

# BIOECONOMY - MACRO AND MICRO APPROACHES

*Challenges in implementing the bioeconomy strategy*

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# **BIOECONOMY as a solution of the main global challenges:**

- **Energy security,**
- **Food security,**
- **Climate change,**
- **Growing world population.**

**Separation of economic growth from degradation of natural environment**

# Biobased Economy / Circular Economy

Fossil route:  
1.000.000 year

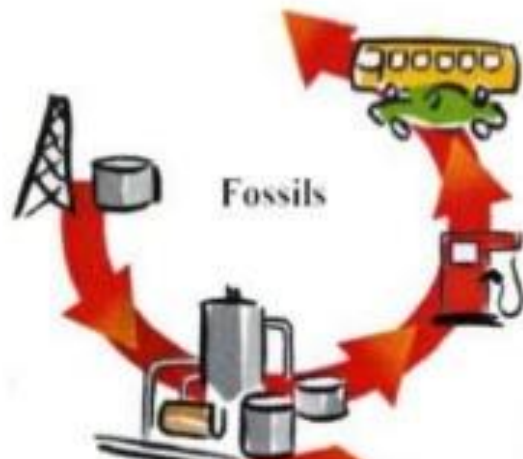


Oil & gas  
Refinery

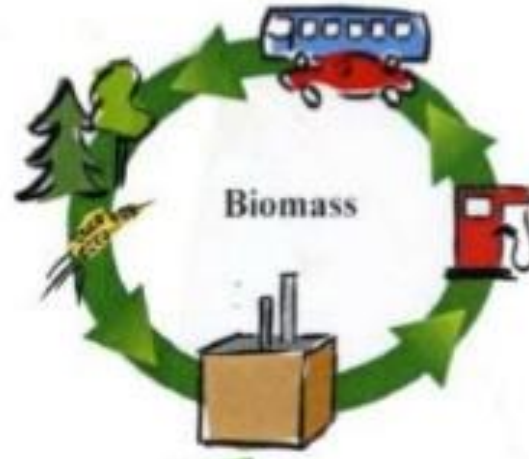


Polymers or  
chemicals

**BROKEN CIRCLE**



**CLOSED CIRCLE**



Bio route:  
1 to 2 year

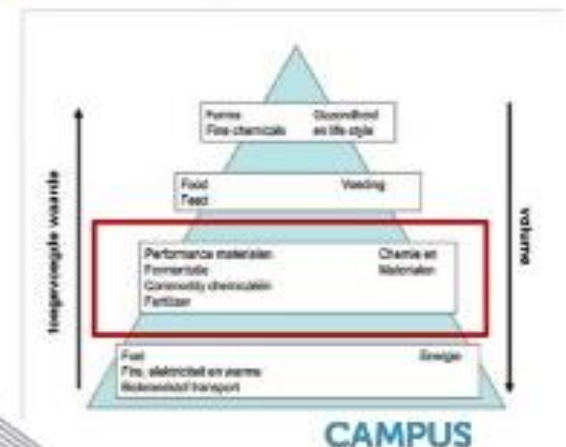


Agro products  
Bio refinery  
Modification



Polymers of  
chemicals

Gradual shift towards sustainable systems



Accelerating Biobased Business

# Global – macro perspective

**Changing the competition for:**

**FOOD, LAND AND WATER**

**C02 Energy Neutrality???**



**Preassure to Soil**

**Food prices**

**Land Grabs**

**Attempts to gain access to lands to grow large quantities of biomass, as well as for food, are resulting in market speculation and investment in land - “land grabs” around the world.**

**International Land Coalition indicates about 44% of recent land grabs have been for the purpose of growing bioenergy crops.**

# Estimates of Biomass Availability are Grossly Overestimated

**“Abandoned cropland”** includes large areas of land where **tropical forests were destroyed** for plantations and cattle ranching and where soil degradation and water depletion now make agriculture difficult.

References to large areas of available **“marginal lands”** is fictional

as it is based on devaluation of the many uses of lands by indigenous peoples, peasant farmers, pastoralists, and for biodiversity, water and soil protection.

# Intensification of Agriculture and GMO

One possible result of limited access to new land is that existing managed lands will be **used more intensively, with increased inputs of capital, labor and materials such as fertilizers.**

# CARBON NEUTRALITY OF BIO BASED ENERGY

If bioenergy crops displace forest or  
grassland



the **carbon released** from soils and vegetation,  
plus **lost future sequestration**, generates **carbon debt**,  
which counts against the carbon the crops absorb.



# DEFORESTATION

**Large-scale deforestation in support of biofuels production, either directly or indirectly.**

**The direct link** between deforestation and biofuels is when forests are cleared to establish biofuels crops (Fargione *et al.*, 2008).

**The indirect link** is when biofuels production moves on to croplands or pastures, and causes new forest clearing to relocate agriculture (Searchinger *et al.*, 2008).

