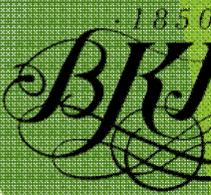


# KLENNEN'15

CO<sub>2</sub> irrigation - change of  
paradigma in CO<sub>2</sub> position ?

March 2015 - Budapest



Speaker: Dr Steier

Department of

# SUNWO Zrt.

## Strategic Energy Technology Development and Supplying Co.



- ▶ Strategic deployment of energy technologies → leader in green technologies
- ▶ Activity focused on innovation, renewable energies and climate mitigation
- ▶ International relationships
- ▶ **Organizer of 22nd International Energy and Innovation Forum**

Cooperating with EU sponsored Climate-KIC program - CO2 recovery -  
in collaboration with Biogas Italia s.r.l. (Faenza, Italy)

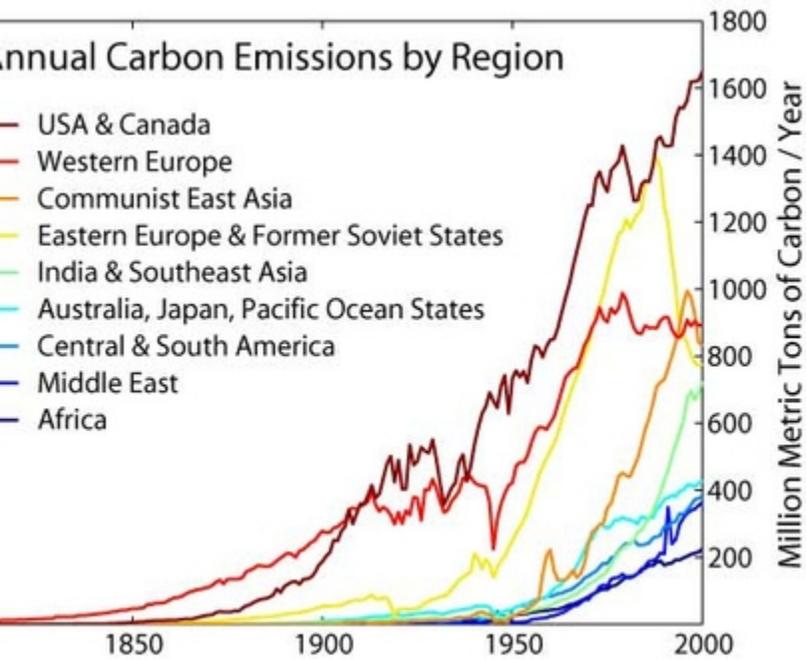
↓  
QuadGeneration (4G technology)

# Dr. József Steier.

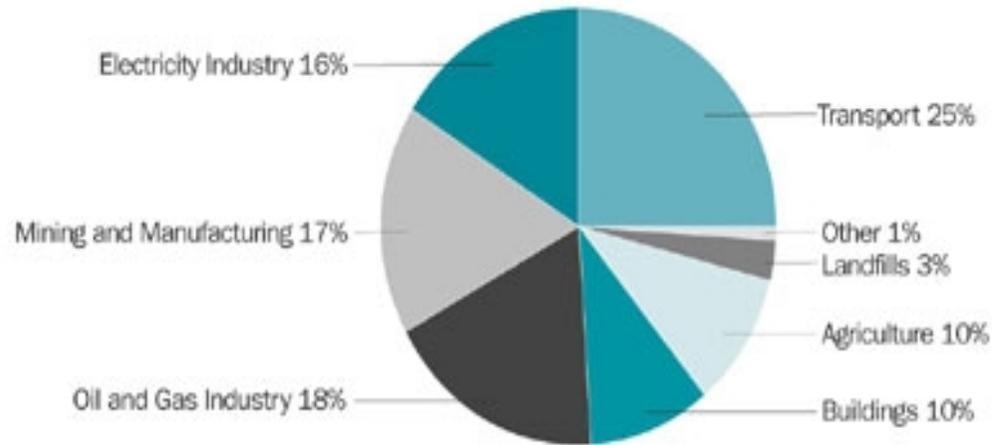
## (Born: Hungary, 1954)

- ▶ Chairman of the Department of Energy of the Budapest Chamber of Commerce and Industry (**BKIK**)
- ▶ Ex-Chairman of the Esztergom County Organisation Board of the Scientific Energy Management Association (**ETE**) and the Energy Strategy Committee
- ▶ Energy and renewable expert of the International Energy and Environmental Protection Association (**IEEPA**)
- ▶ Chairman and managing director of **SUNWO Ztl.** (Strategic Energy Technology Developing and Supply Co.)
- ▶ Honorary Consul of the **Republic of Guinea**

