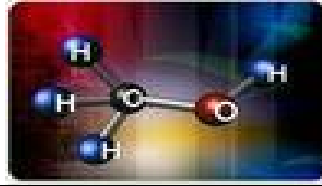


METHASYN



Universal Fuel & Chemical Feedstock

METHASYN[®] is the registered trade mark of synthetically produced methanol from any biomass and agricultural & communal waste. Flue gases from power plants can also be inputs with the supplement of hydrogen.

METHASYN[®] is also called "liquid hydrogen", but its uses are much more versatile for all energy and chemical applications hitherto provided by fossil fuels. It is easy and safe to transport and to store.

For energy applications **METHASYN**[®] from Biomass & Waste substitutes several dozen petroleum products from various gasoline types to jet fuels and heating oils.

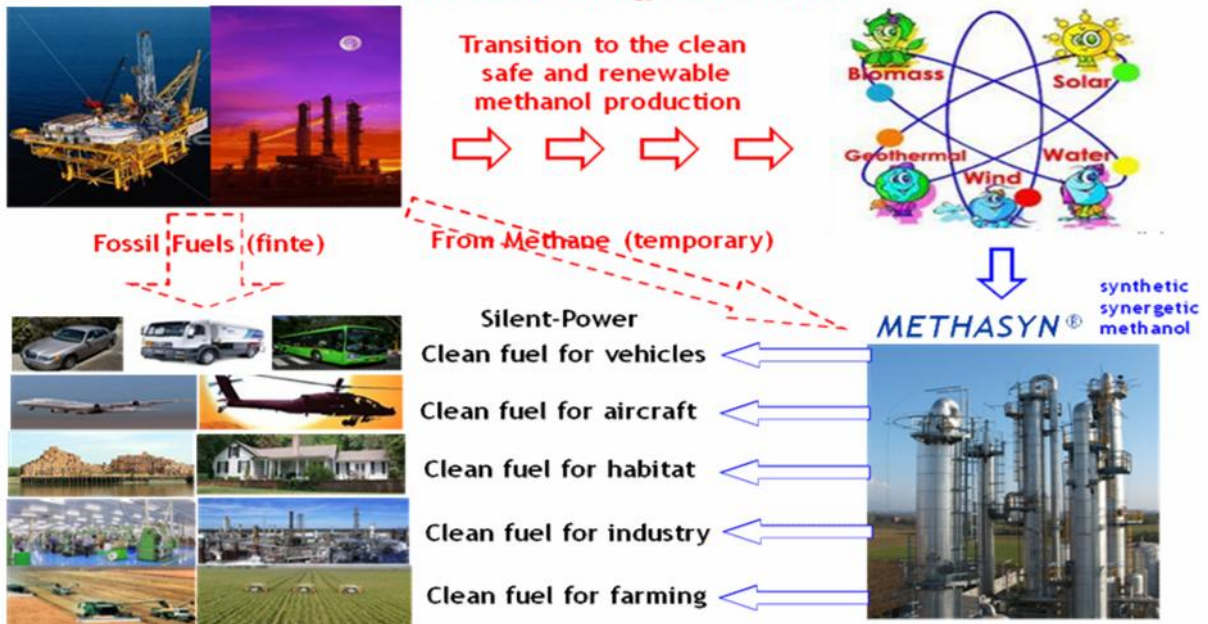
In organic chemistry **METHASYN**[®] substitutes all petrochemical products by synthesized intermediates for thousands of products like plastics, synthetic fibres, organic solar cells, OLEDs and many more.

METHASYN[®] is ecologically superior to methanol from finite fossil fuels. It is harmless to all life and can be produced at much lower cost. Its CO₂ emissions are reabsorbed by re-planted biomass.

METHASYN[®] is the fuel and chemical feedstock of the future for the next thousands of years and makes all nations energy self-sufficient at much lower cost than all fossil fuels with crude oil over 100 \$/bbl.

