



January 2020

FACT SHEET GASIFICATION TO CONVERT SPENT BEDDING INTO ELECTRICITY

The problem:

Piggeries generate significant quantities of solid wastes such as straw and rice hull bedding (spent bedding), resulting in:

- Disposal challenges
- High cost of heating and electricity.

The solution:

Use waste materials to provide behind-the-meter supply of electricity and or heat for piggery operations.



Photograph of the MIHG system

Future business opportunities:

- Convert waste(s) with negative value into electricity and steam
- Reduce grid electricity and natural gas consumption in feed mill or processing operations.

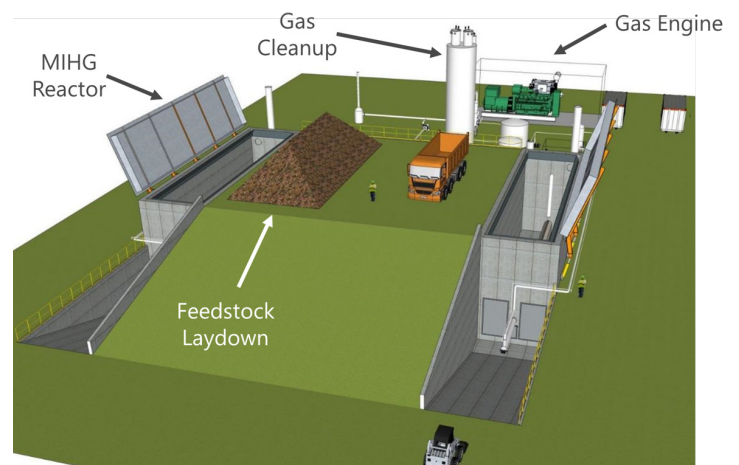
Table 1: Electricity supplied and payback period

Electricity supply	0.5MWe	1.0MWe	1.5MWe
Feedstock required	5ktpa	10ktpa	15ktpa
Electricity supply (MWh/yr)	4,579	9,158	13,738
Current costs			
Average electricity price (\$/MWh)	179	179	179
Total electricity cost (\$/yr)	0.8	1.6	2.5
MIHG costs			
Levelised electricity cost (\$/MWh)	123	85	72
Total electricity cost (\$/yr)	0.6	0.7	1.0
Annual savings with MIHG (\$/m/yr)	0.2	0.9	1.5
Equity investment (\$m)	2.1	3.0	4.0
Simple payback time (yrs)	8.4	3.5	2.7

Summary of results from Table 1:

- 3 capacities studied at 0.5MWe, 1MWe and 1.5 MWe
- Electricity supply of approx 1 MWe and 1.5 MWe have payback periods of 3-4 years
- Annual savings of up to \$1.5m/yr are expected with the MIHG system
- Improved economics with the co-gen application.

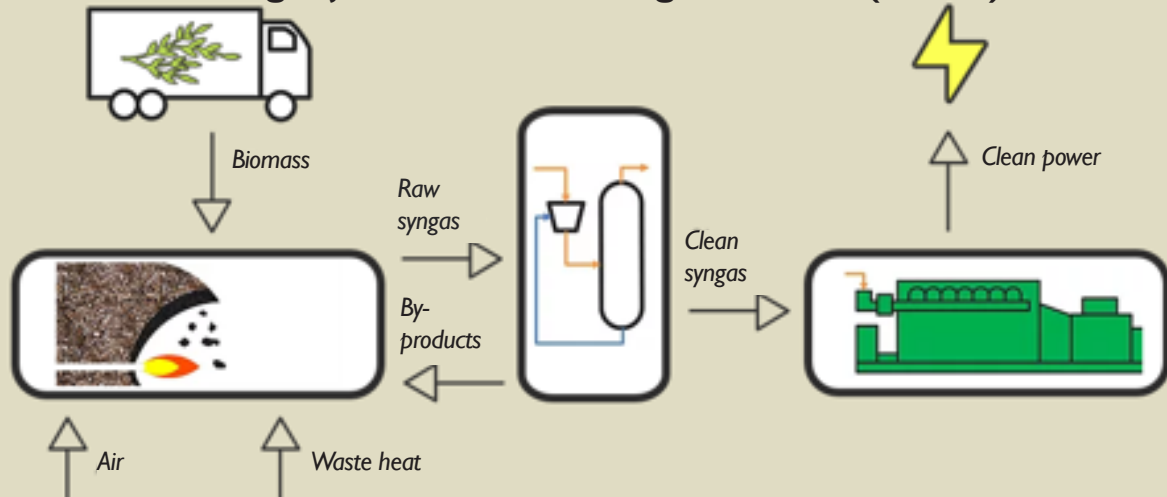
Concept drawing of a full-scale MIHG system:



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How moving injection horizontal gasification (MIHG) works:



MIHG Reactor

- Biomass is loaded
- Reactor is closed
- Biomass is ignited
- Air injection point is slowly retracted to gasify fuel
- Reactor is opened and reloaded

Gas Cleanup

- Raw syngas is cleaned using proven wet scrubbing technology
- By-products are recycled to MIHG reactor

Gas Engine

- Clean syngas is converted to power using proven gas engine technology
- Renewable baseload power is supplied to customer or grid
- Optional cogeneration of heat and power



MIHG reactor before biomass is ignited



MIHG reactor after biomass is ignited

Key findings:

- Consistent quality syngas and flow rate
- Spent bedding should be dried for improved efficiency in commercial operations
- Straw bedding was easier to gasify than rice hull bedding.

The information contained in this factsheet is from APL project 2018/0029 - Conversion of spent bedding materials using moving injection horizontal gasification (MIHG).

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