

# Scientific and political background and History of Bioeconomy



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# Bioeconomy



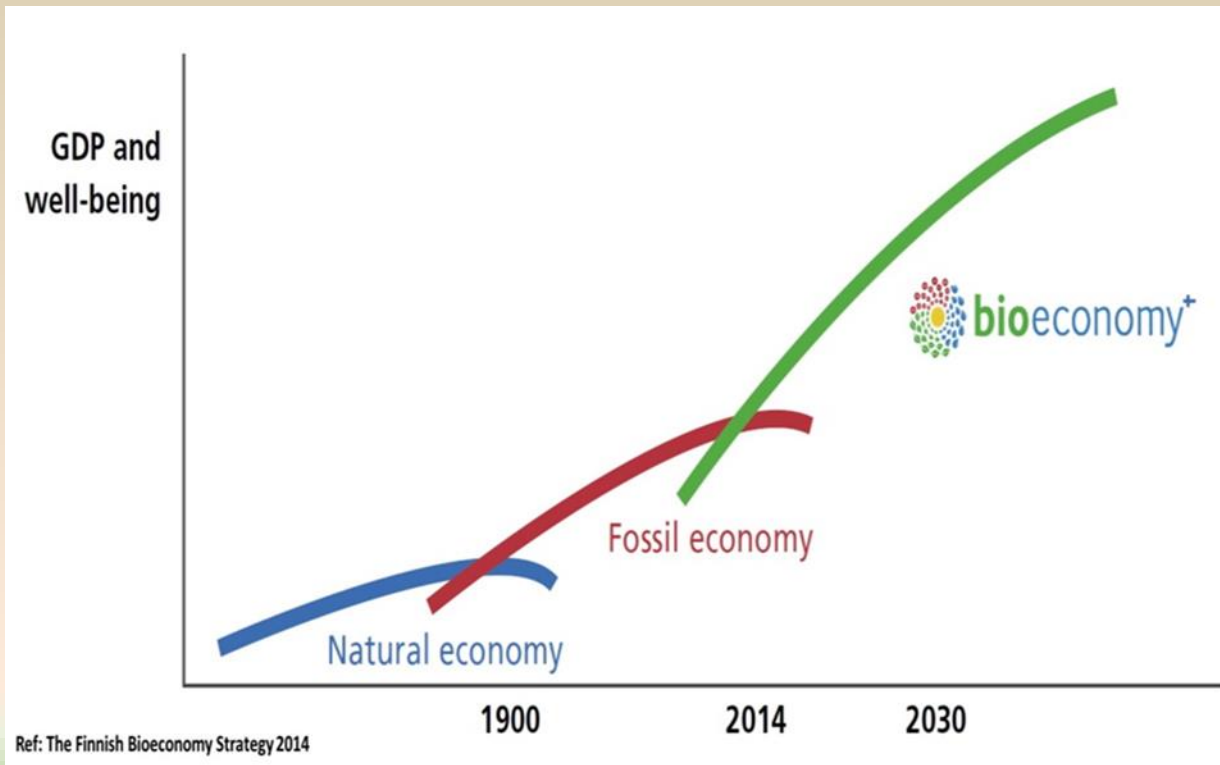
a new theoretical and analytical **concept**

a dynamically developing **sector of the modern economy.**

- Theoretical background
- Promises
- Risks
- Sustainable way
- Political support
- Practical examples