# Increase in carbon dioxide emissions and structure



Greenhouse Gas Emissions by Sector, 2010



- ▶ In 2014 the carbon dioxide emissions growth per annum exceeded 3.2% and in total was 31.6 billion tons. By 2030 (at constant structure), an other increase of 40% expected from the transport

# Greenhouse effect, for which the CO<sub>2</sub> is the main guilty

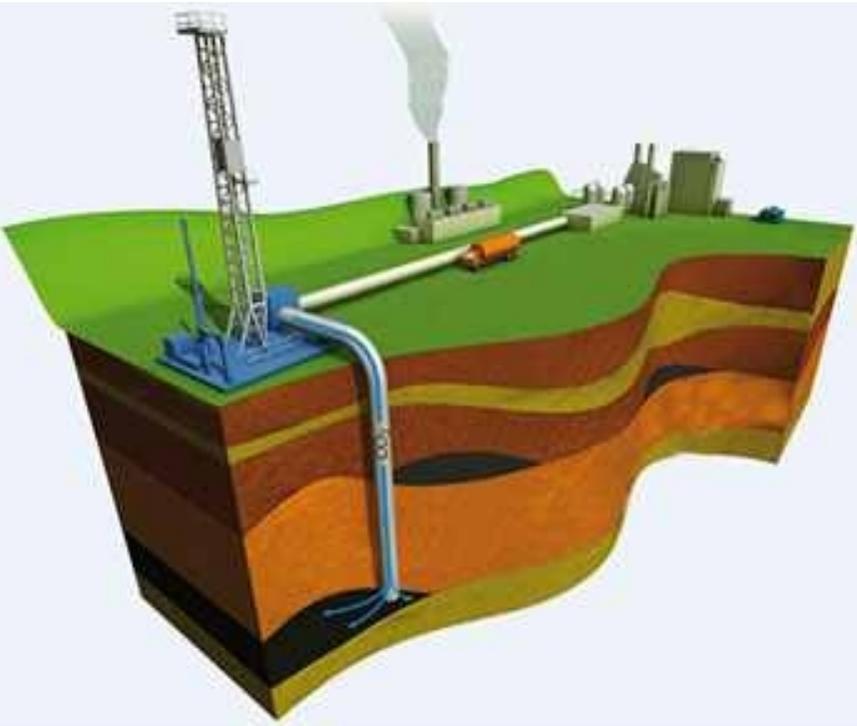


# CO<sub>2</sub> History

- ▶ The amount of carbon dioxide is extremely and continuously varied in the atmosphere throughout the Earth's history
- ▶ **We have had - not even once - higher than 1800 ppm level**
- ▶ At the beginning of the industrial revolution it was as low as 280 ppm
- ▶ Today, it is reported to be in the range of 340-380 ppm
- ▶ Really we can expect unpredictable consequences?

To measure the CO<sub>2</sub> concentration we are using an internationally accepted ppm units. The ppm is parts per million

# Solution I.



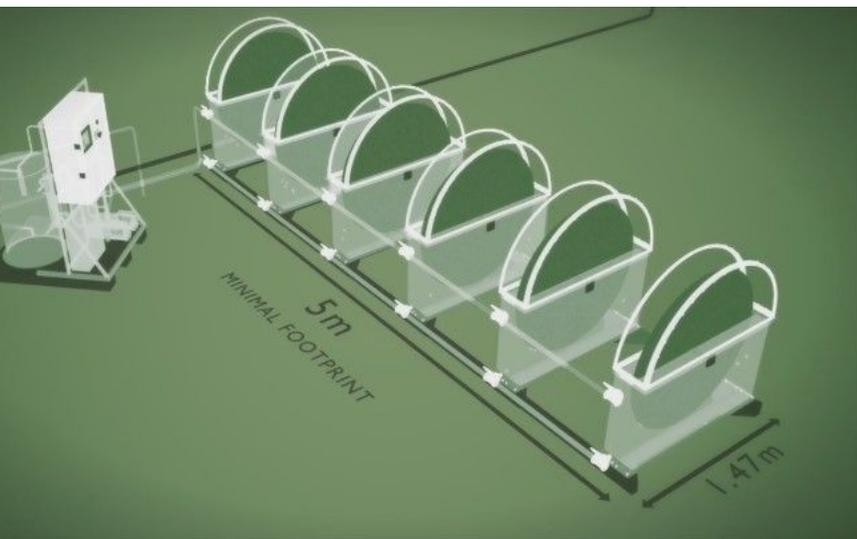
Storing CO<sub>2</sub> (CCS Carbon Capture and Storage)



