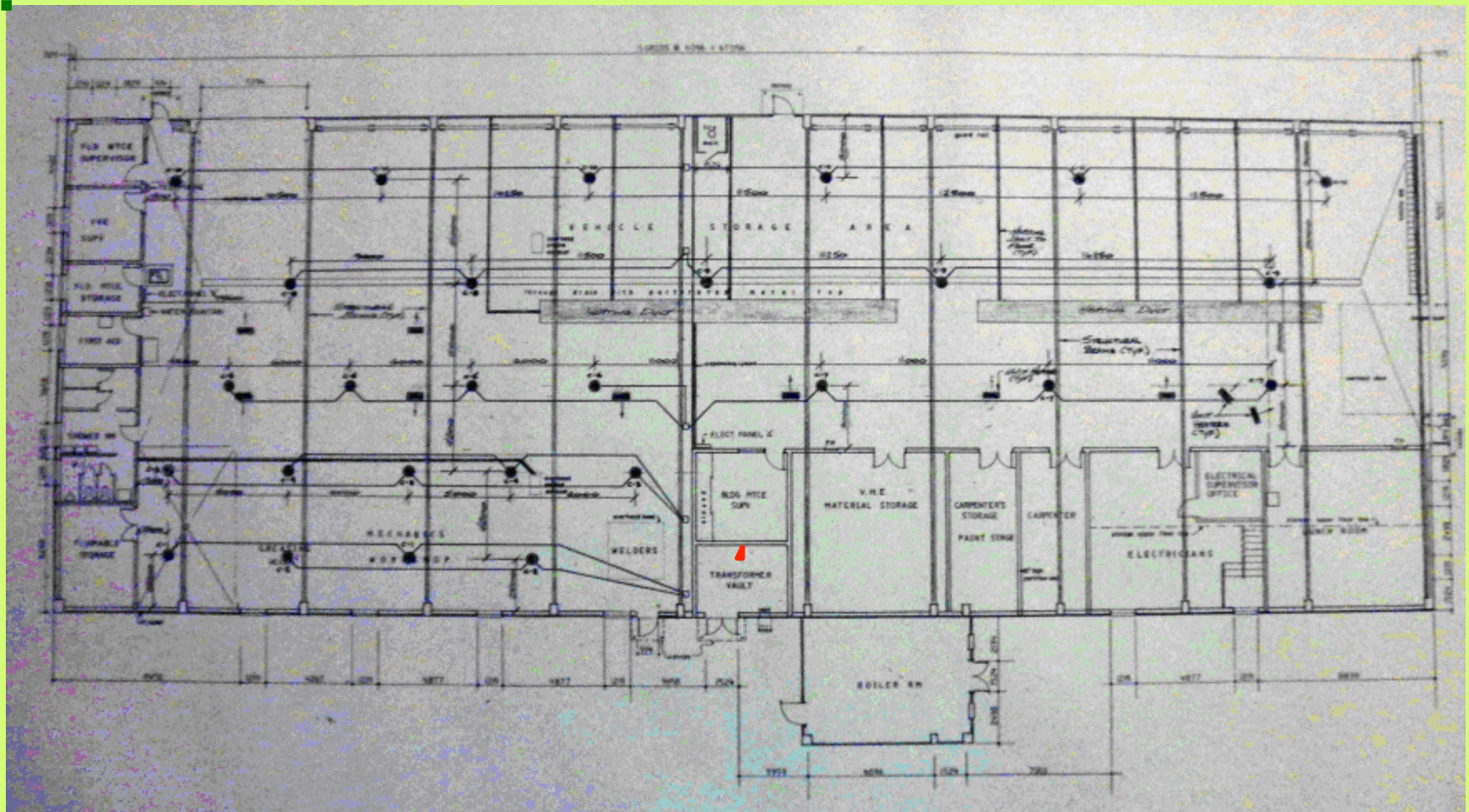
- Area of surface: 1643 m²
- Natural gas heating system
 - 2 x 40 HP VOLCANO boilers
 - Existing infrastructure of pipes
 - 10 hot air radiators
- Average annual consumption: **29803 m³**
- Energy consumption: **1102,711 GJ / year**



Maintenance building (MB) of Jack Garland Airport



Maintenance building (MB) of Jack Garland Airport



Projected system description



- 1 x PYROT® KRT-150
Maximum boiler output:
150kW [512MBH]
- wood brickets, off cuts,
wood chips, wood pellets
- Fuel with water content <
35%
- 35kg/hr of fuel
- Estimated cost: 130000
CAD to 180000 CAD



Projected system description

- storage for the fuel
- **pellet silo**
(watertight grain silo), located outside the boiler room
- Estimated price:
**15000 CAD –
20000 CAD**



Projected system description

- Installation assistance and start-up assistance included in price of boiler
- Estimated price for installation:
 - Removal of old boilers
 - Installation of new biomass boiler
 - Around **2000 CAD**