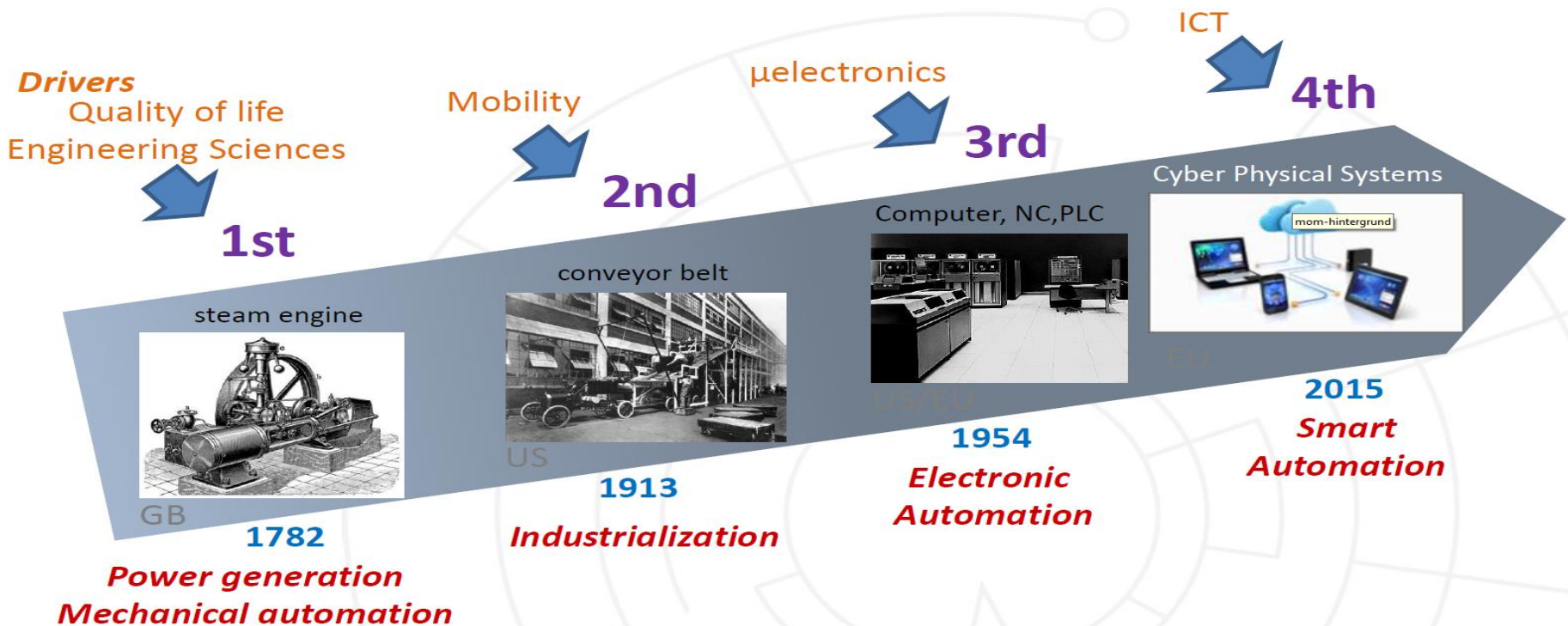
Bioeconomy means 'biologisation' of the economy

**Fossil resources are replaced by bio-based substitutes**, not only for **energy**, but also for **material, clothing, plastic, and chemical applications**.



**Bioeconomy** Based on new biology cuts across sectors can be compared with **industrial revolution 4.0**

## The 4th Industrial Revolution - „Industry 4.0“







Bioeconomy is the challenge is to make better use of biomass with new technologies



## „GREENING“ of Economic Thinking

I. Environmental and Ecological Economics (1980,1990)

Sustainable **Development**

II. Green Economy-(2008)

Green **growth**

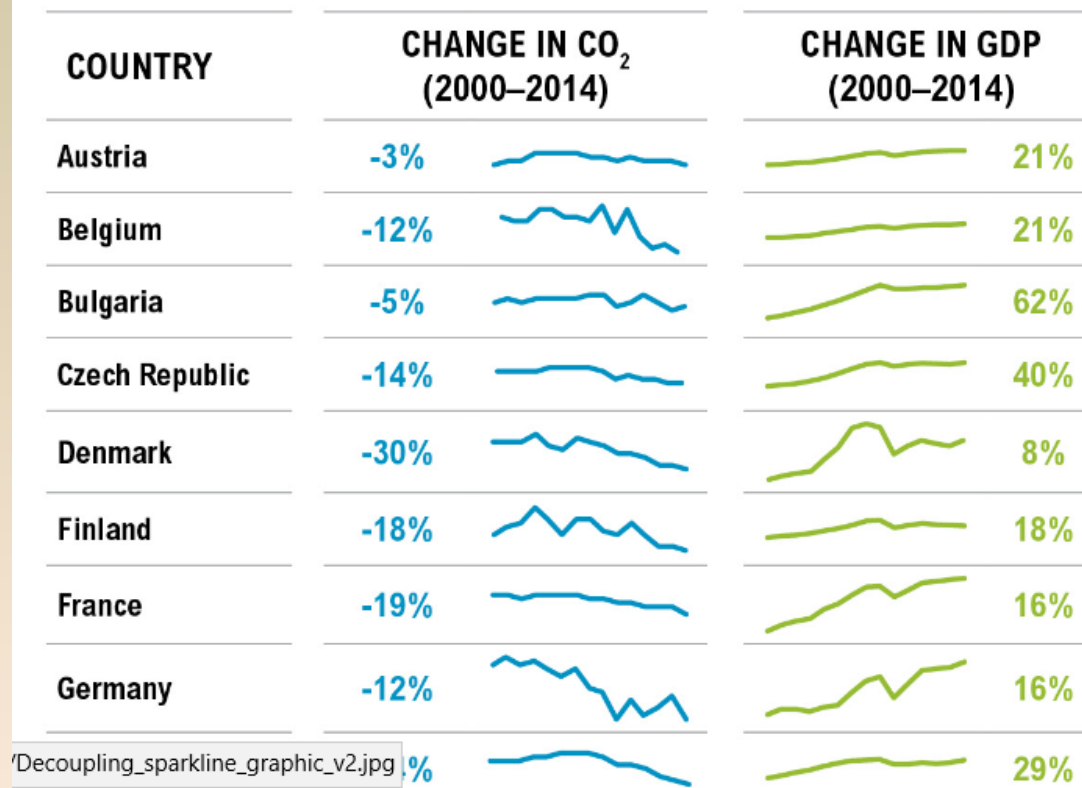
III. Bioeconomy (2012)- part of Green Economy using bio resources  
crops, forests, algae, agricultural and food wastes