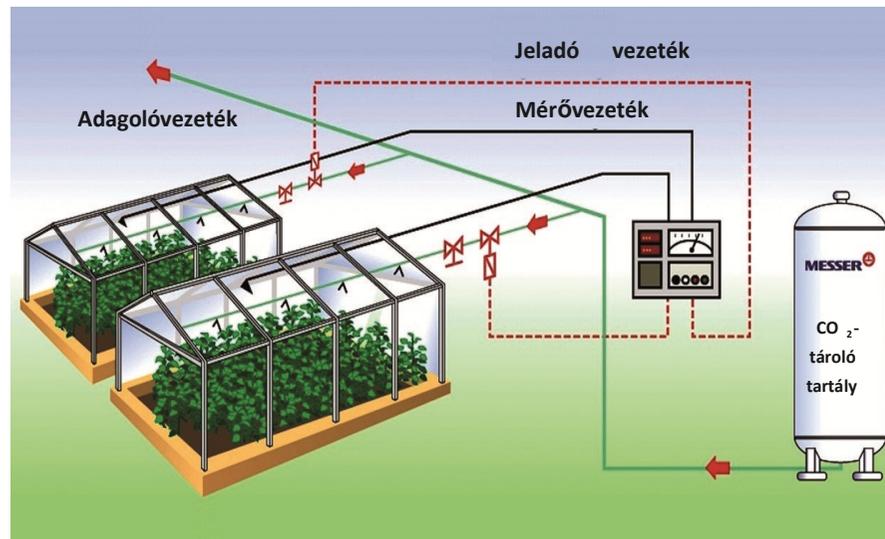
Sequestration of CO<sub>2</sub> through photosynthesis

CO<sub>2</sub> storage postponing the problem to future generations, while the forestation itself will shrink the food production areas.

# Solution II.



ALGADISK



CO<sub>2</sub> fertilization

Brilliant solutions to increase the added value, but not enough to absorb large amounts of carbon dioxide gas

