



Óbudai
EGYETEM
Universitas Budensis



KELETI KÁROLY
GAZDASÁGI KAR



Introduction with concept of BIOECONOMY

assist. prof., Dr.oec. Dina Popluga

"New Challenges of the 21st Century"

3rd International Week

Budapest, November 11, 2015

Latvia (*Latvija*)



Latvia

- Area – 64 589 km²
- Population – 1 997 500
- Population density – 34.3/km²
- GDP_{per capita} – 16 836 \$
- Highest point – 311 m (Gaiziņš)
- Agrarian secotr:
 - 29% of total land are used in agriculture
 - 45% of total land are forests



Hungary

- Area – 93 030 km²
- Population – 9 979 000
- Poplulation density – 107.2/km²
- GDP_{per capita} – 18 738 \$
- Highest point – 1 014 m (Kékestető)
- Agrarian secotr:
 - 57% of total land are used in agriculture
 - 21% of total land are forests





Nature

Latvia can truly be viewed as one huge nature park – white sandy beaches, green forests, clean air and water, and a pristine ecosystem.

Latvia is among the greenest countries in the world.



Sports





Rīga

Population – 643,368

The capital of Latvia, founded in 1201.
Home to $\frac{1}{3}$ of Latvia's population.
Financial and economic hub.
Popular tourist destination.

Jelgava

- Population – 65 597
- In 2015 – 750th anniversary



Jelgava – city of students

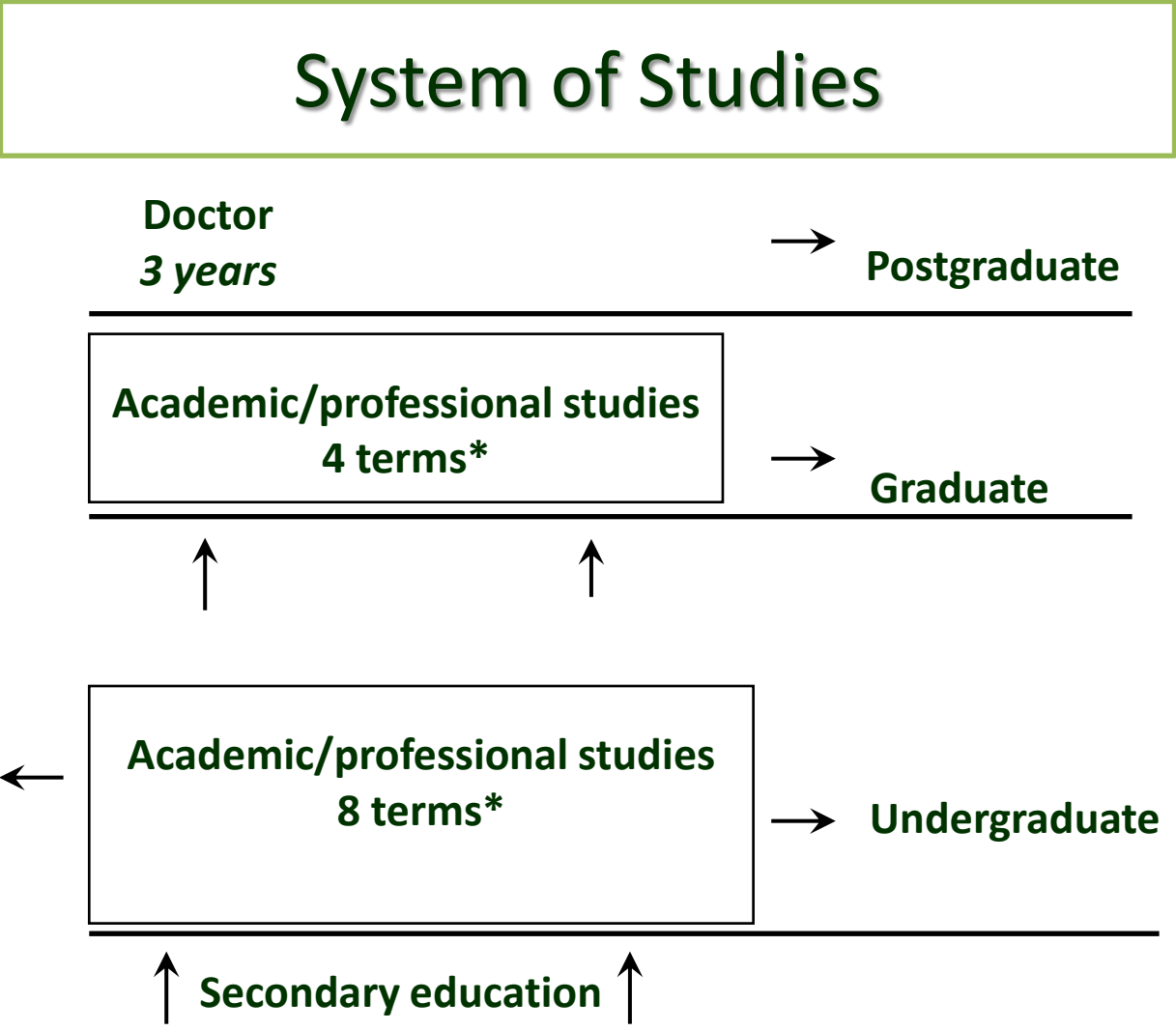




Jelgava Palace – Largest and outstanding architectural pearl of the Baltic during 18th century

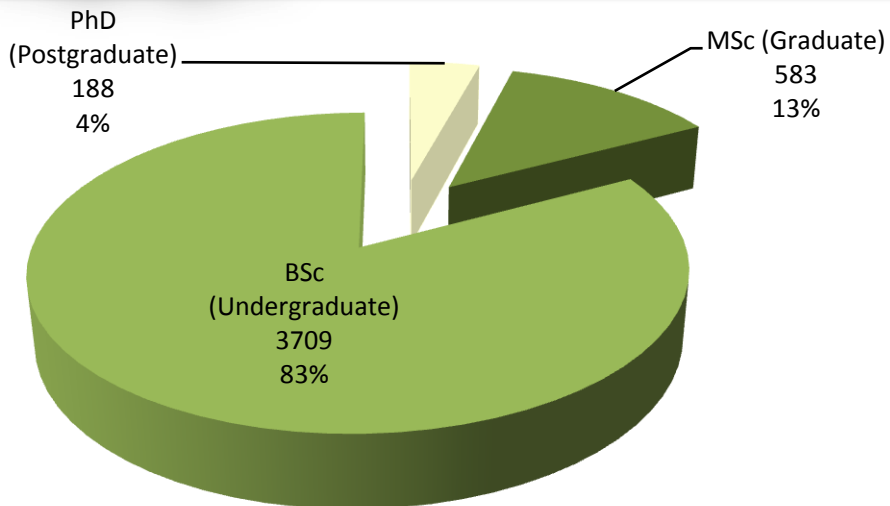
- 1265** The Livonia Order master Mondernos Conrade starts to built the Jelgava Palace
- 1737** The palace is blown up by the order of Ernst Johan Biron (Duke of Courland and Semigallia)
- 1738** The building of the new Jelgava Palace is started by the Italian architect Franchesko Bartolomeo Rastrelli
- 1738-1795** The palace is the residence of the Duke of Courland and Semigallia
- 1919** The army of Bermont – Avalon burns down the palace
- 1939** The Latvian Agriculture Academy starts the academic work in the palace
- 1991** Academy gets a new status - Latvia University of Agriculture
- 2008** the Jelgava Palace celebrated its 270th anniversary
- 2013** University celebrated 150 years of higher agricultural education in Latvia