Sustainable **growth**

Decoupling of economic growth from environmental  
degradation

## The Roads to Decoupling: 21 Countries Are Reducing Carbon Emissions While Growing GDP

Since 2000, More Than 20 Countries Have Reduced Annual GHG Emissions While Growing Their Economies



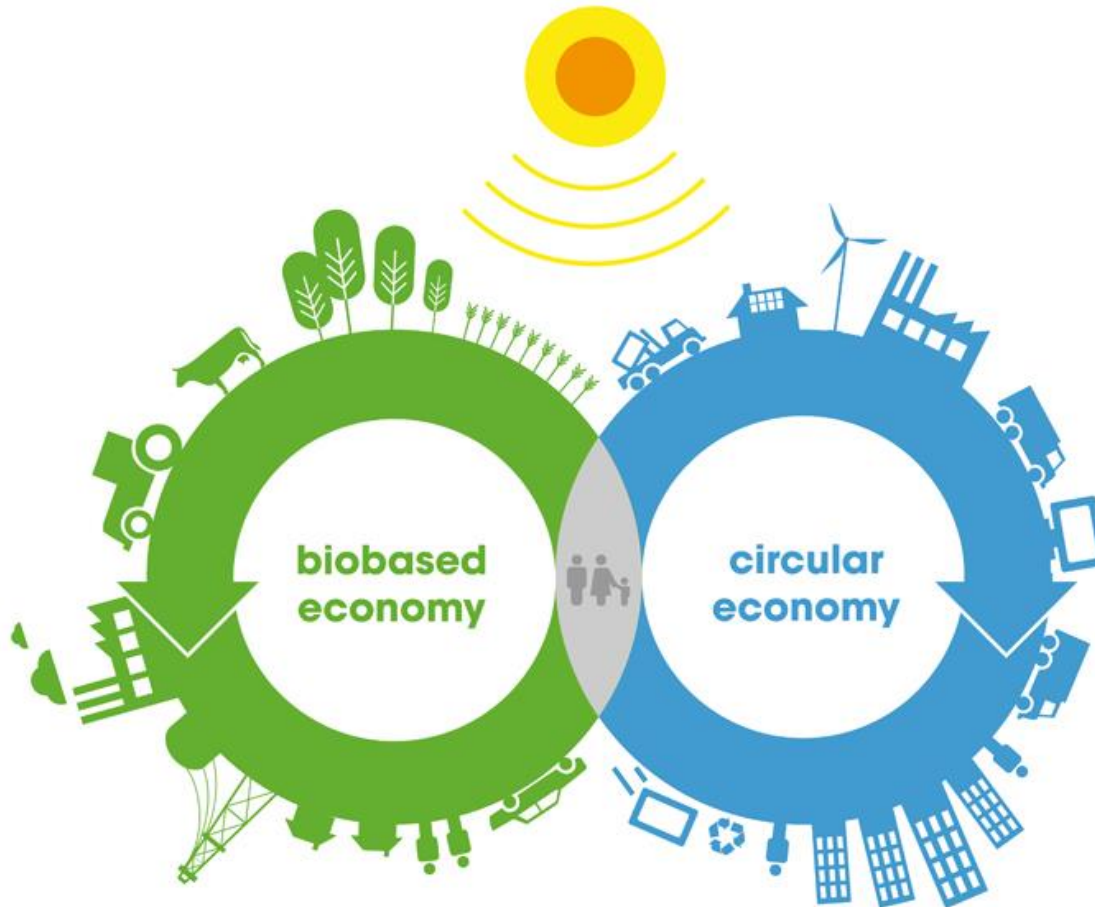
<http://www.wri.org/blog/2016/04/roads-decoupling-21-countries-are-reducing-carbon-emissions-while-growing-gdp>



