# Waste to Energy Processing Technology

## From Landfill Mining to Renewable Energy Power Plant

HONG KONG

ORGANIC WASTE TECHNOLOGIES HK LTD

GERMANY

vmpress TECHNOLOGIES

# Total Waste Management Consortium

SWITZERLAND

ECOLOGY SRL

MALAYSIA

syngas

MALAYSIA

MHSB

Natural Energy Solutions for Tomorrow

MALAYSIA

IE

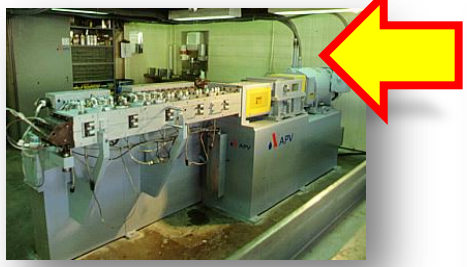
Landfill

Landfill Mining

Waste Separation

# Total Waste Management Solution

## From Landfill Mining to Renewable Energy Power Plant



Syncoal

Electricity

RE Power Plant

Syngas

Diesel

# Landfill Mining and Remediation

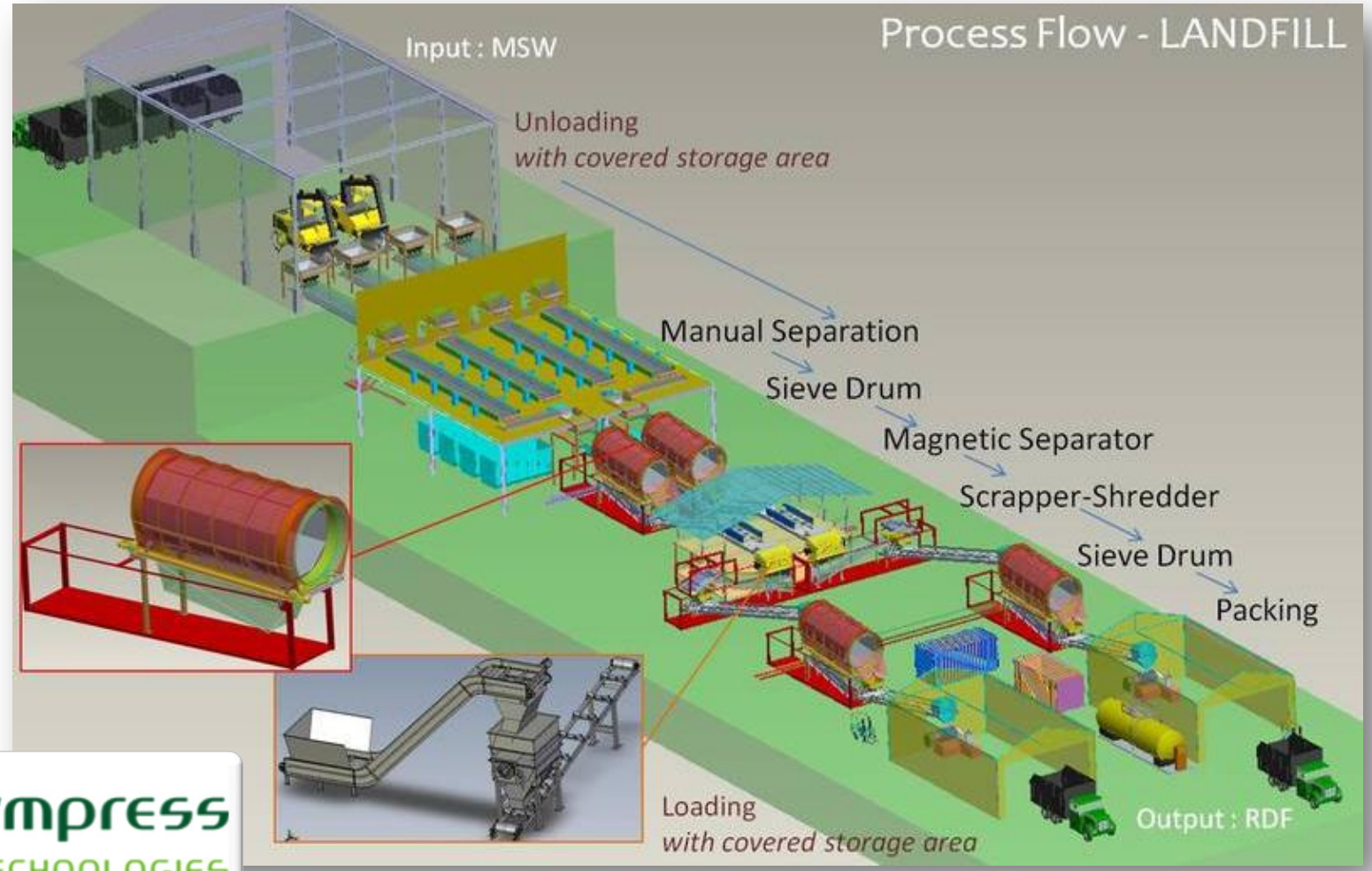
## Capacity = 1,000 Tons

per day


**Landfill mining and remediation** is a process whereby solid wastes which have previously been land filled are excavated and processed.

ORGANIC WASTE TECHNOLOGIES HK LTD

# WASTE SEPARATION
# Renewable Energy – 1,000 Tons Per day



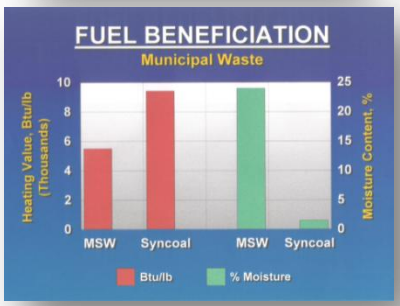

VMPRESS TECHNOLOGIES

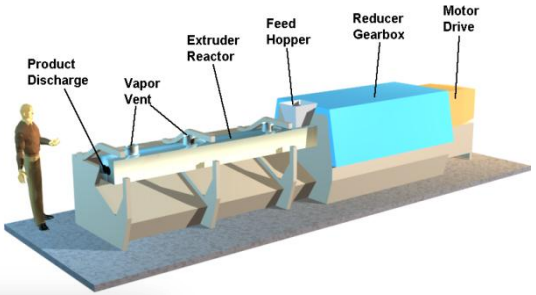
# Renewable Energy
# Solid Fuel 500 Tons per day