## Solution III.



CO<sub>2</sub> irrigation on corn  
plantation



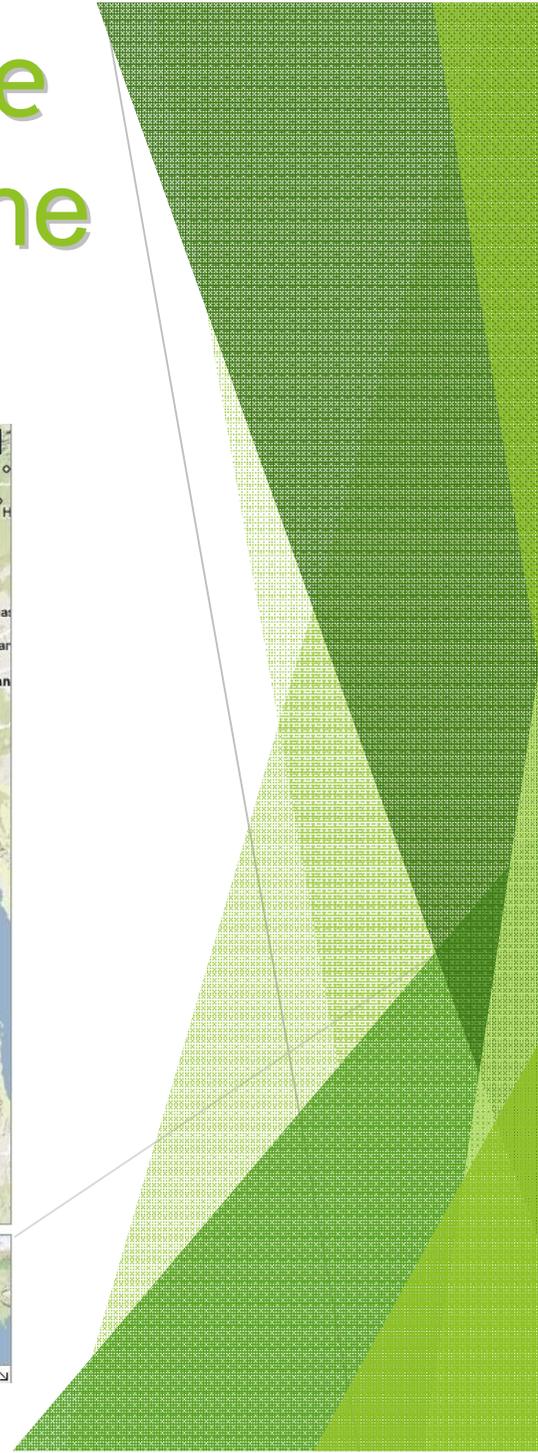
Symbiotic (coffee)  
plantations

In a plantation or even in a symbiotic cultivation the level of CO<sub>2</sub> assimilation can be increased to 4-5 times and reach about 30 -100 tons / ha / year .Currently, the average CO<sub>2</sub> assimilation in Hungary is about 13.6 tons / ha / year.

# CO<sub>2</sub> irrigation technology to be modellised

- ▶ The CHP produced and captured CO<sub>2</sub> is purified , cooled and stored by CCS (carbon capture storage).
- ▶ The CO<sub>2</sub> trough a new pipeline should be delivered to the plantation where special drainage pipes are lying under the crops and can bubble the CO<sub>2</sub> trough the soil.
- ▶ The management of the process is controlled remotely from a software which allows to maintain an optimum condition (in accordance with the curve of CO<sub>2</sub> assimilation of the specific plant ) continuously monitoring the humidity, temperature and light, measuring the intensity of illumination .
- ▶ With this method it is possible to increase the large scale absorption of CO<sub>2</sub> by 4-5 times, so that the cell mass (and yield of course ) can be increased by approximately 30%