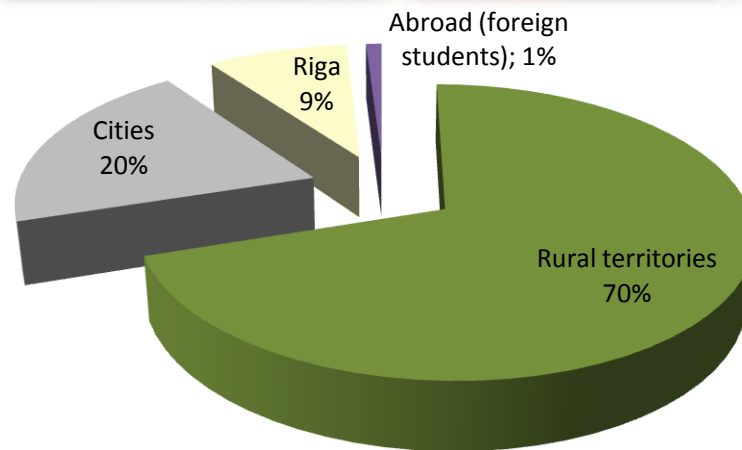




EDUCATION



Number of students (Total - 4480)*

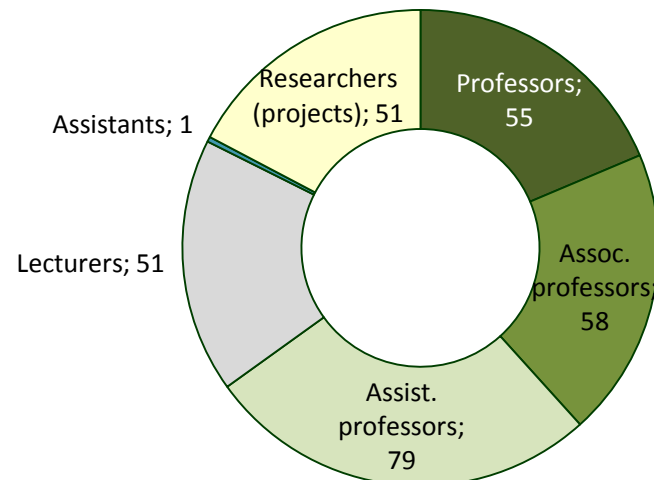


Distribution of students by place of residence (without PhD)*

* Data by October 1, 2014



EDUCATION



Academic Staff (elected)*

Staff of LUA (total number – 938) from which academic staff (elected) - 295

Study Programmes

Undergraduate	27
Graduate	23
Higher professional (2 nd level)	1
Postgraduate	13
Total	64



* Data by October 1, 2014



Faculty of Agriculture

Study areas

- Horticulture
- Crop Cultivation
- Animal Husbandry
- Entrepreneurship in Agriculture



Forest Faculty

Study areas

- Forestry
- Forest Exploitation
- Wood Processing



Faculty of Veterinary Medicine

Study areas

- Veterinary medicine
- Food hygiene



Faculty of Food Technology

Study areas

- Food technology
- Food science
- Hotel and restaurant management



Faculty of Engineering

Engineering Science Study areas

- Automobile transport
- Agricultural machinery
- Agricultural energetics



Pedagogy Study areas

- Home environment in education
- Teacher of professional education
 - Pedagogy
 - Career consultant



Faculty of Rural Engineering

Study areas

- Environmental engineering and water management
- Land use planning
- Civil engineering
- Landscape architecture
- Environmental science





Faculty of Economics and Social Development

Study areas

- Economics
- Public administration
- Project management
- Business management
- Finance and credit
- External relations of organizations
- Regional development and management
- Marketing and agrarian economics
- Accounting and accounting theory
- Sociology of organizations and public administration
- Accountancy, control and analysis of business functions



Faculty of Information Technologies

Study areas

- Programming
- Information technologies
- Computer control and computer science





INTERNATIONAL COOPERATION

Latvia University of Agriculture

Education. Science. Culture



The most valuable mobility and exchange programmes are:

- Erasmus+ programme – 23 countries, 101 partner universities
- Erasmus Intensive Programmes, Summer schools
- NOVA-BOVA network (various intensive courses and mobility)
- Nord+ – express and long term mobilities; intensive courses
- DAAD – exchange programme with Germany
- Different individual projects and programmes run by the faculties
- Cooperation in frames of agreements (31) with 15 countries worldwide
- Member of 29 international organisations and networks

Erasmus Student Network

Starting spring 2014 Latvia University of Agriculture has become the second University to receive the ESN network status.





INTERNATIONAL COOPERATION



Exchange students can choose between 200 courses from 8 faculties.
Application procedure – online!

International students are welcome to study

2 full time bachelor level programmes:

- **Economics**
- Home Environment in Education

11 full time master level programmes:

- Information Technologies
- Landscape Architecture
- Land Management
- Agricultural Engineering
- Pedagogy
- Career Counsellor
- Wood Materials and Technology
- Forest Ecology and Silviculture
- Food Science
- **Business Management**
- **Sociology of Organizations and Public Administration**

8 full time Phd level programmes:

- Agriculture
- Agricultural Engineering
- **Agricultural and Regional Economics**
- Food Science
- Environmental Engineering
- Water Engineering
- Landscape Architecture
- Pedagogy





CULTURE – Student Life



Amateur art clusters

Student Fraternities

- «Ventonia»
- «Fraternitas Imantica»
- «Varaviksne»

Student Association

- «Salkone»

Student Self-Government



- Men's choir «Ozols»;
- Folk dance groups «Kalve» and «Skalbe»
- Jelgava Student theater
- Female chorus «Liepa»
- Mixed chorus «Riti»



Sports Activities

Basketball; Volleyball; Football; Ping-pong; Light athletics; Mounted sport; Mountain tourism; Orientation sport; Weight lifting; Athletics; Shooting; Swimming; Chess; Judo; Aerobics; Handball; Free style and Greek-Roman wrestling