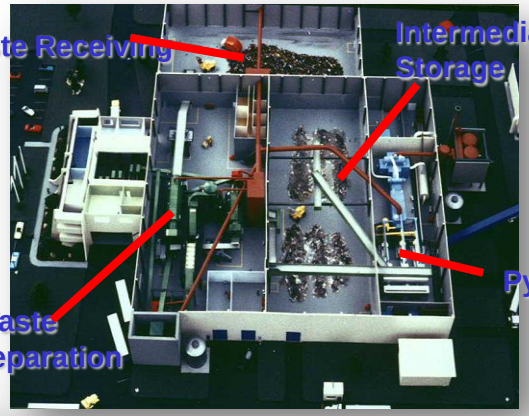
ECOLOGY SRL

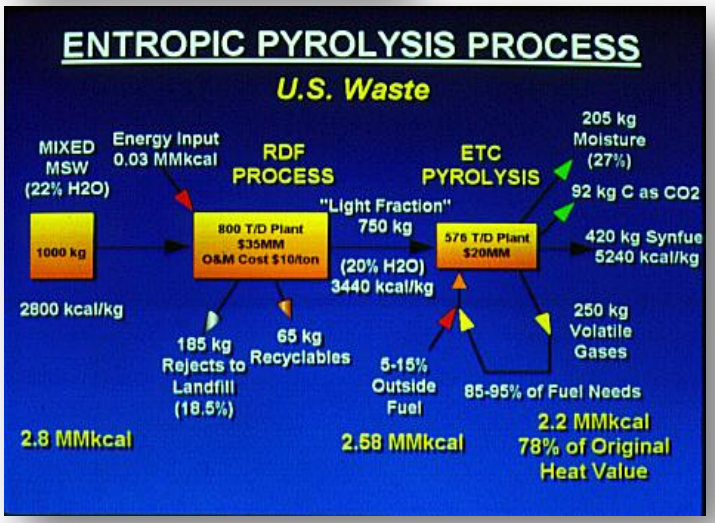
Syncoal

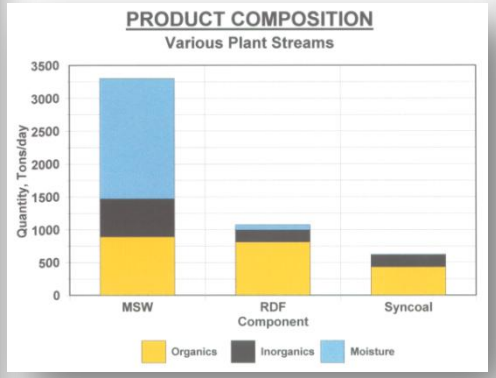
An Entropic process which converts the RDF into a premium coal substitute.
RDF is fed into the head end of a modified extruder/reactor and is moved continuously through the reactor by a twin screw conveyor.
The waste material becomes thoroughly mixed and heated to nearly 320°C, driving off moisture and volatile matter.



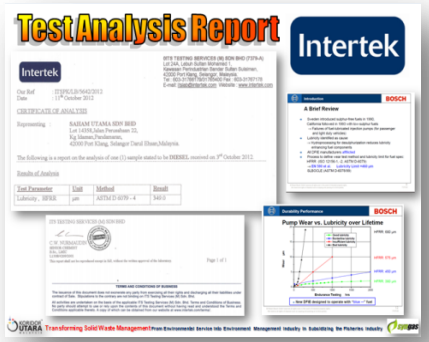




# Renewable Energy

## Liquid Fuel - Diesel Oil

## 80 Tons OR 80,000 Liters per day







DIESEL OUTPUT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High Performance Green Technology Diesel Fuel