Conversion economics

- **Natural gas:**

- 0,31 CAD / m³ (Union Gas)
- average total annual cost of heating: **9329,07 CAD**
- Cost of energy: **8,46 CAD / 1 GJ from natural gas**



Conversion economics



- **Wood pellets:**
 - **150 CAD – 250 CAD / ton** (Gildale Farms, BioSynergy pellets)
 - Energy content: **18,6 GJ / 1 ton**
 - To cover energy consumption: **59 tons / year**
 - average total annual cost of heating:
8892 CAD – 14820 CAD
 - **8,06 – 13,43 CAD/1 GJ from wood pellets**

Conversion economics

• Natural gas Wood pellets

8,46 CAD / 1 GJ from natural gas **8,06 – 13,43 CAD/1 GJ from wood pellets**

Total estimated cost of the projected system:

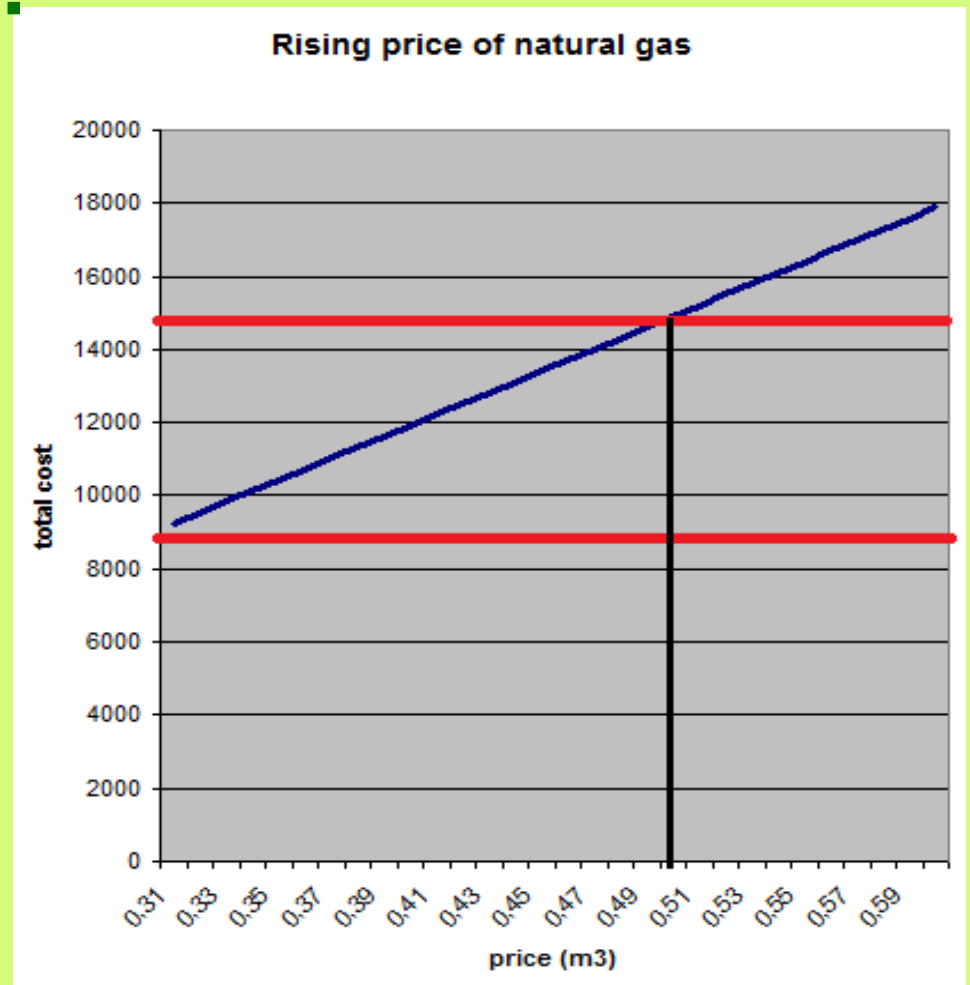
Boiler - 130000 CAD to 180000 CAD +
Pellet silo – 15000 CAD to 20000 CAD +
old boilers removal – around 2000 CAD =

147000 CAD – 202000 CAD

Viability conditions

1. Rising prices of fossil fuels

- Threshold price for natural gas:
 - More than 0,51 CAD / m³ of natural gas



Viability conditions

2. Introduction of Carbon tax

- Tax based on greenhouse gas emissions (GHG) from burning fossil fuels

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		Jan 1 to Jun 30 2010	Jul 1, 2010	Jul 1, 2011	Jul 1, 2012
Natural gas	cents/GJ	74,49	99,32	124,15	148,98
Addition annual costs for the MB	CAD/year	821,4	1095,21	1369,01	1642,81

Recommendations

- Biomass as an opportunity to avoid rising prices of fossil fuels
- Protection of environment – threat of higher cost
- Combination of suppliers
- Combination of biomass and fossil fuel
- Further more detailed research

Thank you for your attention!

Any questions?

