

67th AMEU Convention SUSTAINABLE CUSTOMER CENTRIC ELECTRICITY UTILITIES IN THE 4TH AND 5TH INDUSTRIAL REVOLUTION

INVESTIGATIONS INTO HIGH TEMPERATURE COMBUSTION OF MUNICIPAL SOLID WASTE FOR GREEN ELECTRICITY

Presented by P. Naidoo Visiting Scholar Department of Mechanical Engineering Science UNIVERSITY OF JOHANNESBURG



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NEXUS OF WASTE TO ENERGY

Waste = MSW

1. High Temperature Incineration (750 -1000°C)

2. High Temperature Gasification (4000 °C)





1. High temperature INCINERATION

Mature Technology 100's Plants Mostly Developed Economies

Africa = 0

Reference ABB

Refurbishment of a 58 year old plant in Switzerland





ABB 2012 Fact Sheet

Energie Wasser Bern, Switzerland

360 000 MWh/aelectricity 132 kV GIS – Grid330 000 MWh/adistrict heating & steam

110 000 t/amunicipal solid waste112 000 t/abiomass (parks & gardens of trees & shrubs)

Cash Flows = payment to deposit MSW + energy sales (electricity + hot water + steam) + sale of recovered metals + sale of slag aggregate as paving bricks for roads = 30 full time jobs.





2. High Temperature GASIFICATION

MUNICIPAL SOLID WASTE TO GAS (HYDROGEN)

Hydrogen Economy (JAPAN)

> Electric Cars (CALIFORNIA)







Japan's Vision for a Hydrogen Economy

2015 – 2020 : Strategy Making, Research & Development

2020 – 2030 : Expand Fuel Cell Market + Demo High Efficient Hydrogen Power Generation – small to large scale

2030 + : Introduce H Society in large scale, Commercialize and Market Technologies

Deep experience in WTE; emphasis now on H

2018 Data : Greater than 1000 incinerators, 380 WTE Plants 17248 GWh Industrial Waste 1719 GWh MSW





Californian Energy Commission (1975) Clean Energy Economy : Net Zero 2050

> 2008 Hydrogen Economy 38 Hydrogen Refueling Stations 28 Stations Under Construction

Hydrogen : Natural Gas (Grey/Blue) Electrolysis (Green)

Hydrogen from Gasification of Municipal Waste

- Green & 1/3 cheaper than electrolysis
- Acknowledge : SGH2 Project, Lancaster, CA.





LANCASTER PROJECT – CA USA World's largest green hydrogen plant

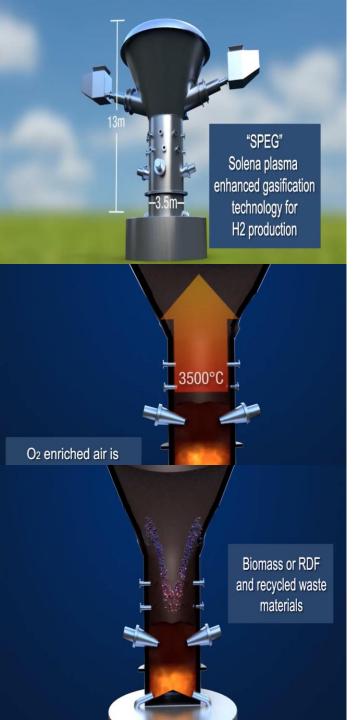
Production Plan

11,000 kilograms of green hydrogen per day, and 3.8 million kg per year – nearly three times more than any other green hydrogen facility – for the next 10 years

Processing 40,000 tons of paper waste annually, saving Lancaster \$50-75 per ton in landfill costs.

Signed 10 year off-take contracts with CEC to supply fuel to 85 of the 120 new hydrogen stations that California is committed to install.

	HYDROGEN TYPES	CARBON INTENSITY	COSTS \$
GREEN HYDROGEN	SGH2 Energy Hydrogen	-188 gCO2eq/MJ	\$2-\$4
	Green Hydrogen (Electrolysis)	0 gCO2eq/MJ	\$10-\$13
HYDROGEN FROM FOSSIL FUELS	Grey Hydrogen (Natural Gas)	+115 gCO2eq/MJ	\$2-\$6 (cost of natural gas)
	Brown Hydrogen (Gasification of Coal)	+20 kg CO2	\$2-\$3
BLUE HYDROGEN WITH CARBON CAPTURE & SEQUESTRATION	Grey Hydrogen	+12 kg CO2	\$6-\$10
	Brown Hydrogen	+20 kgCO2	\$6-\$7



Technology utilizes Plasma Torch Heat as additional heating source

Only industrial process to completely extract not only the volatile matter fraction, but also 100% of its fixed carbon fraction into a clean syngas. The carbon conversion into syngas is > 99.99%.

No fly ash, no bottom ash. The only resulting byproduct is a vitrified slag, which is inert and nonleachable, that can be safely used as an aggregate for construction purposes.

Recommendation

AMEU for Leadership

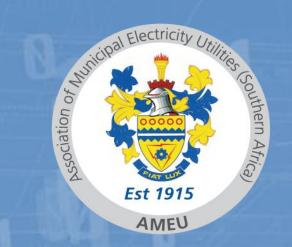
Call for PPP and Investments TALK with the Swiss, Japanese, Americans, Develop the Business Case ... 40 – 50 MW DG Call for Technology Transfer

PEOPLE DEVELOPMENT

AMEU + MUNICIPAL UNDERTAKINGS + ACADEMIA MOA : UJ + AMEU = 100'S PHD'S & MASTER Graduates







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Thank you



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