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

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

# BIO economy



## Biobased Economy / Circular Economy

Fossil route:  
1.000.000 year

Oil & gas  
Refinery

Polymers or  
chemicals

**BROKEN CIRCLE**



**CLOSED CIRCLE**



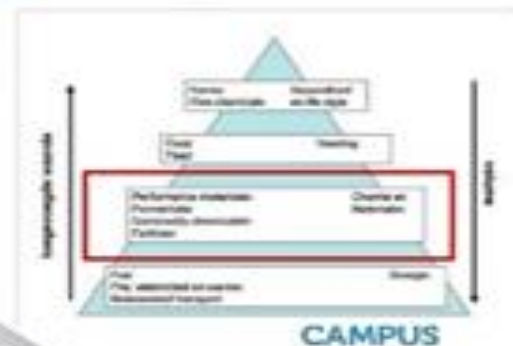
Bio route:  
1 to 2 year

Agro products  
Bio refinery  
Modification

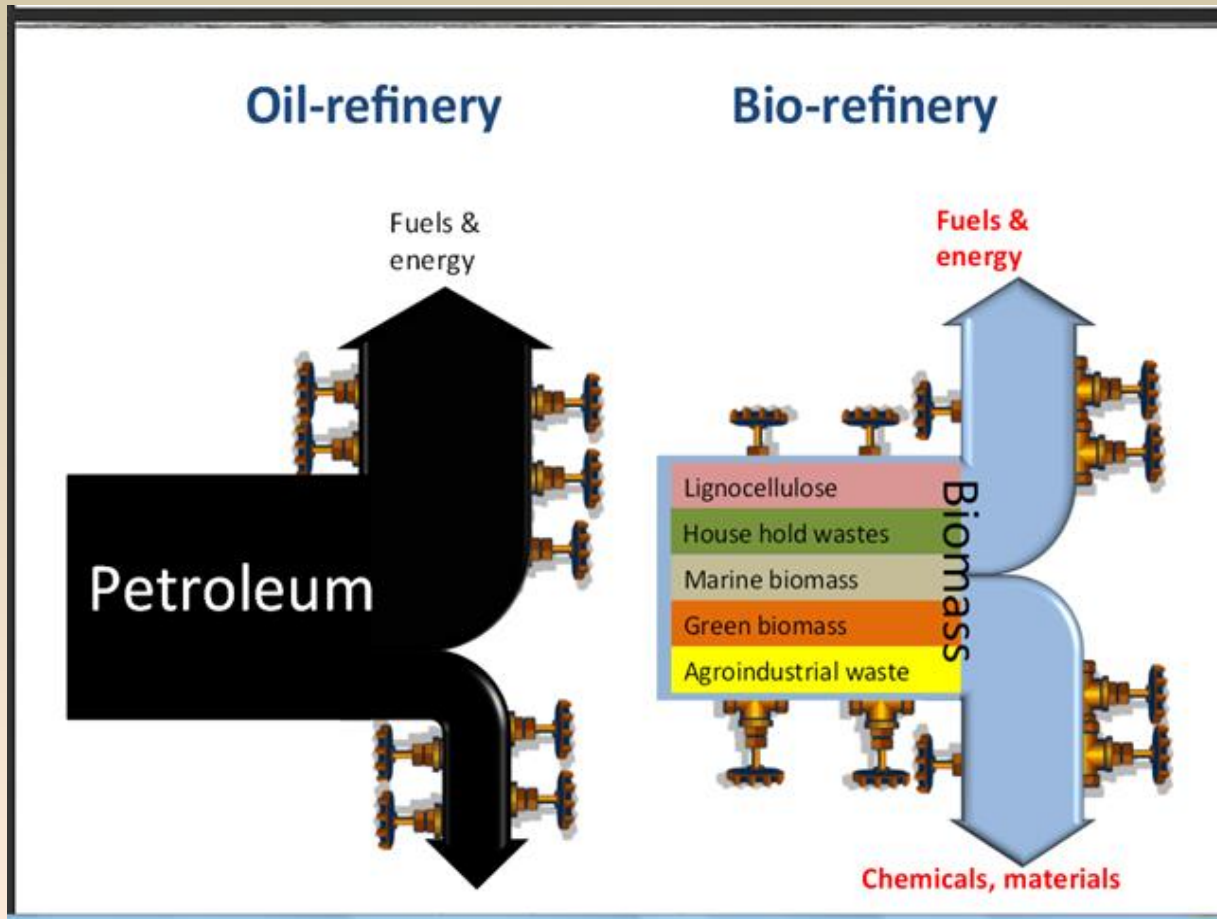
Polymers of  
chemicals



Accelerating Biobased Business



CAMPUS



## **MAIN POTENTIAL RISKS OF GLOBAL BIOECONOMY**

**Biomass is renewable, but the soil on which it grows is limited**

**Changing the competition for:**

**FOOD, LAND AND WATER**

**C02 Energy Neutrality???**

**Pressure 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.**

**BIOTECH GM CROPS**

**Biotech/GM Crops Surge to a New Peak of 185.1 Million Hectares in 2016**

The 110-fold increase in the global adoption rate of biotech crops in 21 years of commercialization – growing from 1.7 million hectares in 1996 to 185.1 million hectares in 2016.

**In 2016, the leading countries growing biotech crops continued to be represented by the United States, Brazil, Argentina, Canada and India.** Combined, these five countries planted 91% of the global biotech crop area.

