



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**

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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



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ABB 2012 Fact Sheet

Energie Wasser Bern, Switzerland

360 000 MWh/a electricity 132 kV GIS – Grid
330 000 MWh/a district heating & steam

110 000 t/a municipal solid waste

112 000 t/a biomass (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.**



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2. High Temperature **GASIFICATION**

**MUNICIPAL SOLID WASTE TO GAS
(HYDROGEN)**

**Hydrogen Economy
(JAPAN)**

**Electric Cars
(CALIFORNIA)**



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Japan

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



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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.



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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 by-product is a vitrified slag, which is inert and non-leachable, that can be safely used as an aggregate for construction purposes.

O₂ enriched air is

3500°C

Biomass or RDF
and recycled waste
materials

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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