# Converting Plastics into Diesel Oil

DUMPSITES

SEGREGATING

SHREDDING

CONVERTING

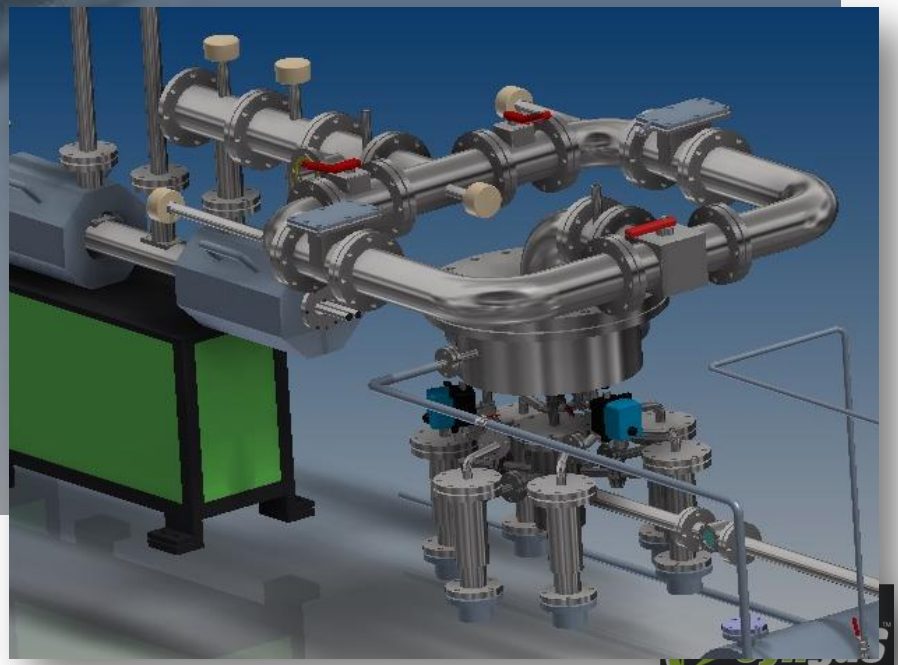

Syngas Fuel

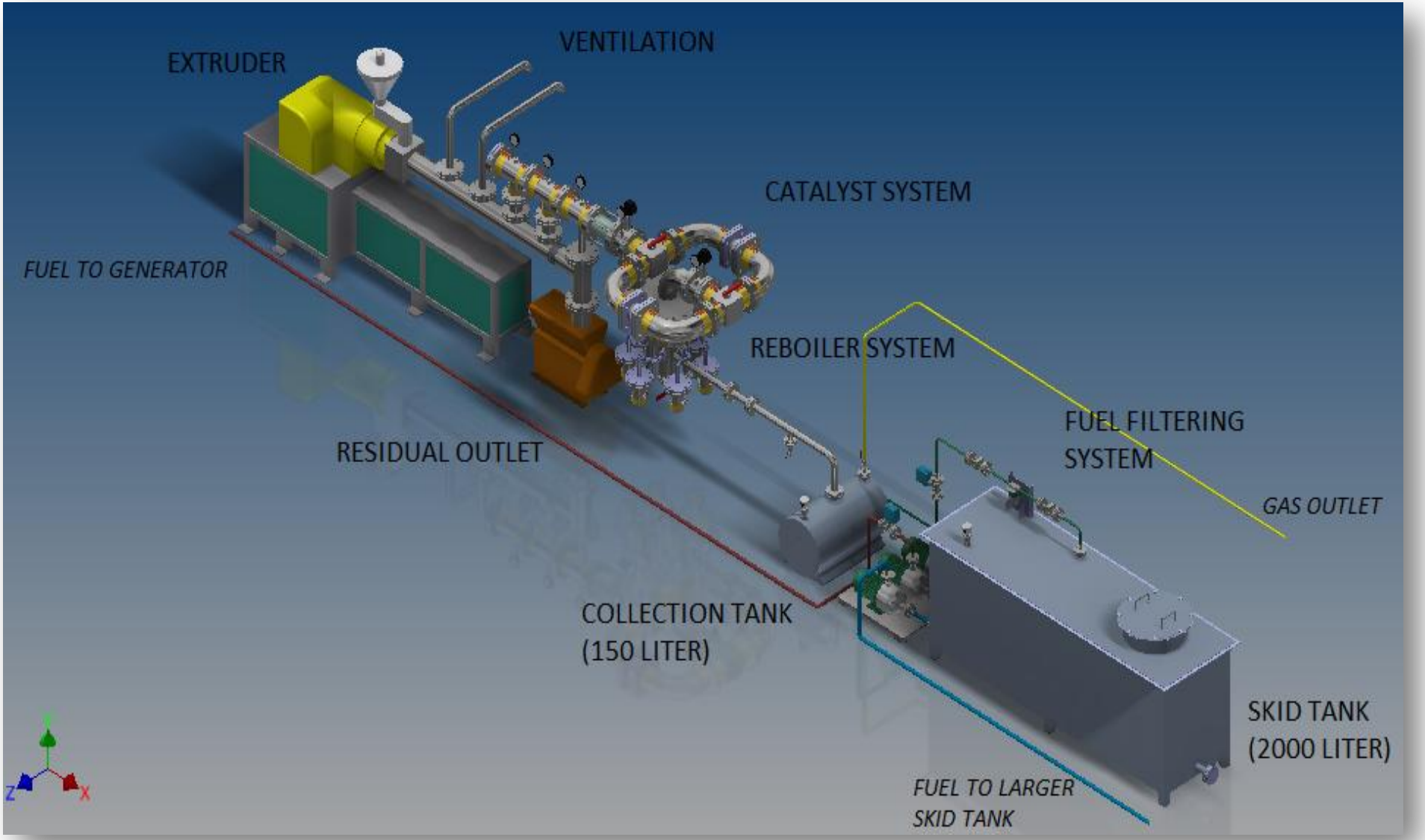
100%

**Creating Renewable Alternative Energy from Waste Plastic**

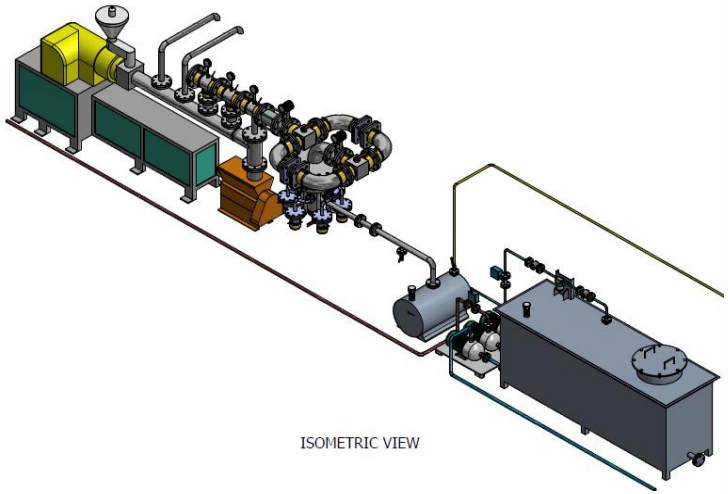