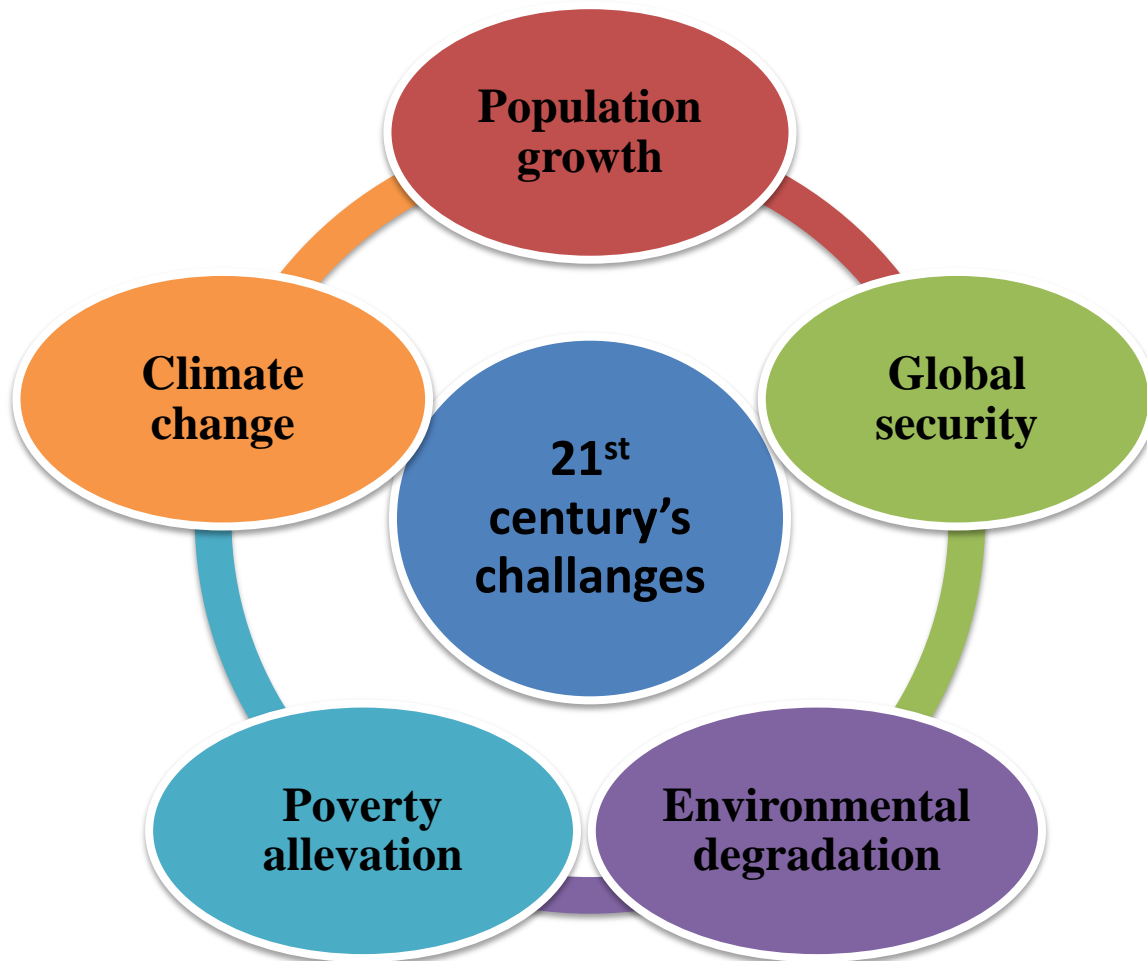
Latvia University of Agriculture
Education. Science. Culture





Now about bioeconomy...

Climate change – one of 21st century's challenges



What is climate change?

In the world:

- Glaciers are melting ...
- Sea water level are rising ...
- Extreame and untypical weather events ...

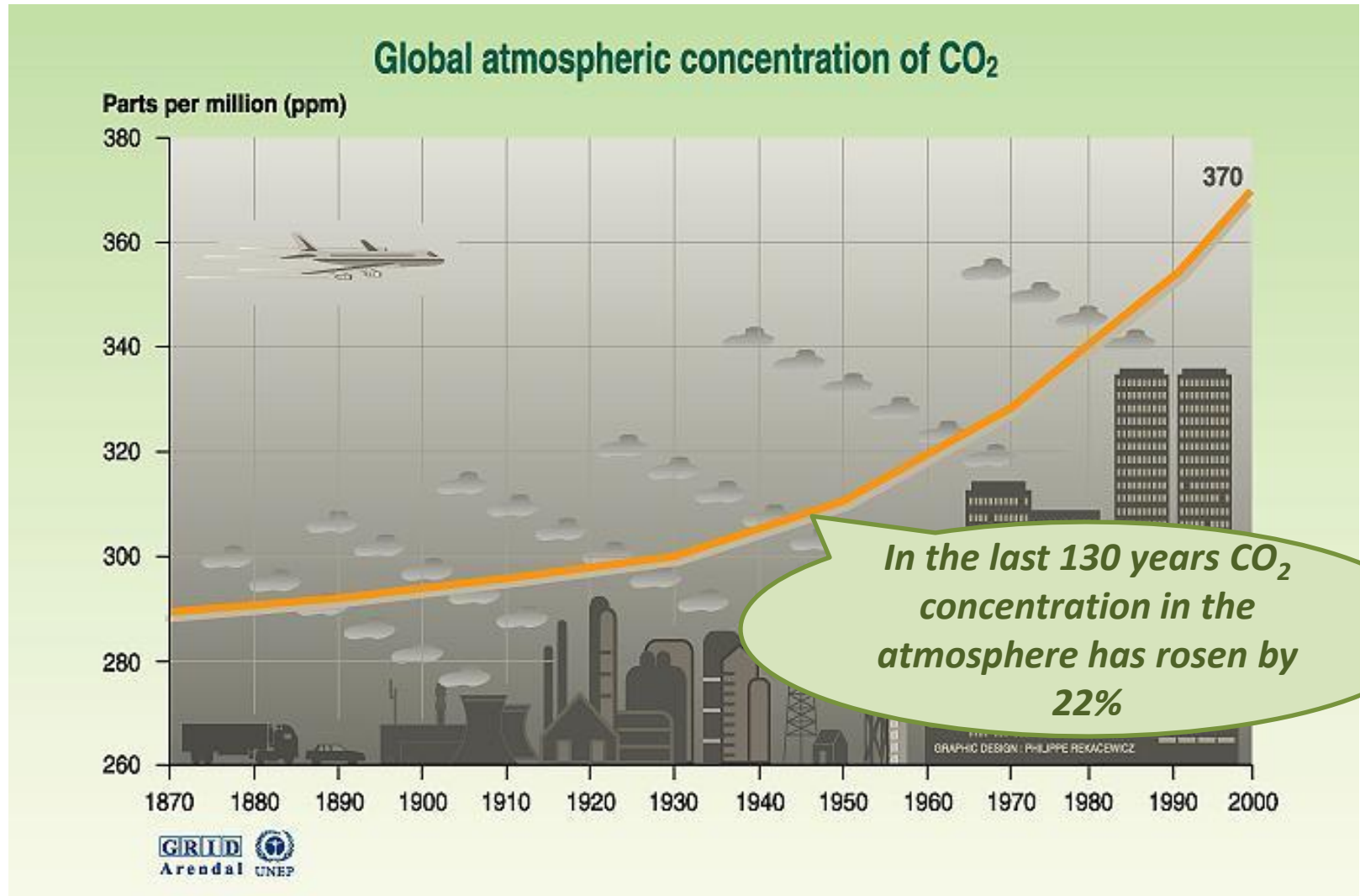


In Latvia:

