
BIOBATTERY – DECENTRALIZED PRODUCTION OF FUEL FROM WASTE

Suncor Academic Forum on Transformational Technology for Energy Systems

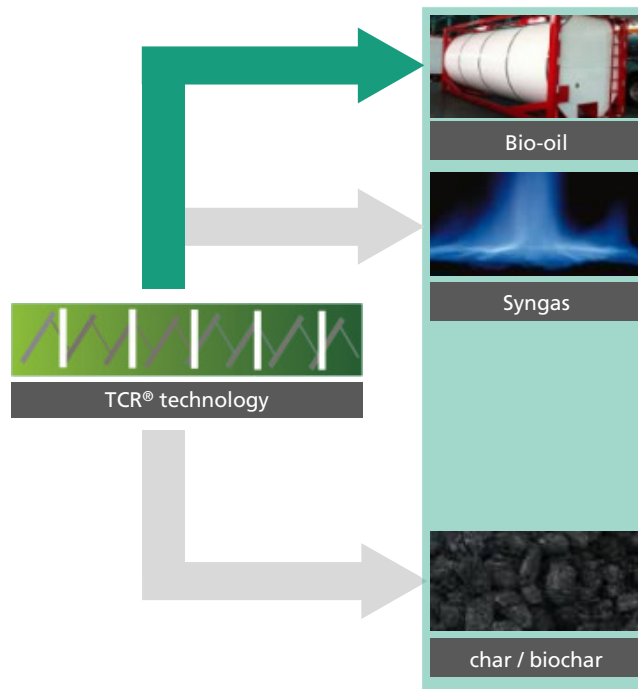
Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT Sulzbach-Rosenberg



Andreas Hornung
October 10th to 12th, 2018
Vancouver, Canada

Biobattery

The approach



High quality, engine-ready

Low acid number / High calorific value / Miscible with common fuels / No tar issues / Low Viscosity / Thermal stability

Engine-ready gas

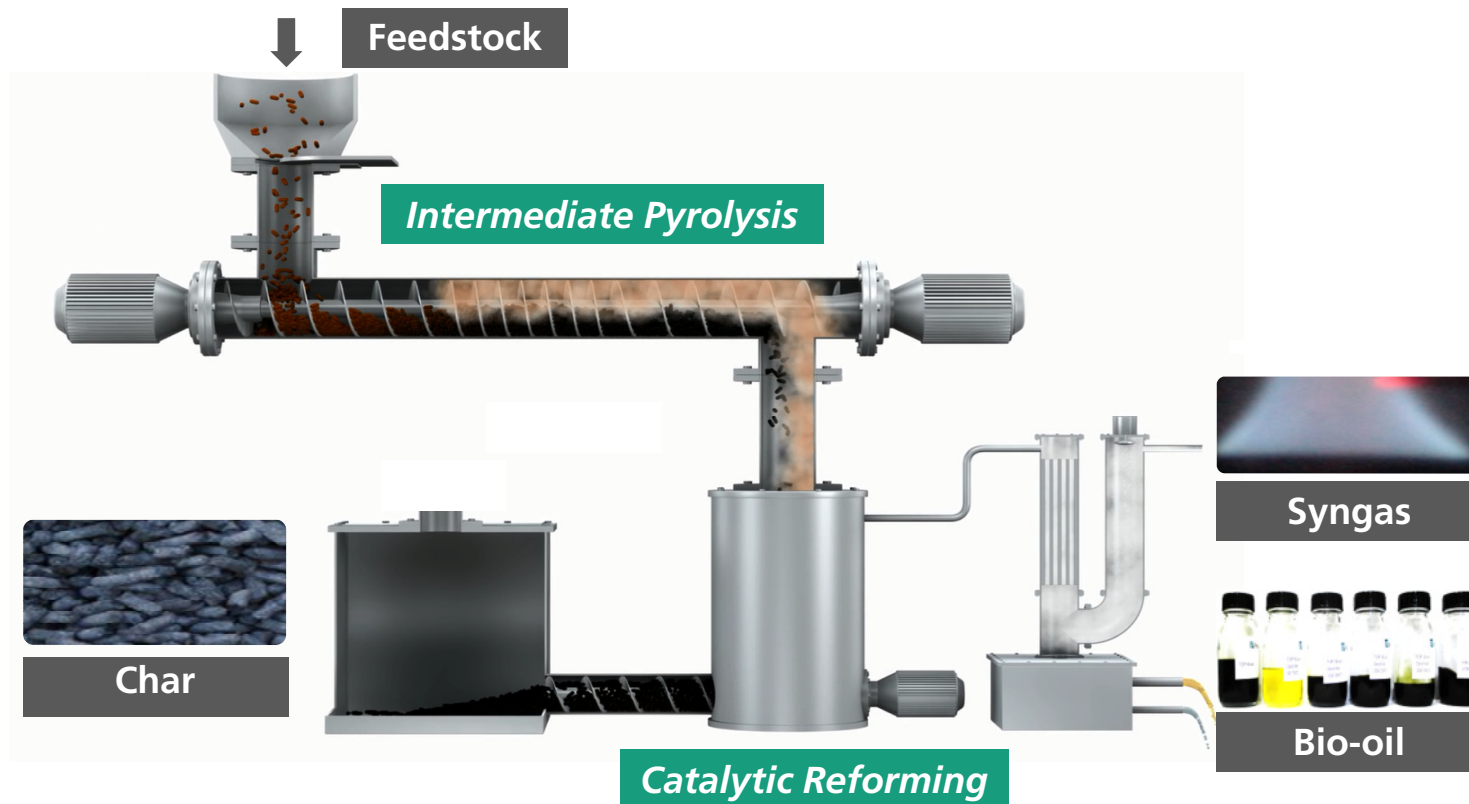
Tar and dust free syngas / Direct suitable for engines / High hydrogen content / Free of aromatic-compounds