# PATENTED CONVERSION MACHINE DESIGN

# Syngas™ Conversion Machine

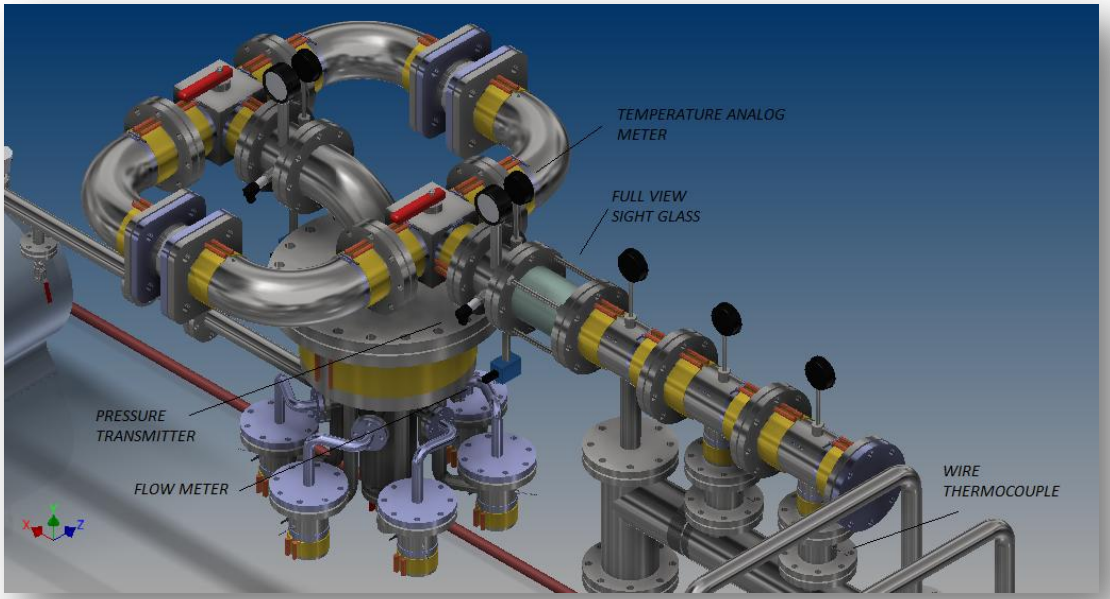


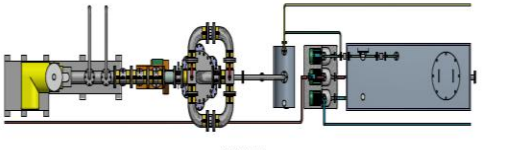



# Syngas™ Conversion Machine

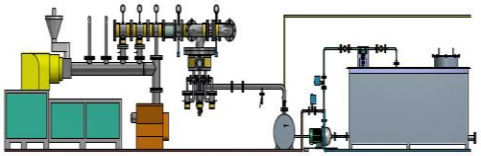


ISOMETRIC VIEW