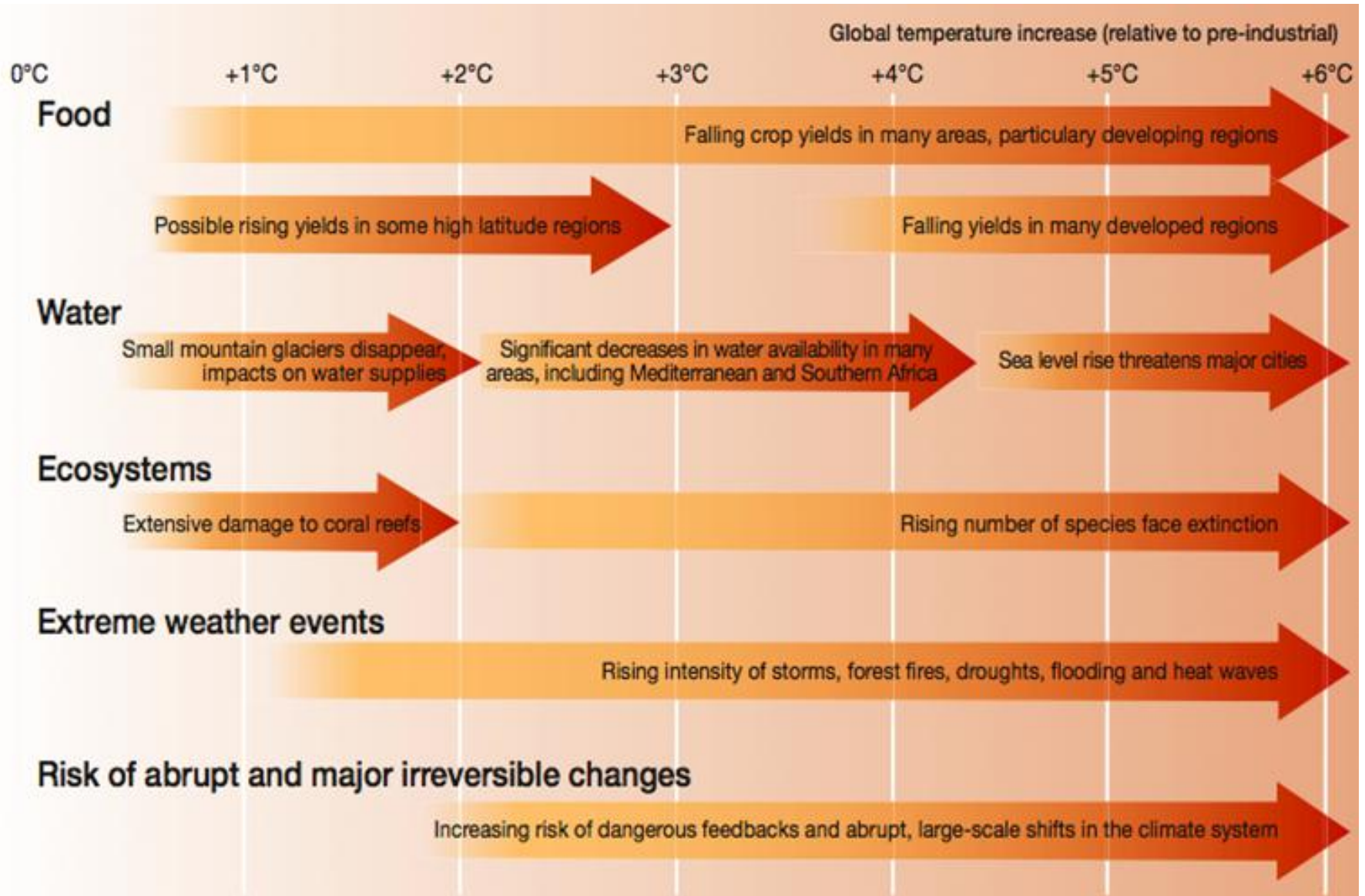
- Winters are becoming warmer, with few of snow but lot of rain ...
- Every year spring starts earlier ...
- Extreame temperature fluctuation in summer ...
- Tornado ...