**Four countries in Europe — Spain, Portugal, Czech Republic Slovakia — grew more than 136,000 hectares of biotech maize in 2016, an increase of 17% from 2015, reflecting EU's need for insect resistant maize**

## 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**

## **SUSTAINABLE WAY OF BIOECONOMY**

- **Scale - Regional dimension**
- **Resources- Wastes, Algay, CO2**
- **Demand site of economy**
- **Circular economy**



# BIOECONOMY FOR RURAL REGIONS

## ENERGY BALANCE

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.**

## REGIONAL CHALLENGES

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

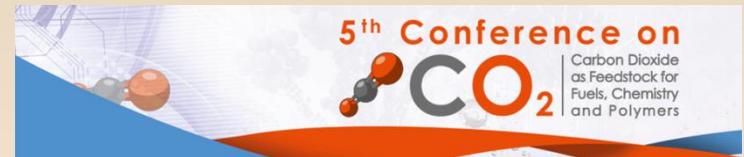
**Opens up new business opportunities for rural regions and entrepreneurs**

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

## WASTES AS A SOURCE FOR BIOECONOMY

- Agricultural wastes as straw etc.
- Food industry wastes
- Municipal wastes
- Cleaning plant sediments
- **Alga biomass and the industrialisation of photosynthesis**

### 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.

## Policy Support

**Appropriate policies** is **needed to avoid the risks of unfavourable developments** such as deforestation, competition between food and fuel, conflicts about land use