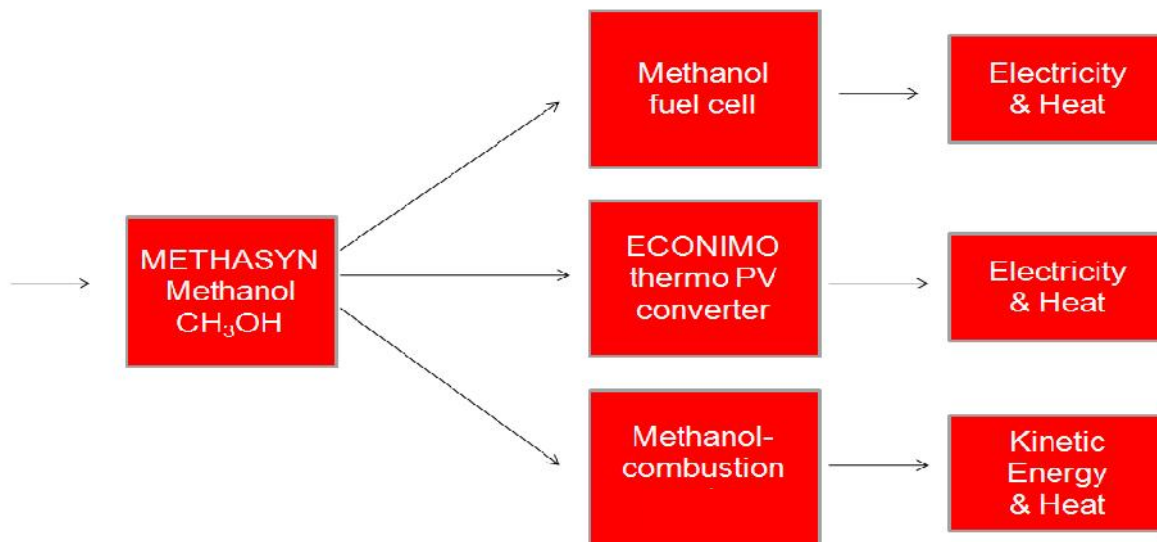
Methanol from Natural Gas and Coal can be economically substituted by **METHASYN**[®] from Biomass & Waste to avoid the escalating cost of these finite fossil resources even before their depletion.

METHASYN[®]
From Petroleum to the Clean Methanol Age
Methanol is now produced from natural gas in the transition period and later synthesized from any clean renewable energy source forever



Why Methanol is an ideal Product and serves as a sustainable resource ?

- It is one of the most traded chemical compounds
- World annual production over 30 million tons.
- It is the feedstock for plastics, alcohols, aldehydes, carbonic acids etc.
- Biochemical bulk materials (parafines, olefines & aromatic compounds)
- Utilization for co-generation by fuel cells and Silent-Power converters
- Direct utilization for combustion engines and any calorific purposes



- ✓ No pollution from CO₂ neutral methanol, if produced from replanted biomass
- ✓ Easy transportation and storage of METHASYN[®] (all the way liquid)
- ✓ Bio-degradable in case of spills or leakages
- ✓ METHASYN is hardly explosive – therefore a safe fuel
- ✓ Biomass is the main source of carbon for life, energy and organic products
- ✓ Biomass waste usage is sustainable and environmentally compatible
- ✓ Waste must be recycled for energy and indispensable materials

Economics of METHASYN[®] - from Waste or Biomass

- Input: any waste containing C (also plastics)
- Product: Methanol CH₃OH
- Purity: 96 % (purum); and 99% (after multipass distillation: it is puriss.)
- Market-price: 1 liter = > 0.32 US\$ or 1 kg = > 0.40 US\$ for M99 ¹⁾
- Production cost: 1 liter = 0.04–0.08 \$ or 1 kg = 0.05–0.10 \$ (depending on waste mix)
- Margin: 0.24 - 0.28 US\$/liter or 0.30 - 0.35 US\$/kg
- Payback: less than 2 years at market price ¹⁾

¹⁾ Actual methanol market price 370-482 US\$/MT (Dec. 2012) depending on purity and bulk quantity. The price is increasing because of raw material cost up-trends of natural gas or coal towards depletion

METHASYN[®] cost will further decrease with any up-scaled plants! Derivatives from crude oil at over 100 \$/bbl. cost over ten times more than METHASYN[®]

Biologically produced waste gives markedly different results than normal waste (from households). Required quantities means, that unseparated garbage shows strongly variable composition with respect to its carbon content.