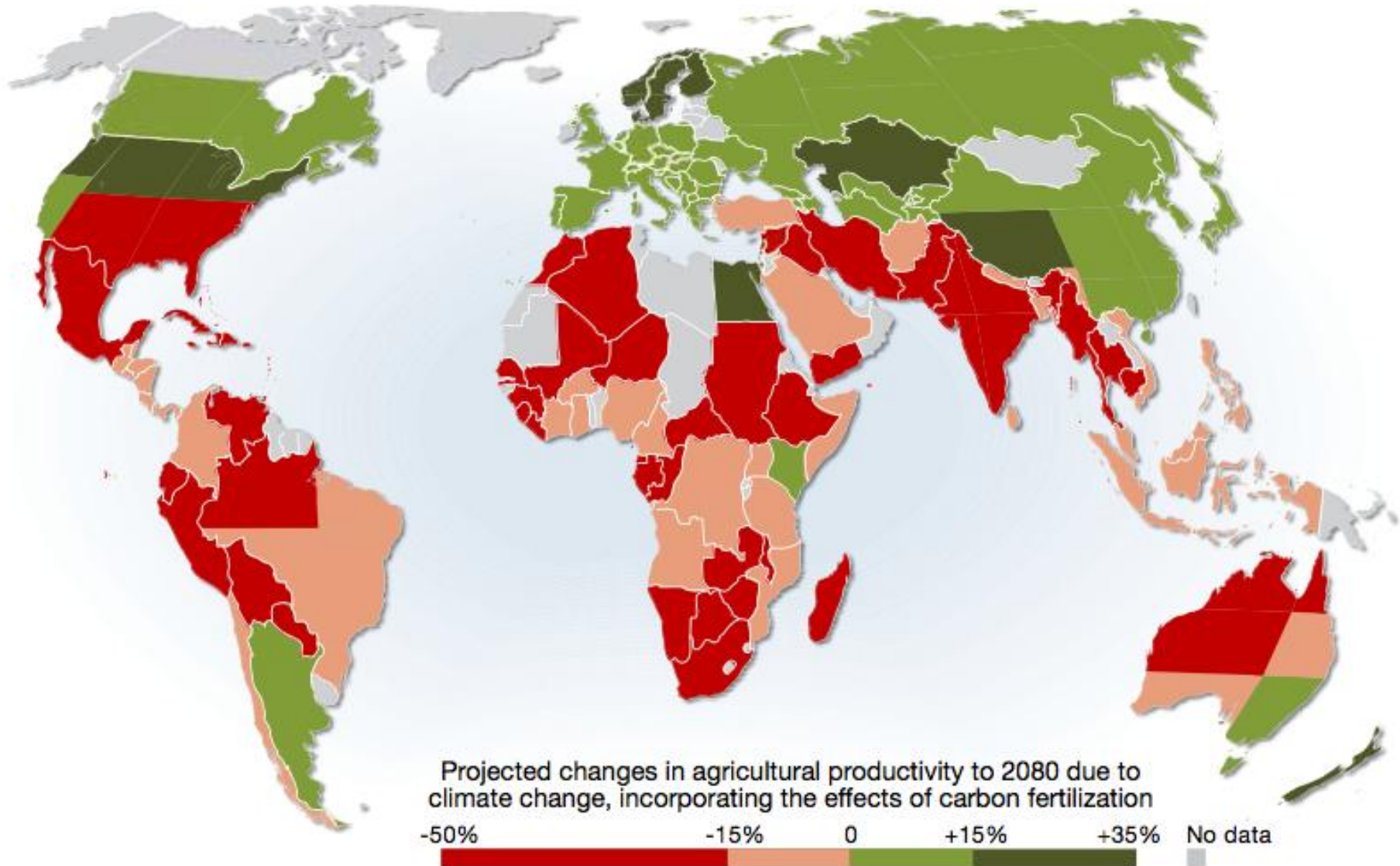
Climate change – caused by the increased concentration of carbon dioxide (CO₂) in the atmosphere



