The Advancement of Downdraft Gasification

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Abstract

Integrated gasification combined cycle systems (IGCC) are currently the most efficient (up to 40 % HHV) thermal method for the conversion of woody biomass to electricity. The production cost of electricity from IGCC is high, U.S. 6.6-8.2 ¢/kW.h (Graig and Mann, 1997). The capital costs alone are U.S. 3.2-4.5 ¢/kW.h. In New Zealand the wholesale price of electricity is typically less than U.S. 2.5 ¢/kW.h.

The bottom line with current IGCC systems is that the capital cost must be greatly reduced if the technology is to be adopted for mainstream use. Methods to reduce the costs of all IGCC components should be investigated.

The use of High Temperature & Pressure (HTP) downdraft technology as an alternative to the current fluidised bed technology could reduce the capital cost of the gasifier component of IGCC by 90%.

The characteristics of the HTP downdraft are different from those of the traditional downdraft. A significant feature is that much larger throughputs are possible at gas turbine combustion pressures. The investigation of HTP downdraft technology is the focus of this thesis.

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