The usable quantities of organic waste to produce syngas and subsequently the total carbon containing material in garbage ranges from about 80% (e.g. Western Europe) down to some 40% of many other countries in the world.

Comparative Energy Content, Production Cost & Fuel Sales

Specified Fuels	Energy Content MJ/kg	Spec. Gravity kg/L	Production Cost estm. U\$/kg	Price per kg Comodity ⁷⁾ U\$/ kg	Production Cost per Energy Unit U\$cent / MJ
METHASYN from organic waste	22.7	0.79	0.05 - 0.10		0.2 - 0.4 ¹⁰⁾ lowest cost
Methanol (from Natural Gas)	22.7	0.79	0.40	0.44	1.8
Methane CH ₄ (from Natural Gas)	38	0.0007	0.12 – 0.50	0.14 – 0.63	0.3 – 1.3
Methane CH ₄ (from Biomass)	38	0.0007	0.50 - 1,20		1.3 – 3.1
Ethanol (from biomass)	26.7	0.80	0.44 - 0.66 ⁸⁾		1.6 – 2.5
Butane ⁶⁾	45.7	0.58	0.90 ⁶⁾	1.00 ⁸⁾	2.0
Propane ⁶⁾	46.4	0.58	0.40 ⁶⁾	0.44 ⁸⁾	0.9
Gasoline ⁶⁾	43	0.74	1.80 ⁶⁾	1.50 - 2.40 ⁸⁾	4.2
Diesel ⁶⁾	42	Ø 0.90	0.22 ⁶⁾	1.20 - 2.50 ⁸⁾	0.5
Bio-Diesel (from Soybeans)	42	Ø 0.89	0.78	0.90 ⁸⁾	1.8
Jet Fuel ⁶⁾	42	Ø 0.82	0.96 ⁶⁾	1.04 ⁸⁾	2.3
Heating Oil Light ⁶⁾	42	Ø 0.90	0.22		0.5
Hydrogen	120	0,07; liq.	1 – 4 ⁹⁾	⁹⁾	0.8 – 3.3

