



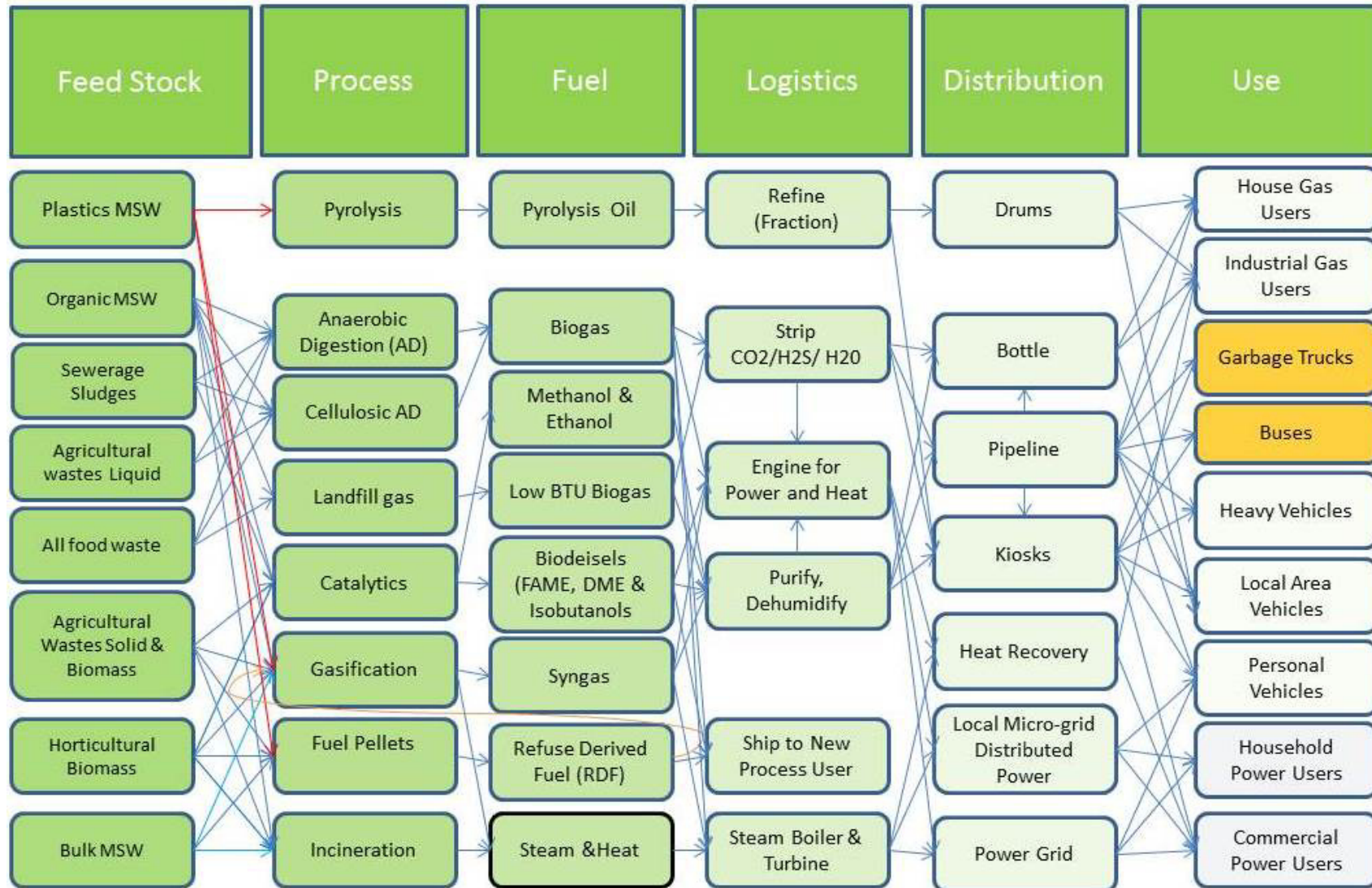
Waste to Fuel Infrastructure Costing - *Biogas to Bio CNG*

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Waste Supply Chain and Linkages for Waste