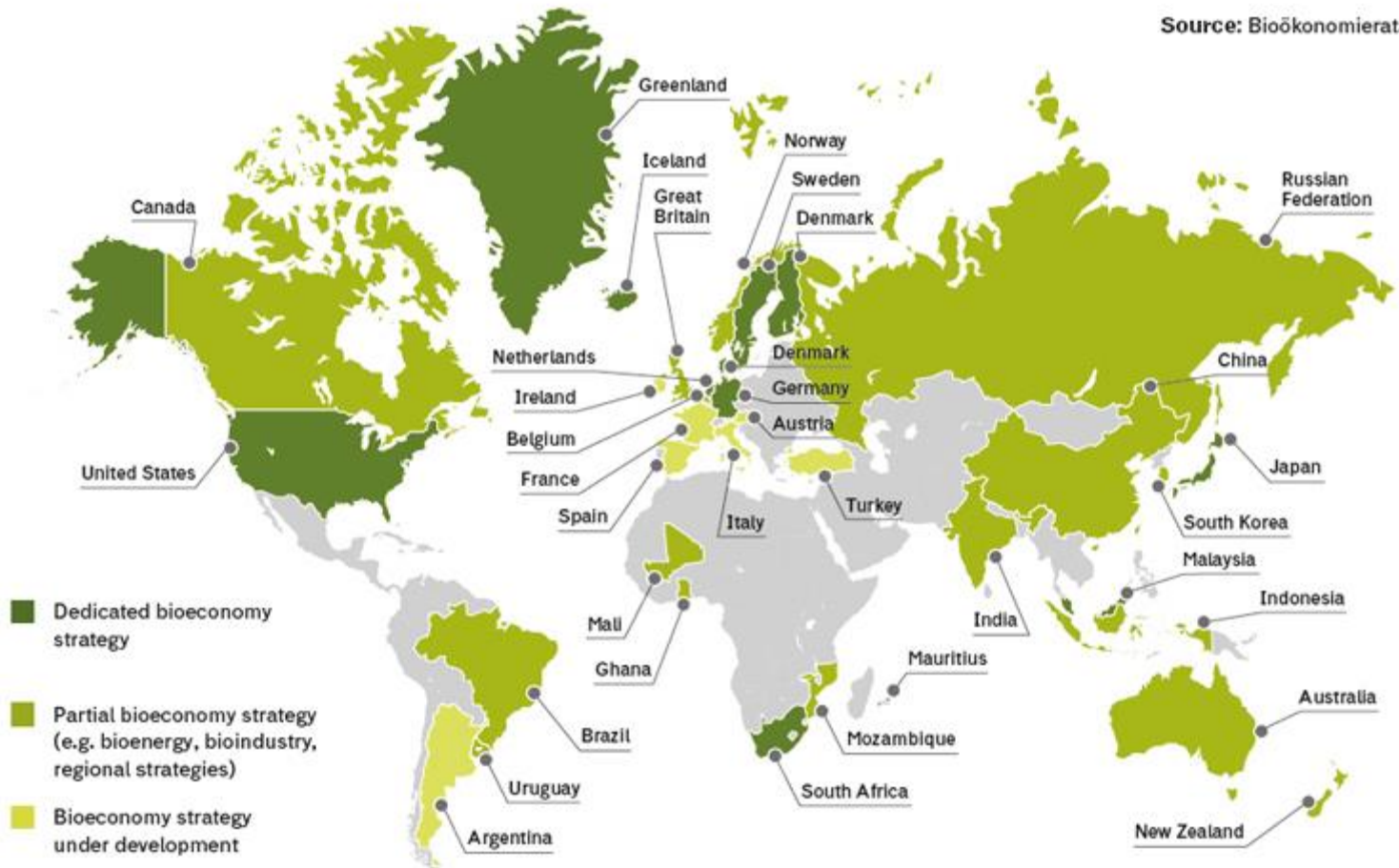
**The use of sustainable biomass in the chemicals and energy sector is usually more expensive than the use of fossil**

Present low price of oil is not supportive for replacing it by new resources

Temporary reduction of the price difference between fossil and biobased resources to spark the transition to the bioeconomy.

## International Bioeconomy Policy

Source: Bioökonomierat.



# Practical examples



The world first 100 % bio-PET Coca-Cola bottles in Milan Expo 2015 year.

PlantBottle packaging uses patented technology that converts natural sugars found in plants into the ingredients for making PET plastic bottles, fully recyclable

Today, PlantBottle packaging accounts for 30 percent of the Company's packaging volume in North America and 7 percent globally, some 6 billion bottles annually, making The Coca-Cola Company a large bioplastics end user.