⁶⁾ refined any from crude oil @ 120 U\$/bbl = 75 U\$/L = 90 U\$/kg @ Ø 0.83 kg/L

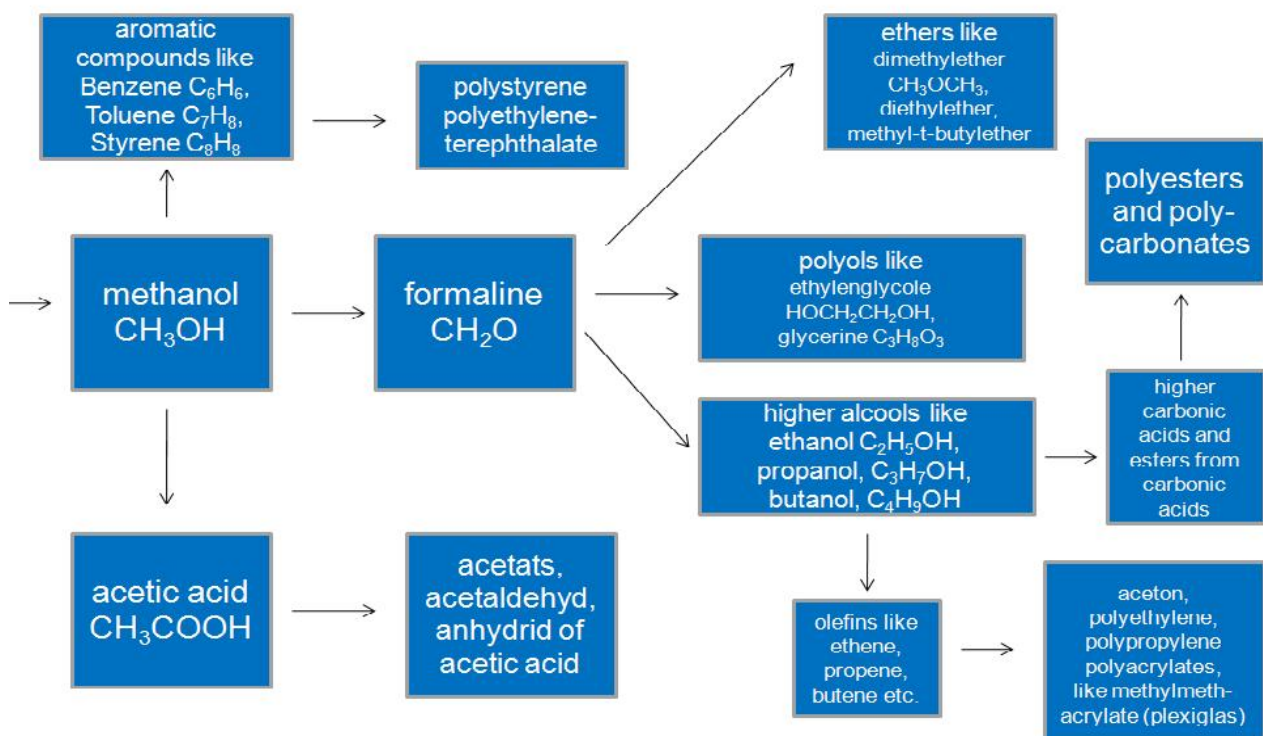
⁷⁾ world commodity market price depending on crude oil price and API grade

⁸⁾ retail price varying from country to country depending on taxes and margins

⁹⁾ grossly varying depending on used energy source and process

¹⁰⁾ with or without separation processes from inorganic bulk material

Methanol is also the most versatile Chemical Feedstock



The 4 Waste Processing Generations



①



Landfills
methane emissions
bad odors
air pollution
groundwater
contamination
nature poisoning
eyesore



②



Incineration
low efficiency
air pollution
hazardous residues
toxic sludge & fly ash
water vapour loss
loss of recyclable metals
ceramics, salts, fertilizers

③



Methanization
medium efficiency
only biomass
feedstock
biogas
production
difficult to store
some pollution

④



METHASYN
synthetic methanol
no pollution at all
highest efficiency of all
refining processes
gain of a precious fuel
gain of recyclable metals
ceramics, salts, fertilizers

Environmental and Health Aspects of METHASYN®

- ❖ During the whole process no hazardous materials are emitted to the environment. That means neither any harmful gases nor any toxic liquids or solids escape from the plant working.
- ❖ Hazardous waste materials are treated in a way which is neutral to the environment, so that it decomposes gradually into harmless products.
- ❖ Polyvinylchloride (e.g. PVC) decomposes readily into syngas, which is converted next to methanol, and also to hydrogenchloride - the latter is soluble in the scrubber and will be removed upon basified washings.
- ❖ METHASYN® spills are bio-degradable but methanol shall not be abused as drinking alcohol, as prohibited by law and therefore never to be mixed with ethanol for consumption. Alcohols are poisons altogether.
- ❖ METHASYN® is recommended to replace ethanol plantations that sacrifice CO₂ sinks of forests and agricultural space for food production.

METHASYN EG
40 rue des Ducats
CH-1350 Orbe, Switzerland

T: +41 22 910 3006
F: +41 22 910 3014

info@methasyn.com - www.methasyn.com