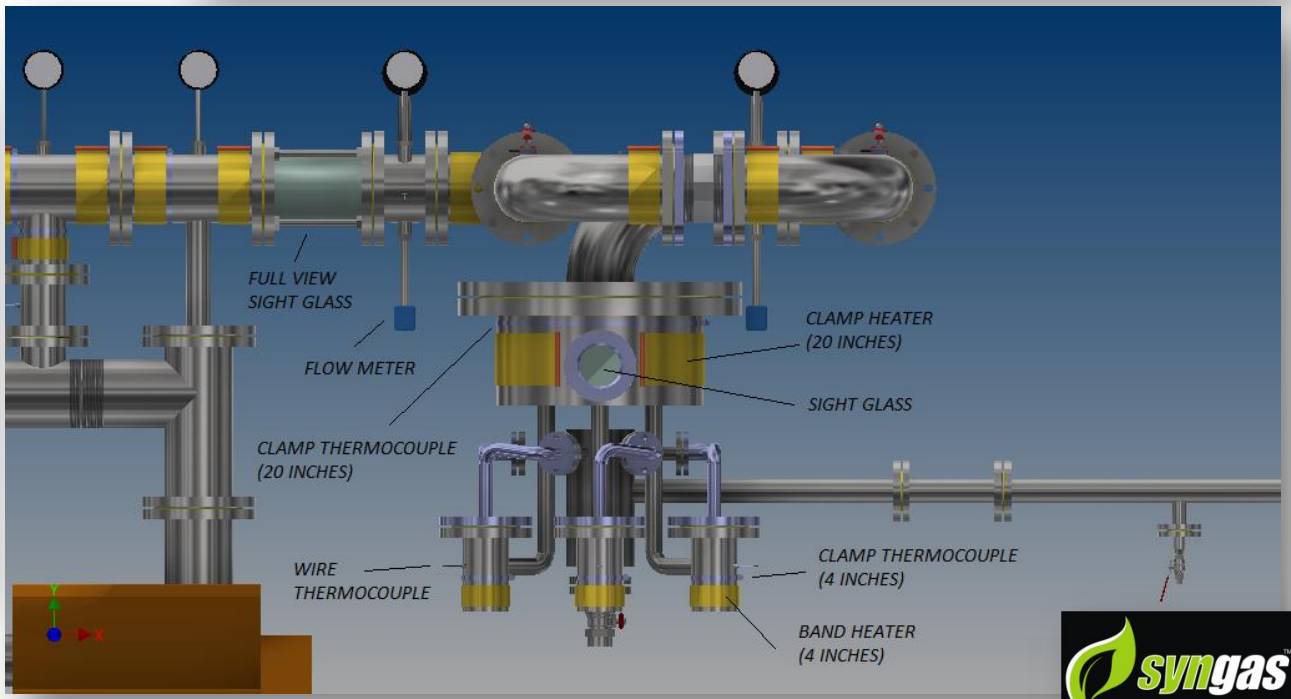


TOP VIEW



FRONT VIEW

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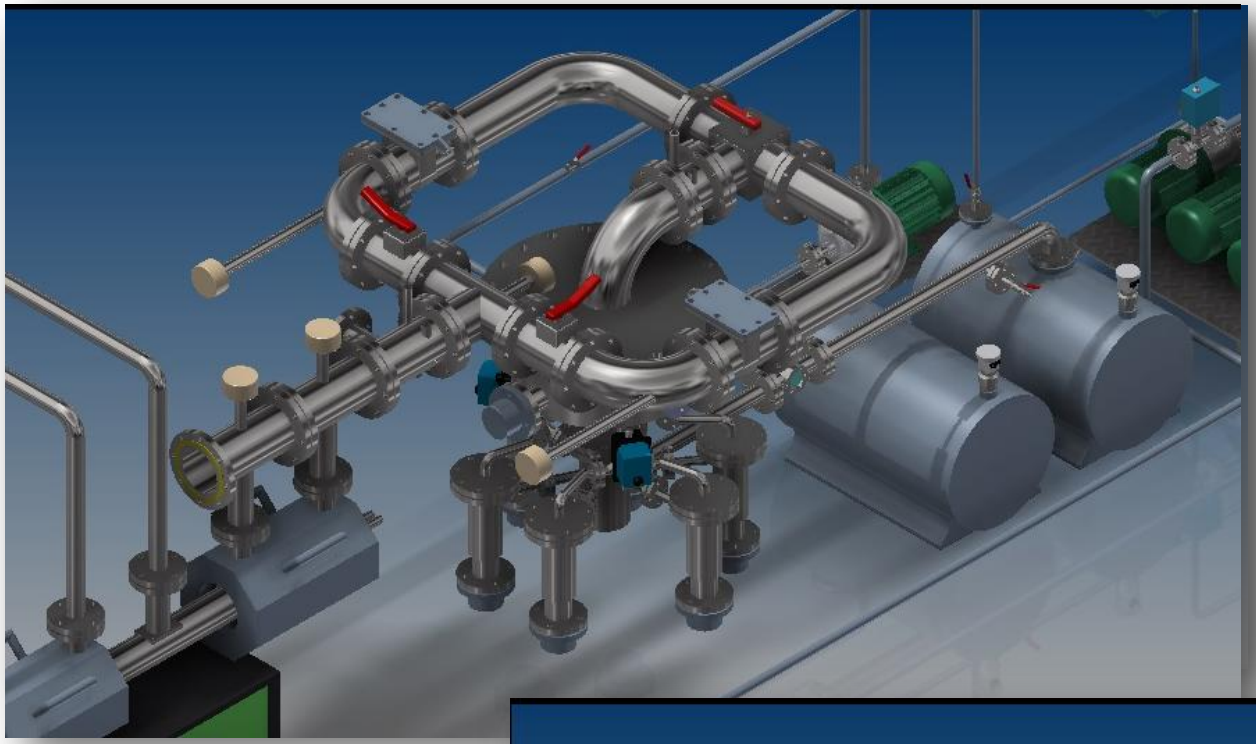
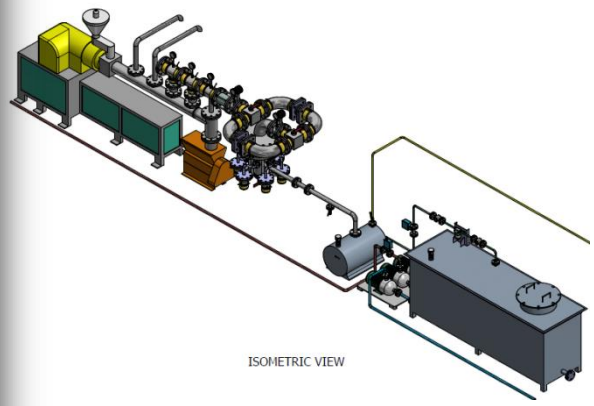
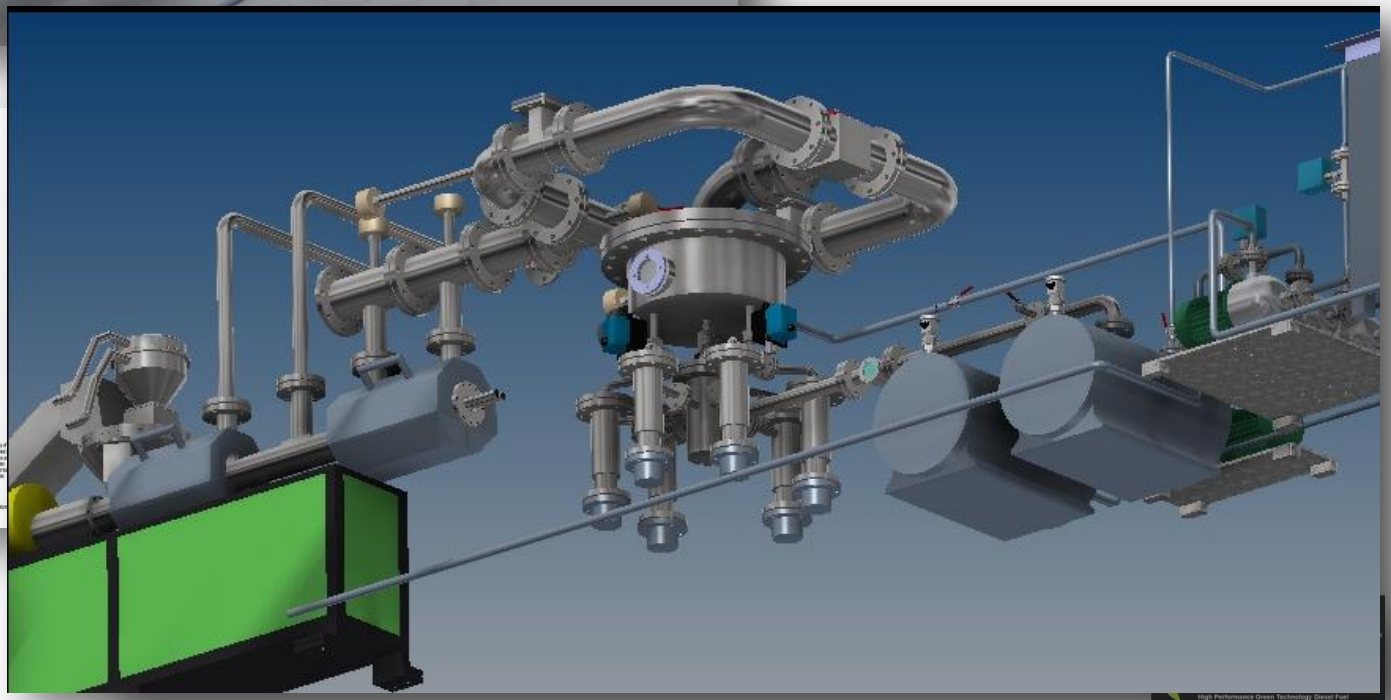
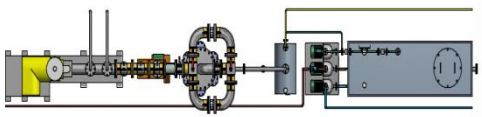