**Industrial Tree Plantation - Impacts On Biodiversity**

# **REGIONAL APPROACH**

## **SUSTAINABLE PERSPECTIVES WITHIN BIOECONOMY**

a responsible bio-economy must initially address  
the sustainable use of resources

# **THE CONCEPT OF SUSTAINABLE BIOMASS REGIONS**

**A regional/local approach can take into account  
divergent natural or social circumstances and needs**

**A regionally differentiated strategy **to prevent  
environmental harm and to facilitate social and  
economic growth****

# REGIONAL CHALLENGES

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From a long-term perspective, the “glocal” nature of bioeconomy—global and local at the same time

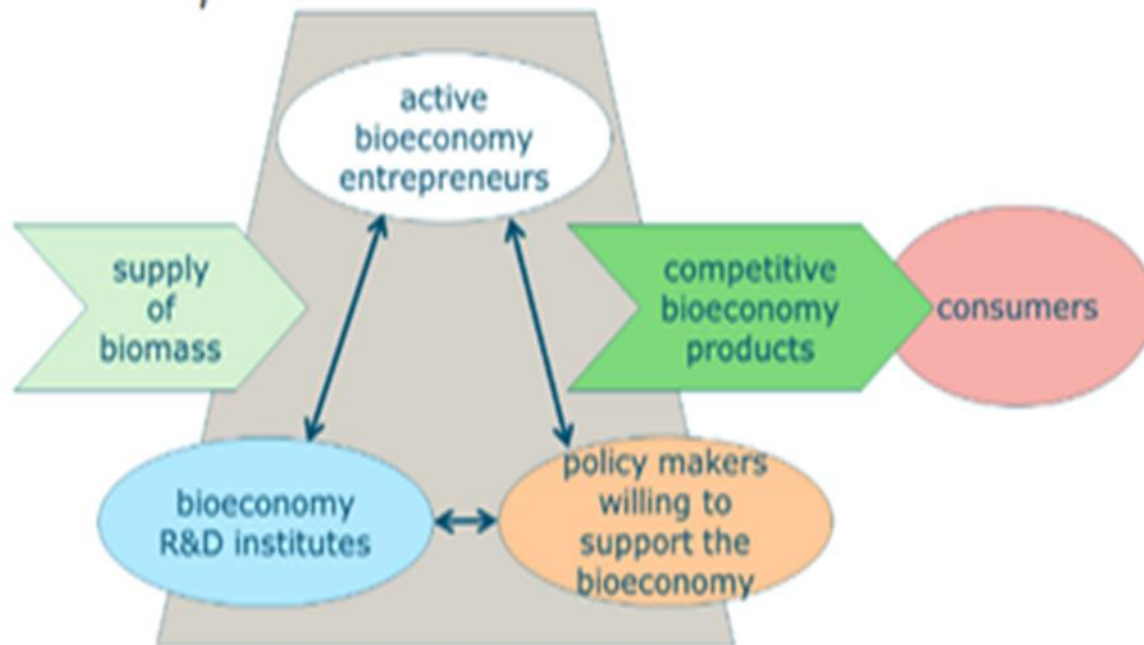
**Opens up new business opportunities for rural regions and entrepreneurs**

**New production systems across stagnating rural regions whose populations are dispersed**



# REGIONAL CHALLENGES

The importance of **local knowledge** enhancing local capabilities, while also accommodating diversity and complexity.



**Figure 1** Conceptual model for the analysis of the strategy of a bioeconomy cluster

# REGIONAL CHALLENGES

A bioeconomy is well **suited to peripheral** areas because the industries entering new regions tend to relate to pre-existing industries

The relatively high cost of biomass **transport** means that the majority of the bioeconomy production, processing and transportation is likely to emerge in rural areas.

# ENERGY BALANCE OF RURAL REGIONS

Those activities and places that produce more energy than they consume will thus be better off relative to other activities and places.

**In the petro-economy**, most rural areas (especially agricultural areas) **used more energy than they produced**, and rising energy costs hurt them.

**In the bioeconomy**, where rural areas will produce more energy than they consume, **they become the beneficiaries**.

# ENERGY BALANCE OF RURAL REGIONS

In the bioeconomy we will **replace petroleum** (as well as coal and natural gas) **with biomass-based** material.

Thus in the bioeconomy, the **agricultural economics issues will be much the same as in the petro-economy**



# **SUSTAINABLE WAY FOR BIOECONOMY**

**Regional dimension**

**Use of wastes**

**Waste gases to biomass and products**

**Gas fermentation offers an opportunity to utilise resources as diverse as industrial wastes, and municipal solid waste for the production of fuels and chemicals**

# CO<sub>2</sub>- MATERIAL FOR BIORAFINERY

Four conceptual models for **CO<sub>2</sub> biosequestration** and the synthesis of biobased products, as well as **an integrated CO<sub>2</sub> biorefinery** model, are proposed.

Biological CO<sub>2</sub> sequestration methods using microorganisms as catalysts are cost effective and could lead to important breakthroughs in CO<sub>2</sub> capture and utilization (CCU) methods





## *A Bioeconomy Initiative in Czech Republic*

<http://bei.jcu.cz/>



Thank you for your attention