



## Development of a novel solids feed system for high pressure gasification

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### Highlights

- A high pressure feed system for feeding solid fuels was designed and constructed.
- 6 mm wood pellets were fed to pressures as high as 25 barg.
- Considerably lower energy requirements than conventional systems were recorded.
- A negligible effect on fuel moisture content was observed.

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### Abstract

The Hydraulic Lock Hopper (HLH) embodies a high pressure dry feed system that uses water as an incompressible fluid to bring about compression. No pressurising gas is required, so commonly used inert gases such as nitrogen and carbon dioxide are conserved. The HLH has successfully demonstrated the feeding of solid fuels such as wood pellets to pressures as high as 25 barg in two modes of operation. Energy requirements of 15.51 kJ/kg (Mode 1) and 20.61 kJ/kg (Mode 2) have been recorded which translate to significant energy savings of 81.9% and 75.9% compared to conventional lock hoppers. Energy savings have been projected to increase for Mode 2 where lock gas contamination with syngas takes place, and the mass flow rate has been shown to operate independently of pressure varying between 2 and 2.5 tonnes/day. The HLH has also been shown to have a negligible effect on the fuel moisture content with moisture content increases being recorded to be consistently less than 1 wt.%.

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