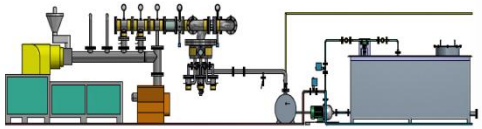


ISOMETRIC VIEW





TOP VIEW



FRONT VIEW



Notes:
1. All dimensions in inches (")
2. Do not measure undimensioned features
3. Remove sharp edges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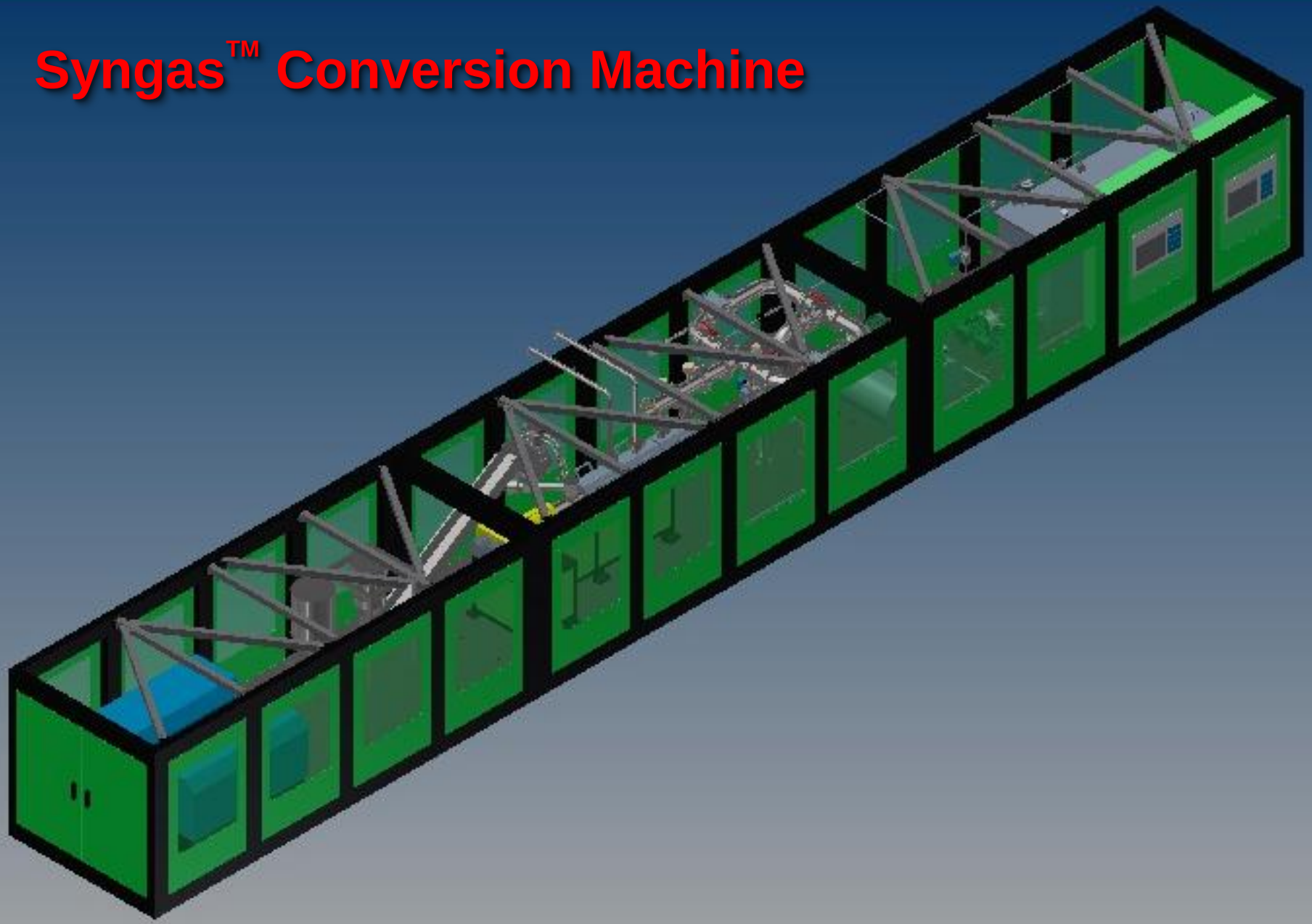
High Performance Green Technology Diesel Fuel

# Syngas™ Conversion Machine



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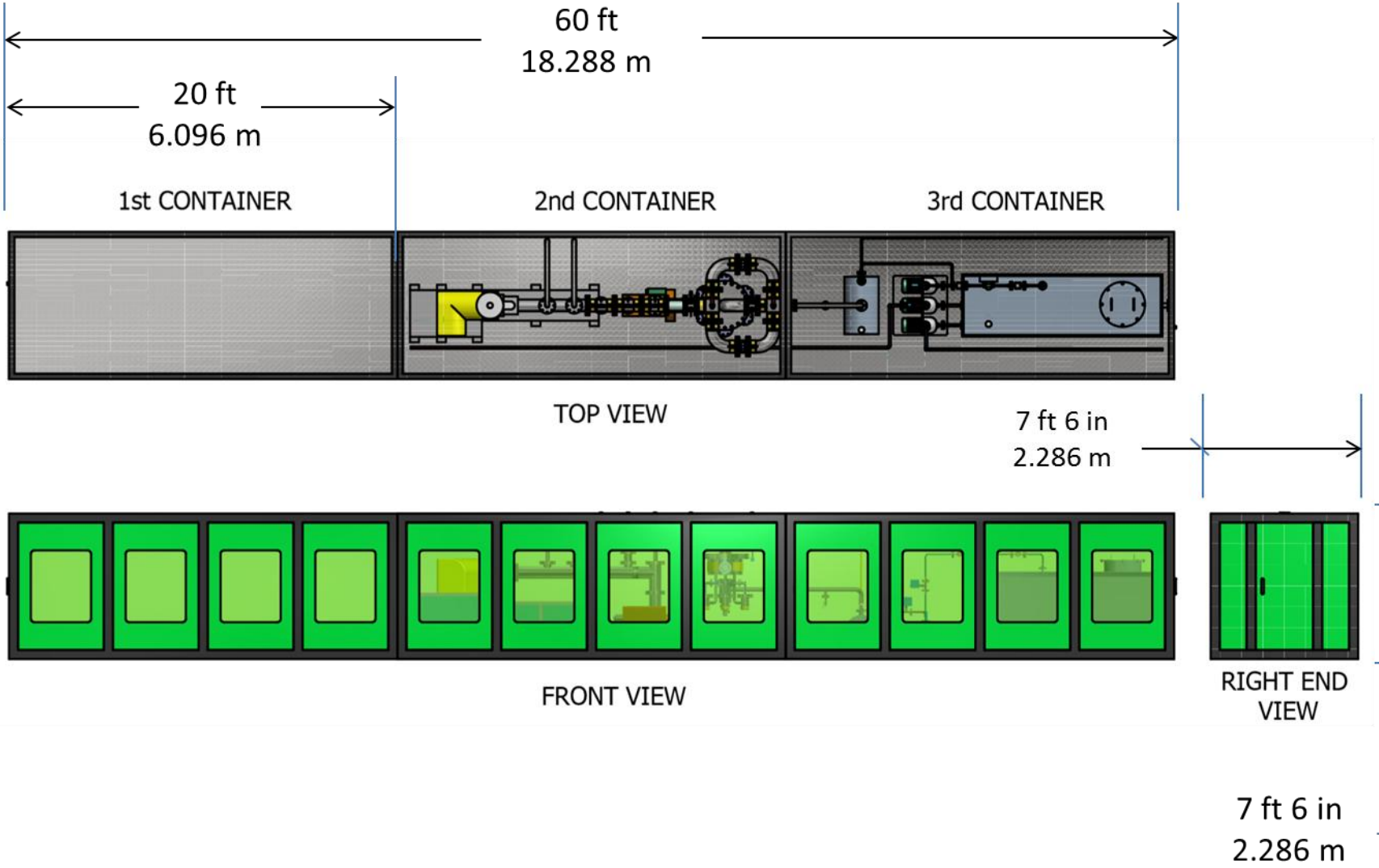