# CO2 irrigation can be a tool to the Green Sahara project and key to the progressive climate mitigation

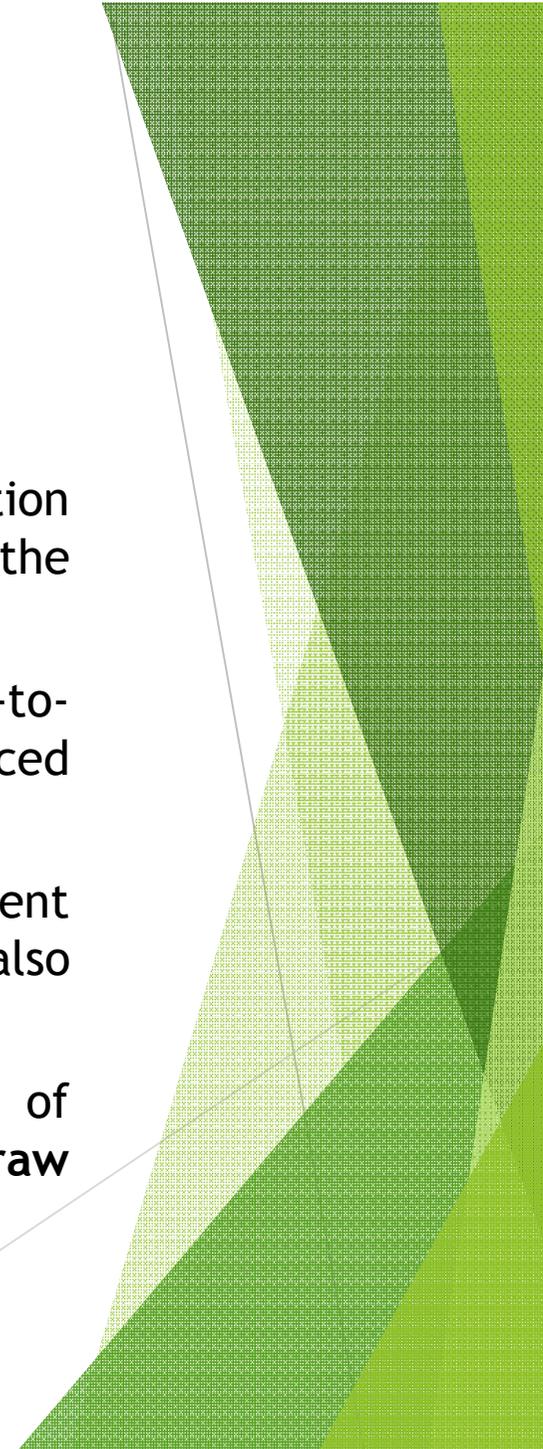


# CO<sub>2</sub> irrigation can be a tool to the Green Sahara project and key to the progressive climate mitigation

- ▶ From 9 million km<sup>2</sup> of the Sahara Desert about one third can be occupied by symbiotic plantations , which use a C4 photosynthetic hibrid (Paulownia Smaragdifa) Thus we can transform about 4 billion tons of CO<sub>2</sub>, while improving the supply of food and feedstock in the world
- ▶ Promoting eco-forests (C4 type trees for rehabilitation the rain forest) and the cultivation of trees in the unused , degradated areas is estimated to lead to the seizure of an other 4 billion tons of CO<sub>2</sub>, obtaining also as important materials as oxygen and wood besides other externalias .
- ▶ If the world 161 million hectares - which are used to grow corn - is performing CO<sub>2</sub> irrigation technology we will consume additional 1.61 billion tonnes of CO<sub>2</sub>
- ▶ **Just from above solutions a 10 billions tons of CO<sub>2</sub> can support a Progressive Climate Mitigation as a raw-material!**

# Ecological paradigm shift?

- ▶ The reduction in CO<sub>2</sub> emissions by 2030, and carbon dioxide planned irrigation together provide a new solution for humanity, which puts the emphasis on the CO<sub>2</sub> processing instead of placing additional restrictions;
- ▶ The resulting amount of biomass would increase further the biogas and bio-to-liquid (BTL) technologies, further reducing the global amount of CO<sub>2</sub> produced by fossil fuels;
- ▶ The evolving CO<sub>2</sub> pipeline systems generate extraordinary investment (strengthening the green economy) in agriculture and drainage works also offer new investment occasions worldwide;
- ▶ Carbon irrigation and related technologies are opening new dimension of industrial agriculture, where the **carbon dioxide can become a useful raw material.**



# What are we expecting from KLENEN - KIC InnoEnergy?

- ▶ To provide a finance to development in pilot scale the CO<sub>2</sub> irrigation system - innovative technology
- ▶ Expected budget:
  - ✓ Elaboration of CO<sub>2</sub> irrigation technology → 2.000 €
  - ✓ Modelization CO<sub>2</sub> irrigation system → 5.000 €
  - ✓ Patenting and know-how control and preparation → 2.000 €
  - ✓ International cooperation → 1.000 €

→ Approximate budget: 10.000 € to speed-up the large scale CO<sub>2</sub> irrigation project

# Thanks for your attention!

## INTERNATIONAL ENERGY CONSERVATION ENVIRONMENTAL PROTECTION ASSOCIATION



Cordially Invite

**Dr. Jozsef Steier**



to become an  
**Energy and Renewables  
Expert**

For developing social energy conservation and environmental protection, promoting environment and economical sustainable development, according to the need of organization's growth and specialized development, we honorably invite Dr. Jozsef Steier, to help in the guidance for our work in the Fields of Strategy promotion of global green economy, sustainable Development of industries and enterprises, effective utilization of traditional energy, efficient development of new energies and renewable resources, environmental protection, improvement of industry cluster and cyclic economy of energy conservation and environmental protection and promotion of sustainable development.



INTERNATIONAL ENERGY CONSERVATION  
ENVIRONMENTAL PROTECTION ASSOCIATION

August 24th, 2010

IEEPA COUNCIL

IEEPA pays attention to and researches the global green industry economy. All the work is based on UN world sustainable development concept with the impetus of energy conservation, environmental protection and new energy industry for developing countries and areas, especially for the development of the Chinese market. It assists to promote industry programs and construction modification, increase energy efficiency, popularize new technologies and new materials, develop efficient clean energies and energy conserving environmental protection techniques and builds industry exemplary systems with systematic solar development. IEEPA is an organization improving regional cyclic economy and industry cluster, advancing green economic strategy continuously, which is engaged in sustainable development of environment of economy and develops all-directional economic collaborations in relevant fields including UN, international organizations, governments, and enterprises.

Under the framework of global green economic progress and UN sustainable development, we make efficient and constructive achievements and services as the helping hand of industry development, the important component of multilateral investment and cooperation as well as popularization and application system of technology and project, and for our council members as well. We are not only the researcher and supporter for overall solutions of sustainable development of countries, industries and enterprises, but also the coordination organization of international green industry development, supplier of resource integration in countries all over the world, undertaker of special projects or assignment implementation, organizer and participant for international cooperation platform. Meanwhile, we are still devoted to becoming supporter and consultant of governments for industry development and economy growth, policy and decision-making, work schemes and action plans with collaboration mechanisms.

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Stratégiai Energia Technológiai Fejlesztő és Szolgáltató