



***Old Landfill sites have harmful emissions that affect the environment and increase Climate change — this can now be turned into renewable electricity***

And there are many hundreds of them! Vykson Ltd has developed world leading technology that means this new turbine engine can turn the waste gas into renewable 'Green' electricity.

The market has two sectors. Firstly, the existing market where power is already being generated, and Vykson can extend the period of power generation long after conventional engines stop generating. Secondly, old sites that have either never generated power or where power generation has ceased. This low quality Landfill gas is normally flared or vented to atmosphere. This should not be allowed, or accepted.

We specialise in power generation in the range of 30% to less than 10% methane with no pilot fuel. Conventional landfill gas generation technology (Gas Engines as they are known) cannot generate power from gas whose quality is below around 30% methane. As landfill sites age and the waste has decomposed more, so the quality of methane drops off.

Vykson Ltd have spent many years developing a small gas-turbine engine which is purpose designed to run on low-calorific-value gas, or liquid fuel. The Vykson 140, which is in commercial demonstration trials, produces 120 kW of electricity, from Landfill gas that is

otherwise flared off, or vented. These options are wasteful and environmentally unfriendly - methane gas is 21 times more harmful to the atmosphere (Climate change contributor) than carbon dioxide.

The engine is packaged in a purpose designed container that houses all the necessary systems required to make this a 'plug & play' unit. 'Landfill gas in one end, and power out the other'. It can also do the same from more conventional fuels with much less maintenance costs, and increased reliability. Vykson has a technology lead and intends to build the Business by exploiting various global niche markets.



*Vykson 140 containerised generating set*

**Financial incentives & viability**

These are split for the two potential landfill markets. Firstly, the existing market where power is already being generated, and Vykson can extend the period of power generation long after other engines stop. This market is supported by Grandfather rights under ROCs (Renewable Obligation Certificates) which means the power can be sold at a premium making the project financially viable.

# vykson™



*Vykson engine in container*

But the second market is not financially supported. These are the hundreds of closed municipal and private sites around the country, on which generation was either never viable, or ceased when the gas quality deteriorated to a point where it was not viable with conventional technology. They now flare or vent the gas off. These sites are excluded from the 1 ROC subsidy and would only attract 0.25 of a ROC which makes application of this new technology not commercially viable.

Vykson are pushing DECC (Department of Energy & Climate change) to have this new technology included in their proposed 'feed in tariff' scheme for these older landfill sites not presently supported by ROCs. A sensible feed in tariff rate would make this financially viable.

Vykson estimate that there may be around 400 sites of this type that could have potential for installation of a small turbine engine, offering perhaps 50 MW of capacity nationwide, or around 370

GWh per year of renewable electricity. This is equivalent to power for over 10,000 homes, and equivalent to around 150 MW of wind power.

### Draft technical summary

One Vykson engine will save the equivalent of 4939 tons CO<sub>2</sub> per annum from gas that is presently being vented into the atmosphere.

Vykson engines can cope with a high moisture content in the fuel, and a higher oxygen content (up to 15%) than Gas engines. This makes it an ideal unit for burning perimeter gas that often has a high oxygen content.

This is a small purpose designed gas turbine engine for remote unmanned operation on various low quality fuels, and is containerised in a 9 metre container, complete with integral gas compression. Approximate net output is 120 kW, 415 volt, 3 phase. Asynchronous.

Gas supply of 50 mbar plus required.



*Vykson 140 on a landfill site & grid connected*

Container is 9.0 mts x 3.0 mts. Gross weight circa 13 tonnes

Usage of landfill gas at certain methane concentrations:

- @ 30% CH<sub>4</sub> = 170 mts<sup>3</sup>hr
- @ 20% CH<sub>4</sub> = 250 mts<sup>3</sup>hr
- @ 12% CH<sub>4</sub> = 400 mts<sup>3</sup>hr



### Emissions from development combustor on prototype engine

Carbon Dioxide	CO <sub>2</sub>	3.10%
Oxides of Nitrogen	NO <sub>x</sub>	109 mg/m <sup>3</sup>
Oxygen	O <sub>2</sub>	15.60%
Carbon Monoxide	CO	11 mg/m <sup>3</sup>
Unburnt Hydrocarbons		<1 ppm