60 ft
18.288 m
20 ft
6.096 m
1st CONTAINER
2nd CONTAINER
3rd CONTAINER
TOP VIEW
7 ft 6 in
2.286 m
FRONT VIEW
RIGHT END VIEW
7 ft 6 in
2.286 m

# The Conversion Process

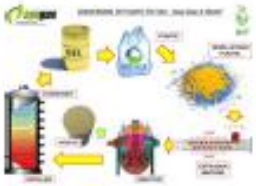
# Conversion Process

SYNGAS CONVERSION SYSTEM : PROCESS FLOW

**1** Feedstock poured into material container of the extrusion machine

# Conversion Process

SYNGAS CONVERSION SYSTEM : PROCESS FLOW



**2** Reactor heaters is switched on.
The temperature is set between 400°C to 600°C

# Conversion Process

SYNGAS CONVERSION SYSTEM : PROCESS FLOW

**3**

The molten plastic will be extruded into the Reactor.
Inside the Reactor, the plastic will be gasified into Hydrocarbon Gas.
The Gas will then flow into the Catalyst Chamber to interact.
The Gas then flows into the Distillation Column and condensed.

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# Conversion Output

SYNGAS CONVERSION SYSTEM : PROCESS FLOW

**4**

– Diesel Oil is obtained

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# Conversion System

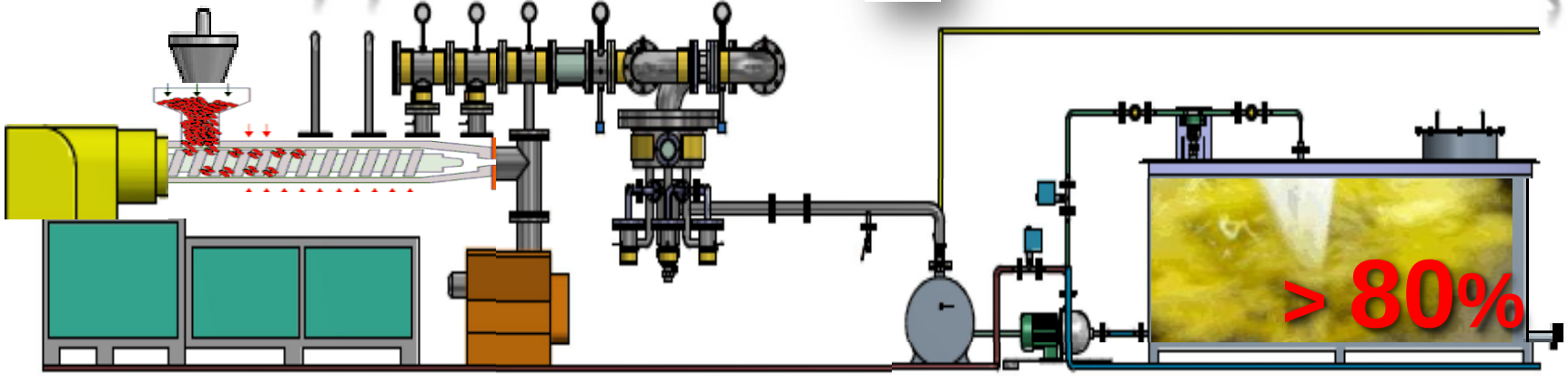
## Gas Composition

| | $H_2$ (wt%) | $CH_4$ (wt%) | $C_2H_6$ (wt%) | $C_2H_4$ (wt%) | $C_3H_8$ (wt%) | $C_3H_6$ (wt%) | $C_4H_{10}$ (wt%) | $C_4H_8$ (wt%) | $CO_2$ (wt%) | CO (wt%) | HCl (wt%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HDPE | 0.12 | 1.90 | 2.21 | 6.08 | 1.31 | 4.56 | 0.22 | 0.36 | | | |
| PE | 0.8 | 23.8 | 6.7 | 20.0 | 0.08 | 5.6 | | 0.6 | | | |
| LDPE | 0.05 | 1.14 | 1.67 | 4.00 | 1.33 | 4.00 | 0.32 | 2.00 | | | |
| LDPE | | 22 | | 28 | | 18 | | | | | |
| LLDPE | | 4.6 | 2.2 | 19.4 | 0.8 | 12.0 | 13.1[1] | | | | |
| PP | 0.05 | 0.93 | 1.45 | 3.52 | 1.00 | 3.53 | 0.23 | 1.29 | | | |
| PP | 0.7 | 28.2 | 4.0 | 13.9 | 0.09 | 3.7 | | 0.4 | | | |
| PS | 0.04 | 0.53 | 0.08 | 0.26 | 0.02 | 0.05 | 0.00 | 0.06 | | | |
| PS | | 0.06 | | 0.04 | | | | | | | |

Yield and Composition of Gases and Oils/Waxes from the Feedstock Recycling of Waste Plastic

PAUL T. WILLIAMS
Energy and Resources Research Institute, Houldsworth Building, The University of Leeds, Leeds LS2 9JT, UK

