

CREATING THE RIGHT (GREEN) CHEMISTRY & TECHNOLOGY
CO_2 and Carbon and where it matters

Paul O'Connor
ANTECY – Fruitful Innovations, Hoevelaken, The Netherlands

In the billion year history of our earth a most amazing and unique process has occured of the massive conversion of the plentitude of the present CO_2 in the atmosphere with water into biomass or biomaterials under the influence of solar energy, a process we call: photosynthesis.

Because of this processs the CO_2 in the earth's atmosphere dropped from 20% to ± 250 to 300ppm. Part of these biomaterials over billions of years has been degraded (or "fossilized") and converted into coal, oil and gas, or what we call today fossil fuels.

The accelerated use of these fossil resources over the last 200 years has lead to a sharp increase in CO_2, now already at 400 ppm and also the increase of Methane (CH_4) in the atmosphere, triggering global warming.

It is our responsibility to invent, develop and apply the right green chemistry making use of the available natural resources such as CO_2, water and biomaterials in a way which does not harm the eco-systems of our earth, meaning in a circular and sustainable way,

Examples will be given of innovations in this exciting field over the last 15 years, leading to new technologies, opening up the possibilities for:

1) Advanced materials and chemicals from biomass and biomass waste
2) Fuels and chemicals from CO_2 and water from the open Air, making use of clean renewable energy (Solar, Wind, Hydropower etc).
3) Carbon removal from Fossil fuels

Biography

Paul O' Connor graduated at the Eindhoven University of Technology in Chemical Engineering in 1977. He has been active in heavy oil conversion processes at Shell and at Akzo Nobel in development of refining catalysts. In 2006 he formed BIO^{e}CON, focused on the economical conversion of biomass. BIO^{e}CON has developed several breakthrough concepts, most recently a process towards selective biomass fractionation producing high value materials. In 2010 Paul formed ANTECY aiming to convert renewable energy directly into high-density liquids. ANTECY has developed technology for the capturing of CO2 based on a low cost and environmentally friendly non-amine sorbents.

Presenting author details
Paul O'Connor

Office: +31 332540473 / Mobile +31-641734842
Twitter: https://twitter.com/PaulFruitful
Linked In account: https://www.linkedin.com/in/pauloc/

Extended Abstract (Intro)

In the billion year history of our earth a most amazing and unique process has occured of the massive conversion of the plentitude of the present CO_2 in the atmosphere with water into biomass or biomaterials under the influence of solar energy, a process we call: photosynthesis. Basicly the energy radiated by the sun in the form of photons was stored in the form of carbohydrates which were amongst other utilized by nature to build more complex biomaterials such as algae, trees and ourselves. Because of this processs the CO_2 in the earth's atmosphere dropped from 20% to ± 250 to 300ppm. Part of these biomaterials over billions of years has been degraded (or "fossilized") and converted into coal, oil and gas, or what we call today fossil fuels.

The overall energy efficiency of the foregoing processes are very low: ±1% of solar energy (SE) is converted into biomass by photosynthesis, while only roughly 1% of the biomass (so 0,01%SE) is converted into fossil fuels. The accelerated use of these fossil resources over the last 200 years has lead to a sharp increase in CO_2, now already at 400 ppm and also the increase of Methane (CH_4) in the atmosphere, triggering global warming.

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