Projected impacts of climate change



Projected changes in agricultural productivity to 2080 due to climate change

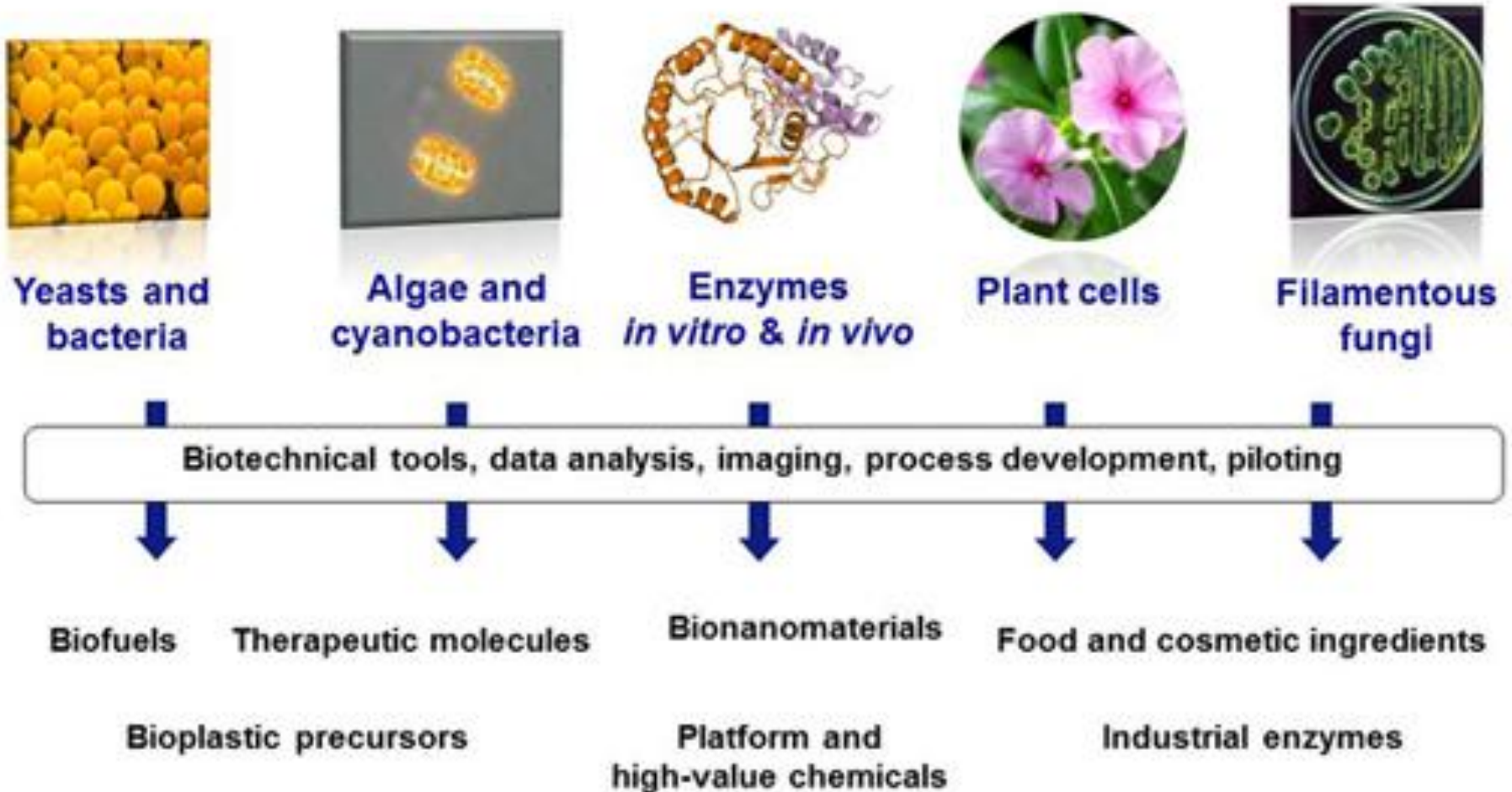


Solutions

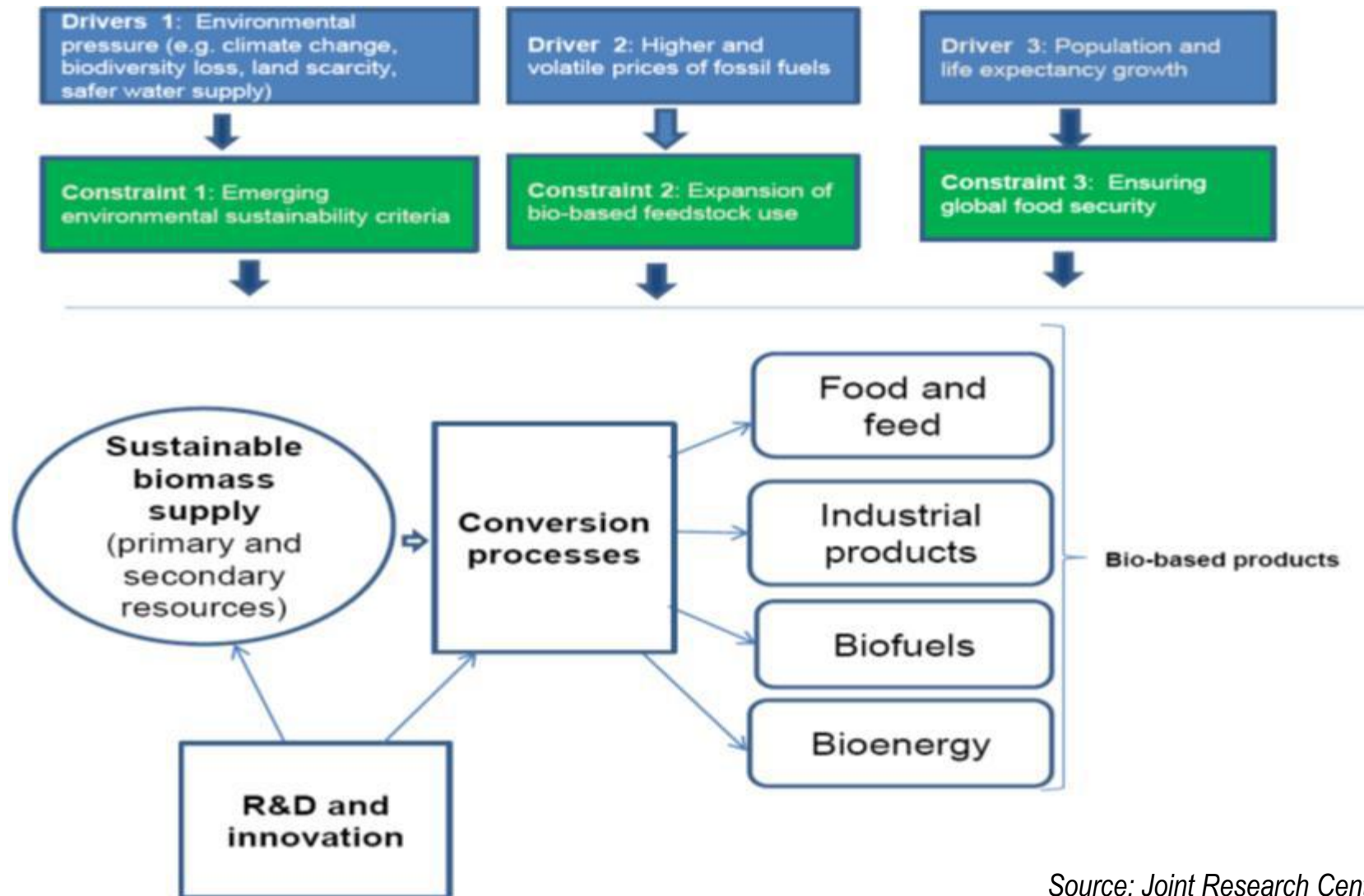
- Development of bioeconomy.
- Mitigation of greenhouse gas emissions.
- Replacement of fossil energy with renewable energy.
- Energy efficiency.



Biotechnology and environment protection



Global drivers and constraints conductive to bioeconomy transition



Term “bioeconomy”

“A bio-based economy integrates the full range of natural and renewable biological resources - land and sea resources, biodiversity and biological materials (plant, animal and microbial), through to the processing and the consumption of these bio-resources”

European Commission, 2012



European
Commission

Current areas of bioeconomy

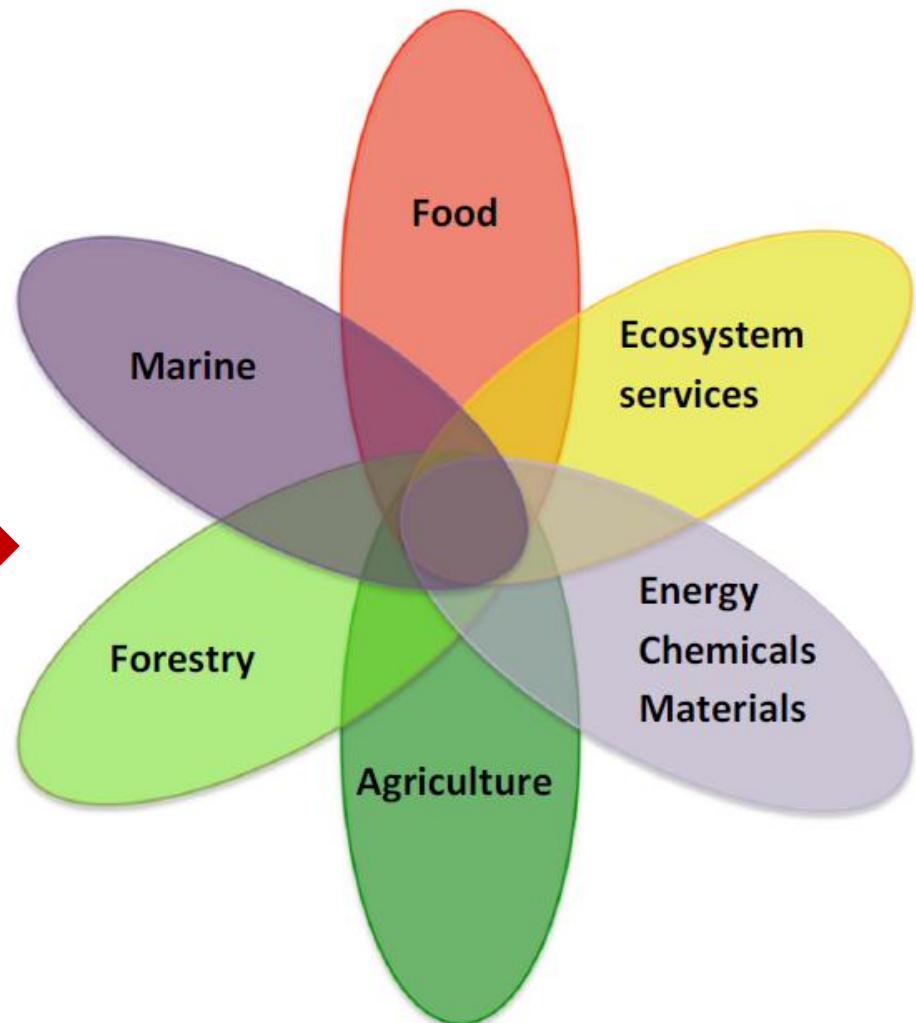
Bioeconomy sectors



*Bioresources
production sectors*



- Animal origin bioresources
- Plant origin bioresources
- Soil
- Peat



Main goals of bioeconomy

- Reducing the dependency of EU's economy on fossil resources and mitigating climate change.
- Satisfying Europe's need of renewable biological resources for secure and healthy food and feed, as well as for materials, energy, and other products.