$H_2O$




## Residue Composition

| No. | Test Parameter | unit | Result |
|---|---|---|---|
| 1. | Silver (Ag) | ppm | <1 |
| 2. | Potassium ( as $K_2O$) | %wt | 0.03 |
| 3. | Aluminum (as $Al_2O_3$) | %wt | 1.26 |
| 4. | Cadmium (Cd) | ppm | <1 |
| 5. | Chromium (as Cr) | ppm | 27 |
| 6. | Copper (as Cu) | ppm | 89 |
| 7. | Iron (as Fe) | %wt | 0.55 |
| 8. | Manganese (as MnO) | %wt | 0.04 |
| 9. | Molybdenum (as Mo) | ppm | 2 |
| 10. | Sodium (as Na) | %wt | 0.14 |
| 11. | Nickel (as Ni) | ppm | 8 |
| 12. | Lead (as Pb) | ppm | 17 |
| 13. | Silicon ($SiO_2$) | %wt | 2.47 |
| 14. | Sulphur (S) | %wt | 0.012 |
| 15. | Titanium (as $TiO_2$) | %wt | 0.34 |
| 16. | Vanadium (as $V_2O_5$) | ppm | 1 |
| 17. | Barium (as Ba) | %wt | 0.01 |
| 18. | Calcium (as Ca) | %wt | 16.8 |
| 19. | Magnesium (as MgO) | %wt | 0.41 |
| 20. | Zinc (as Zn) | %wt | 0.13 |
| 21. | Phosohorus (as $P_2O_5$) | %wt | 0.10 |

## Output Composition

Table 1 Product yields for liquefaction (wt%)

| | Temp. | Distillate | Residue | Gas |
|---|---|---|---|---|
| PE | 470℃ | 87.3 | 9.7 | 3 |
| PP | 450℃ | 85.0 | 14.0 | 1.0 |
| PS | 450℃ | 92.1 | 7.9 | 0 |

Intertek

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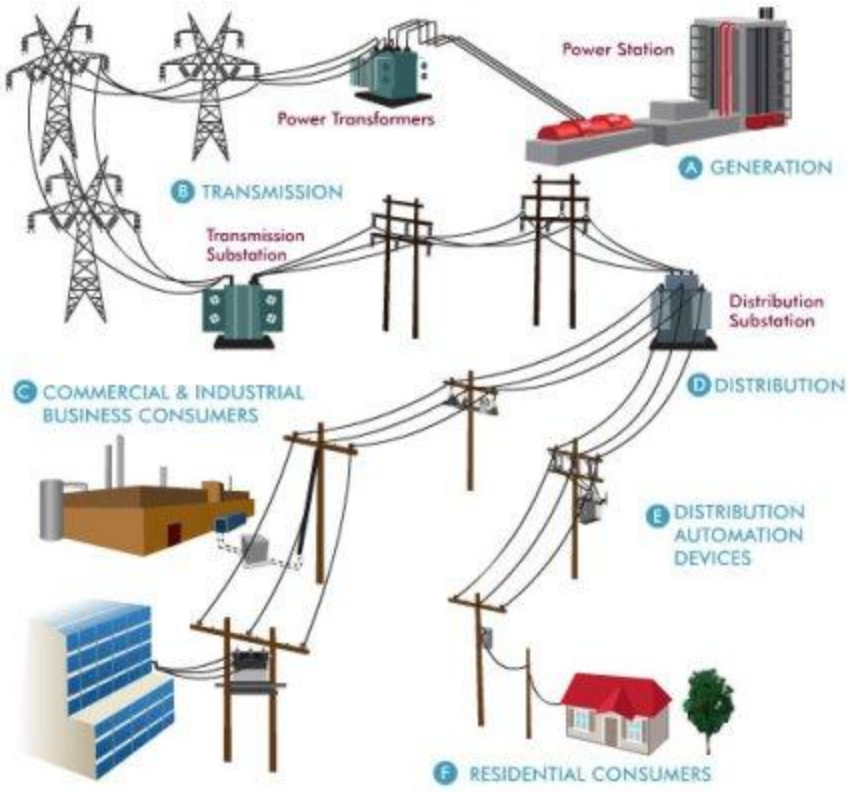
RENEWABLE ENERGY
High Performance Green Technology Diesel Fuel

# Renewable Energy Power Plant – 10 MW per day


Electricity

BIO - GRID

| Mill | RDF Syncoal/Diesel |
|---|---|
| RE Fuel Capacity | 45 tons/hr |
| WTE Internal Use | 0.7MW |
| Minimum Sales to TNB Grid | 5.0MW |
| Total Electricity Produced | **10MW** |



# Waste to Fuel Processing Technology
## i.e. 1,000 Ton per day

ORGANIC WASTE TECHNOLOGIES HK LTD

| TWM System | Daily Capacity (Tons) | % | Technology Origin |
|---|---|---|---|
| Landfill Mining | 1,000 | 100 | Hong Kong |
| Waste Processed | 1,000 | 100 | Germany |
| Syncoal Produced | 500 | 50 - 60 | Switzerland |
| Plastics in MSW | 200 | 20 | Malaysia |
| Diesel Produced | 80 | 10 | Malaysia |
| Power Plant | 600 | | Malaysia |

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# Waste to Fuel Processing Technology
## – COSTS @ 1,000 Ton per Day

ORGANIC WASTE TECHNOLOGIES HK LTD

| WEPT | Daily Capacity (Tons) | Technology COST |
|---|---|---|
| Landfill Mining | 1,000 | USD 20 Mil |
| Waste Processed | 1,000 | USD 25 Mil |
| Syncoal Produced | 600 | USD 80 Mil |
| Diesel Produced | 80 | USD 55 Mil |
| Power Plant | 10 MW | USD 75 Mil |
| Infrastructures | 1,000 | USD 20 Mil |
| TOTAL | | USD 275 Mil |

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# Waste to Fuel Processing Technology
## – COSTS @ 1,000 Ton per Day

## PROJECTED INCOME GENERATION per site

a. ELECTRICITY = 10MW x USD110/MWh x 8000hrs /year
~ USD 9 million

b. DIESEL = 80Mton/day x USD700/ton* x 360 days
~ USD 20 million

* Profit margin

TOTAL ~ USD 30 million per site

**RETURNED OF INVESTMENT**

= USD 275 mil / USD 30 mil
= 9.2 Years ~ 11% IRR

# Technology Swiss HSE S.A.

**For a Better Tomorrow call us today !**


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**SWITZERLAND**



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