Anthrazitic-like, storable biochar

Very low H and O content / High calorific value / High soil stability / Significant ash content

Thermo-Catalytic Reforming (TCR®)

The key technology



Product utilization

Oil and syngas

Crude Oil

CHP Engine

Dual Fuel Engine (with Syngas)

Fuel Blends

[illegible]

Up-graded Oil

Green Diesel

Green Naptha and Jet Fuel

Green Chemicals

Gas energetic

CHP Engine

Dual Fuel Engine

Gas Burner (Heating)



Gas material

Synthesis Gas

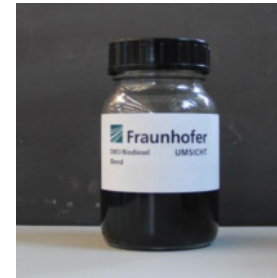
Green Hydrogen



Hydro treatment of TCR[®] oil

Anlaysis Diesel Fraction

Standard Value				Reference Product	TCR®-Product
Diesel EN 590				Diesel B7	Fractionated
min	max	Property	Unit	EN590	TCR®-HDO
51	-	Cetane number		54	43
820	845	Density at 15 °C	kg/m³	842,5	840,0
-	8	PAH	% (m/m)	4	n.a.
-	10	Sulphur	mg/kg	n.a.	19,9
55	-	Flash point	°C	67	86
-	0,01	Ash content	% (m/m)	n.a.	<0,005
-	200	Water content	mg/kg	n.a.	55
Copper strip corrosion			Class		
Class 1	Class 1	(3 hours at 50 °C)		n.a.	Class 1
-	460	Lubricity at 60 °C	µm	165	196
2	4,5	Viscosity at 40 °C	mm²/s	3,3	2,855
-20 (Winter) 0 (Summer)		CFPP	°C	n.a.	-11
-	< 65	Volume at 250 °C			54
85	-	Volume at 350 °C			92,7
-	360	95 %(V/V) recovered at	°C	360	360
Lower Heating Value			MJ/kg	42,49	42,496
Carbon			% (m/m)	86,5	86,3
Hydrogen			% (m/m)	13,4	13,6
Nitrogen			% (m/m)	n.a.	< 0,5
Oxygen			% (m/m)	0,1	< 0,5



Primary Oil



Hydrated Primary Oil



Hydrated Primary Oil Fractions

Product utilization

Bio-TChaR®

Energetic Use

Co-Combustion in Power plant

Cement Industry

Barbecue Coal

Distributed Combustion



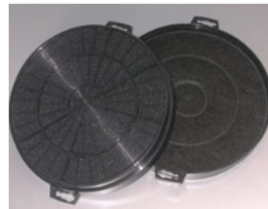
Material Use

Soil Improvement

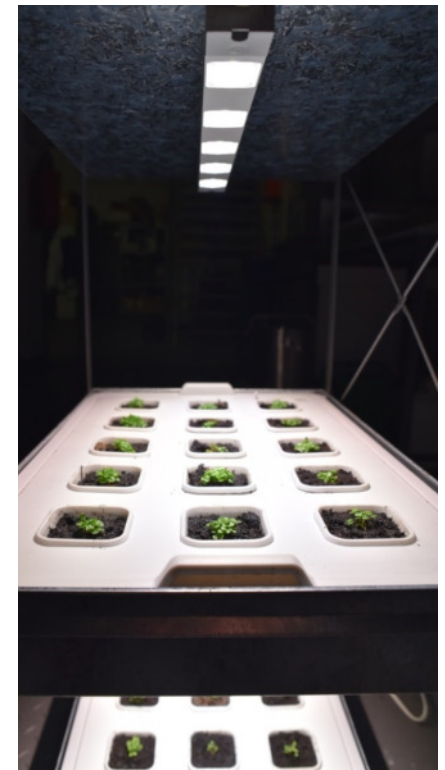
Animal feed additive

Filter Material (Activated Carb.)

Reduction in metal process



Registration as
soil supplement
at Canadian
Food Inspection
Agency



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**Thank you very much for
you attention!**

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