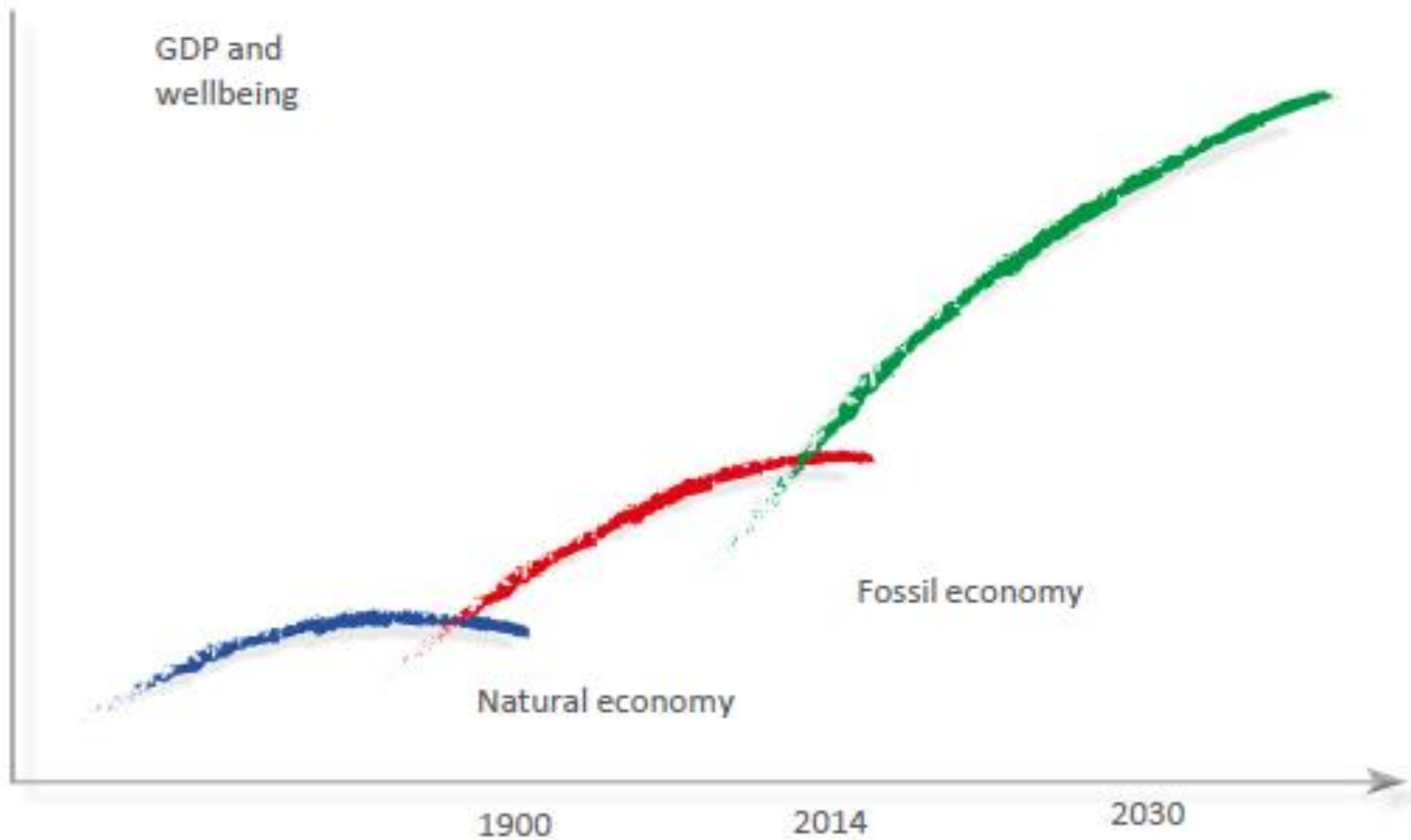
Contributions of bioeconomy

Bioeconomy approach - to use in sustainable way biological/natural resources in order to produce materials, energy, food and services.



- Sustainable production of higher quality renewable raw materials
- Assurance of food security
- Assurance of healthy environment
- Conversion to a wider range of end products producing little or no waste, and often using biological processing

Bioeconomy – the next economic wave





Europe's bioeconomy strategy

- Approved in European commission in February 13, 2012.
- ***“Innovating for Sustainable Growth: A Bioeconomy for Europe”***

How to make more sustainable use of removable resources in Europe's economy?