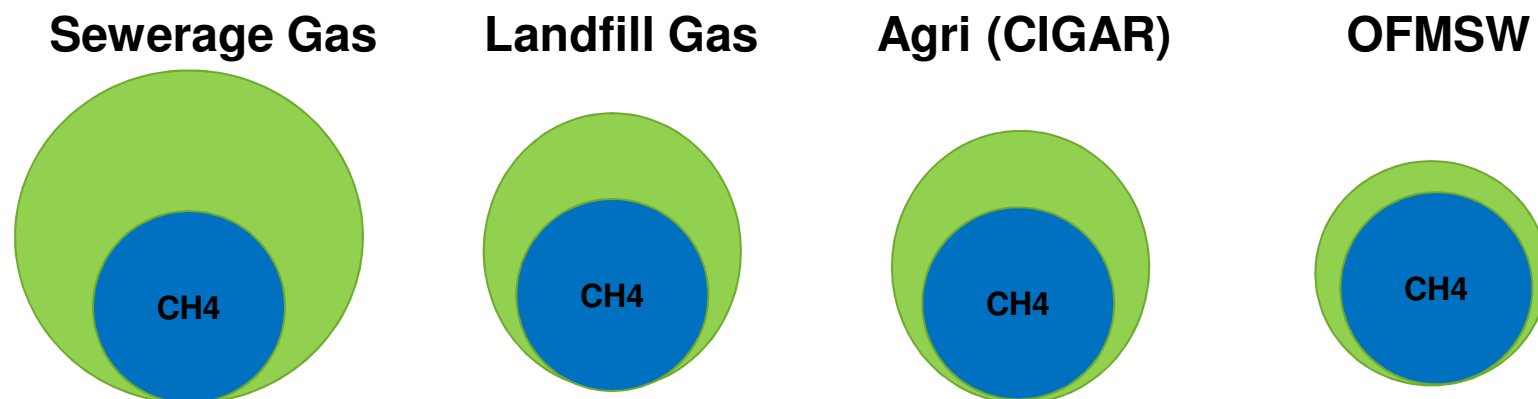


Key Steps

- **Site Acquisition** – Price & Proximity
- **Feedstock Security** – Price & Proximity
- **Biogas Process** – Proven with Feedstock
- **Biogas Purification (H₂S)** – Ease of Use
- **CO₂ Removal** – Type & Cost
- **Compression** – Integral to CO₂ removal
- **Storage** – Intermediate or direct sale
- **Transport** - Virtual Pipeline
- **Fleet refit** – Compare fuel efficiency and emissions



Raw Biogas

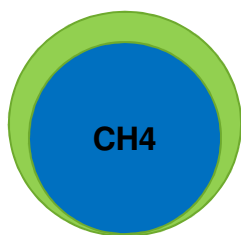


CH4 Percentage in Raw Biogas

30-40%	40-50%	50-60%	65%
Capital Costs per 9450 NM3 of CH4 (10,000 NM3 of BIO-CNG			
US\$ 3.3M	US\$ 1.6M	US\$ 2.3M	US\$ 3.3M

Formula for cost of biogas determined by the amount of raw divided by yearly costs for labour, spares (4-7% of capex), depreciation, cost of financing, management overhead and margin for feedstock cost plus profit)

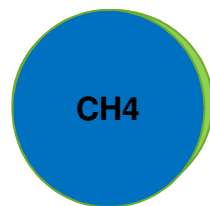
Stripping, Logistics and Fleet Costs



Biogas



CO2 Stripping

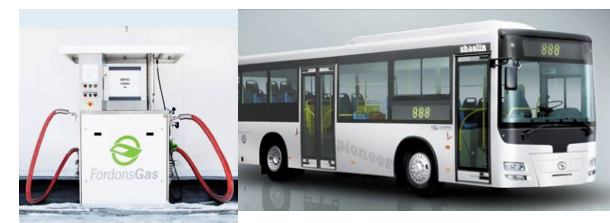


BIO-CNG



Tanker / Bowser

Fleet



Key Costs

- CO2 Stripping US\$ 1.9-2.3M per 10,000 NM3 biogas,
- Tanker US\$ 175,000 per trailer (1 trailer for 8 buses),
- Bowser and fleet replacement is project specific,
- Operations costs for CO2 Stripping 3-6% depending on kms
- One Litre of Diesel is equivalent to 1.18 Nm3 of BIO-CNG

Formula for cost of BIO CNG determined by the amount of BIOCNG divided by yearly costs for labour, spares (3-6% of capex), depreciation, cost of financing, management overhead and cost of raw input biogas cost plus profit). Not 1-3% loss of methane during stripping process.

This price per NM3 is then converted to Diesel litre equivalent

Putting it all together

Formula for price per kilometre for the buses is determined by the number of kilometers travelled per year divided by yearly costs for labour, spares (3-6% of capex), depreciation, cost of financing, management overhead and fuel cost plus profit. Environmental cost can be added separately to show sensitivity.