## Bioplastic AWARDS

### World First 100% Bio-PET Polyester Shirts

in Taiwan 2016 demonstrated the world first 100 % bio-polyester shirt made entirely from renewable raw materials

This development of 100 %bio PET plastics to textile application showed the tremendous potentials **for changing the textile industry to use more sustainable bio-materials**

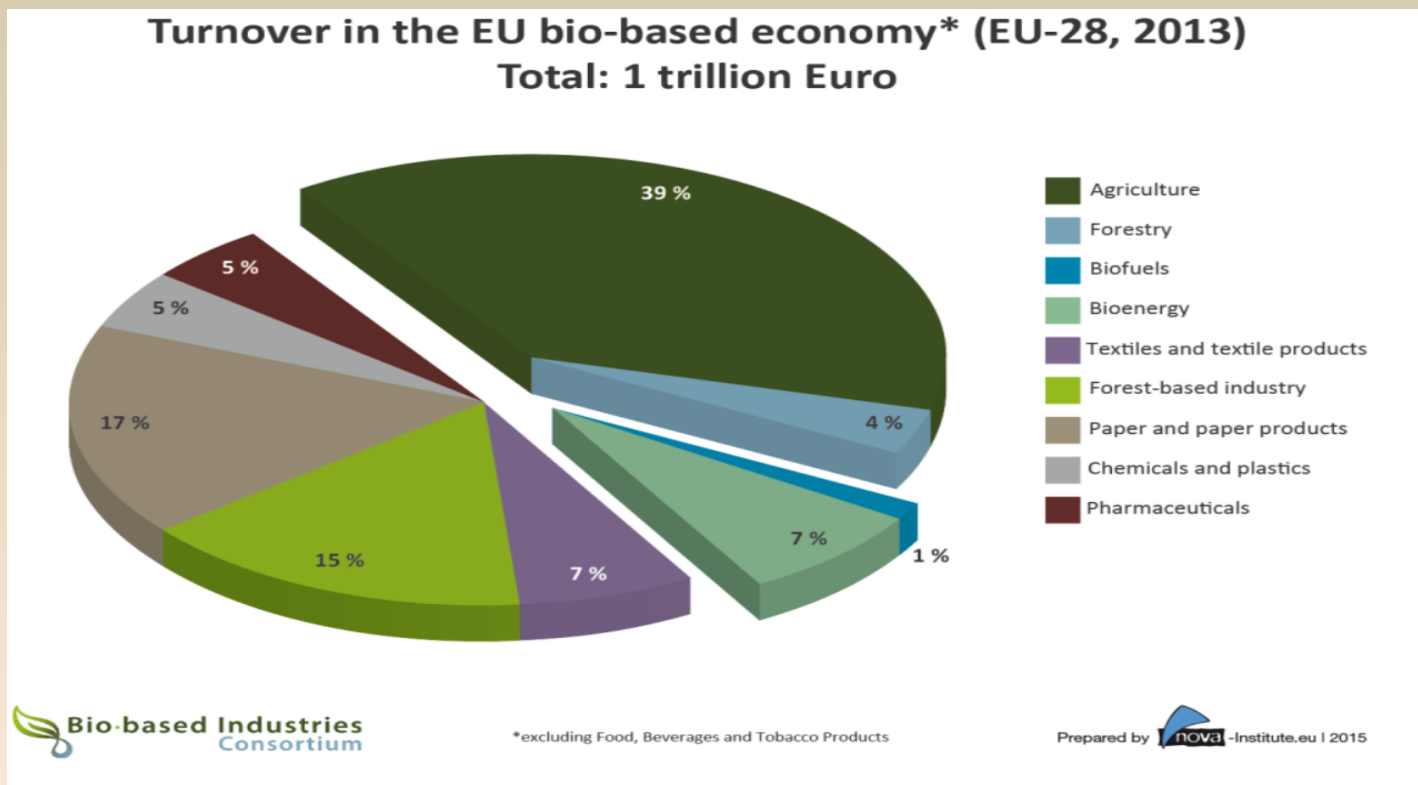


**Candybar-wrapper made from (waste potato) starch based film**

Bioplastic AWARDS

[http://www.bioplasticsmagazine.com/en/events/bioplastics\\_award\\_2016.php](http://www.bioplasticsmagazine.com/en/events/bioplastics_award_2016.php)[http://www.bioplasticsmagazine.com/en/events/bioplastics\\_award\\_2016.php](http://www.bioplasticsmagazine.com/en/events/bioplastics_award_2016.php)

## European Bioeconomy in Figures



### Authors

<http://biconsortium.eu/library/bioeconomy-figures>

**Europe has limited land availability for growing biomass, and ambitious bioeconomy plans.**

**The total supply of sustainable biomass in 2030 may be enough to fulfill the demand of a 10% biobased economy.**

The EU is one region that will probably **depend on the world market** to supply its bioeconomy with biomass in the future.

## **Question of DEMAND**

**our patterns and amount of consumption**

Thank you for your attention