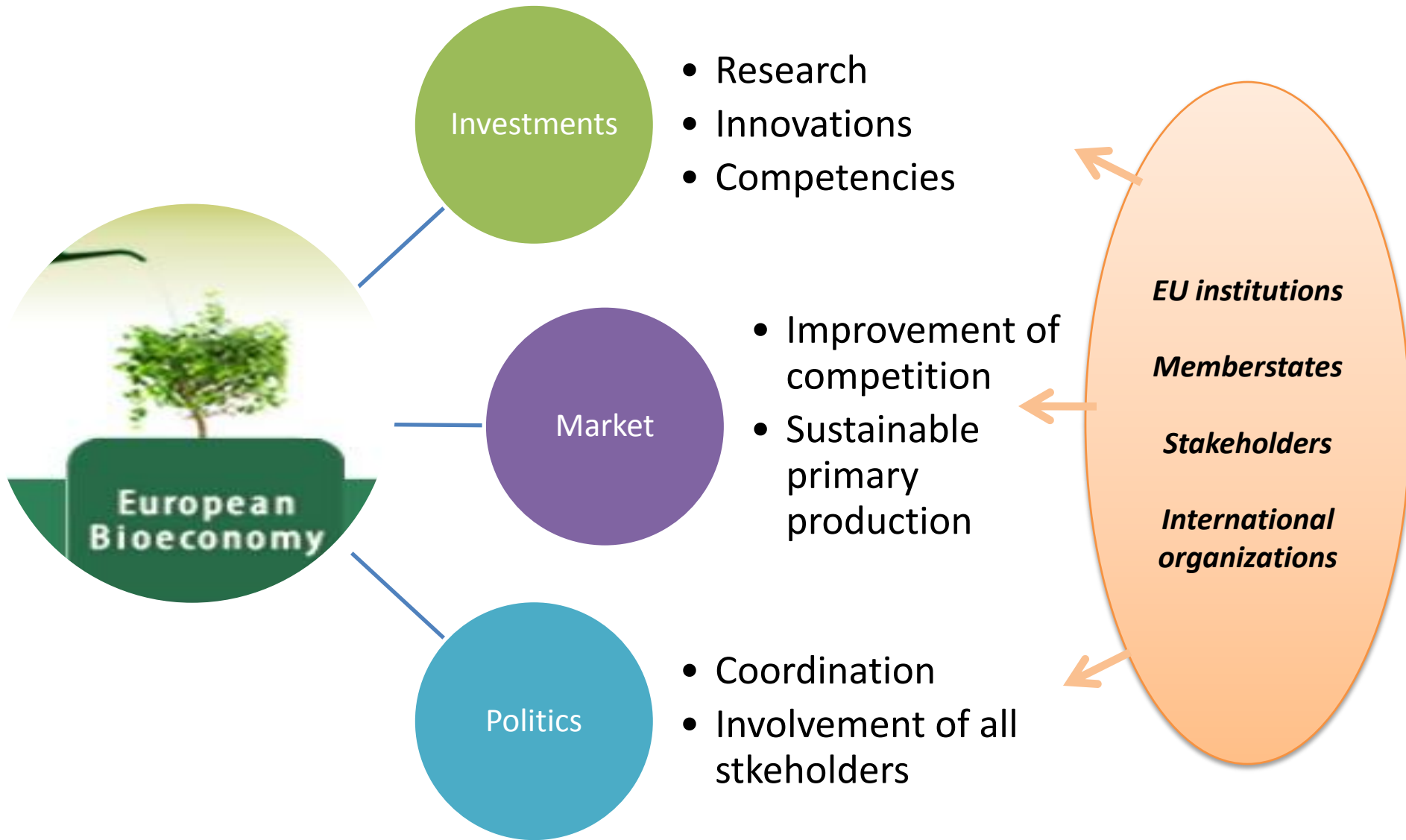


Aim of bioeconomy strategy:

To pave the way to a more innovative, resource efficient and competitive society that reconciles food security with the sustainable use of renewable resources for industrial purposes, while ensuring environmental protection.



Pilars of bioeconomic strategy:

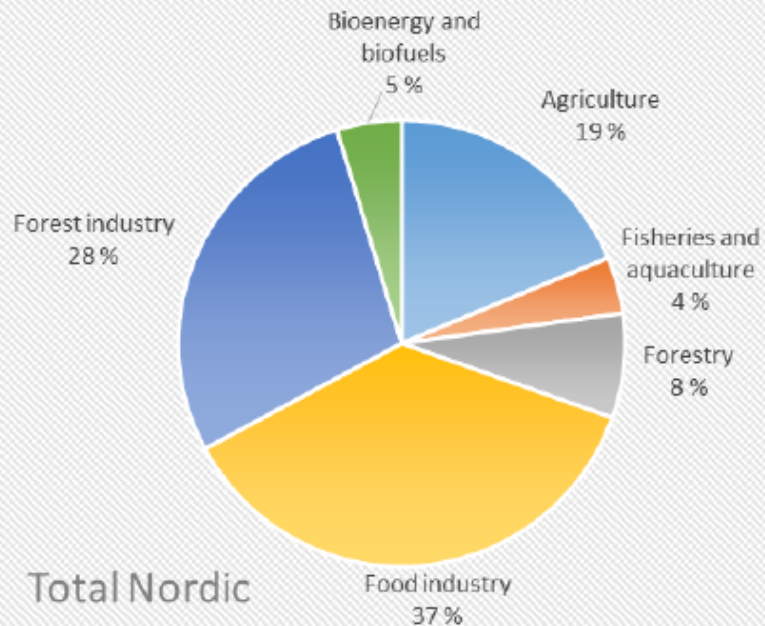
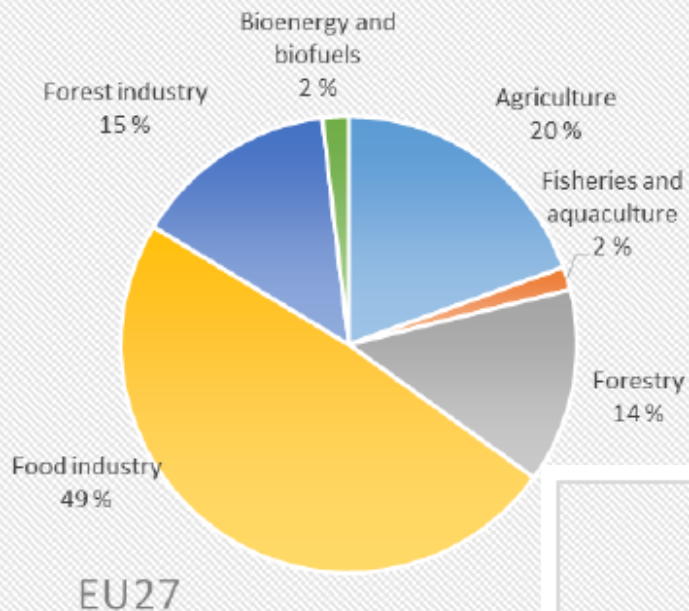


How bioeconomy is implemented in EU member states?

3 Different Stages of Implementation:

- **Integrated concepts and strategies** with different levels of integration (AT, BE (Flanders), DE, IR, NL, DK, NO, SE, SF, E (planned))
- **No integrated strategies** BUT specifically Bioeconomy-related policies and activities (CZ, FR, UK, IT)
- More or less **no specific activities and policies**, but acknowledgement of its political importance and potential (EE, GR, LT, SI, PT)

Proportion of different sectors shaping bioeconomy in EU and Nordic countries, %, 2011-2012



Estimated turnover and employment in EU bio-based industries

Sector	Annual turnover (bil. €)	Employment (1000)
Forest	550-600*** (8% of GVA in manufacturing industry; 25-30% of world production of forest- based products)	3000-400 industrial jobs
Fisheries and aquaculture	32	500
Agriculture	168**** (1.6% of the total GVA)	12200**** (5.5 % of EU employment)
Food	965	4400
Pulp/Paper	375	1800
Starch	7.5	15.5
Sugar	14	28 employees; 161 beet growers
Bio-chemicals and bio-plastics	50*	150*
Enzymes	0.8* (64% of global production)	5*
Biofuels	6**	150
Total	2078	22005

Notes: *Estimation for Europe for 2009; **Estimation based on a production of 2.2 million tonnes bio-ethanol and 7.7 million tonnes of biodiesel at average market price in Europe; *** EU-25; **** in 2009.

Importance for rural areas in EU

- Rural regions covers 52% of total EU territory.
- 23% of total population.
- Generated 16% of total gross value added.
- 21% of the employment.
- Rural regions represents more than 80% of territory in Portugal, Greece, Finland, Ireland, Estonia.

Estimates for future

- Biofuels markets are forecasted to more than triple by 2020.
- Combined US and EU27 demand for biomass in the fields of heat and power is expected to more than double by 2020.
- Bio-based chemicals are expected increase their share in overall chemicals production to around 9% of all chemicals.

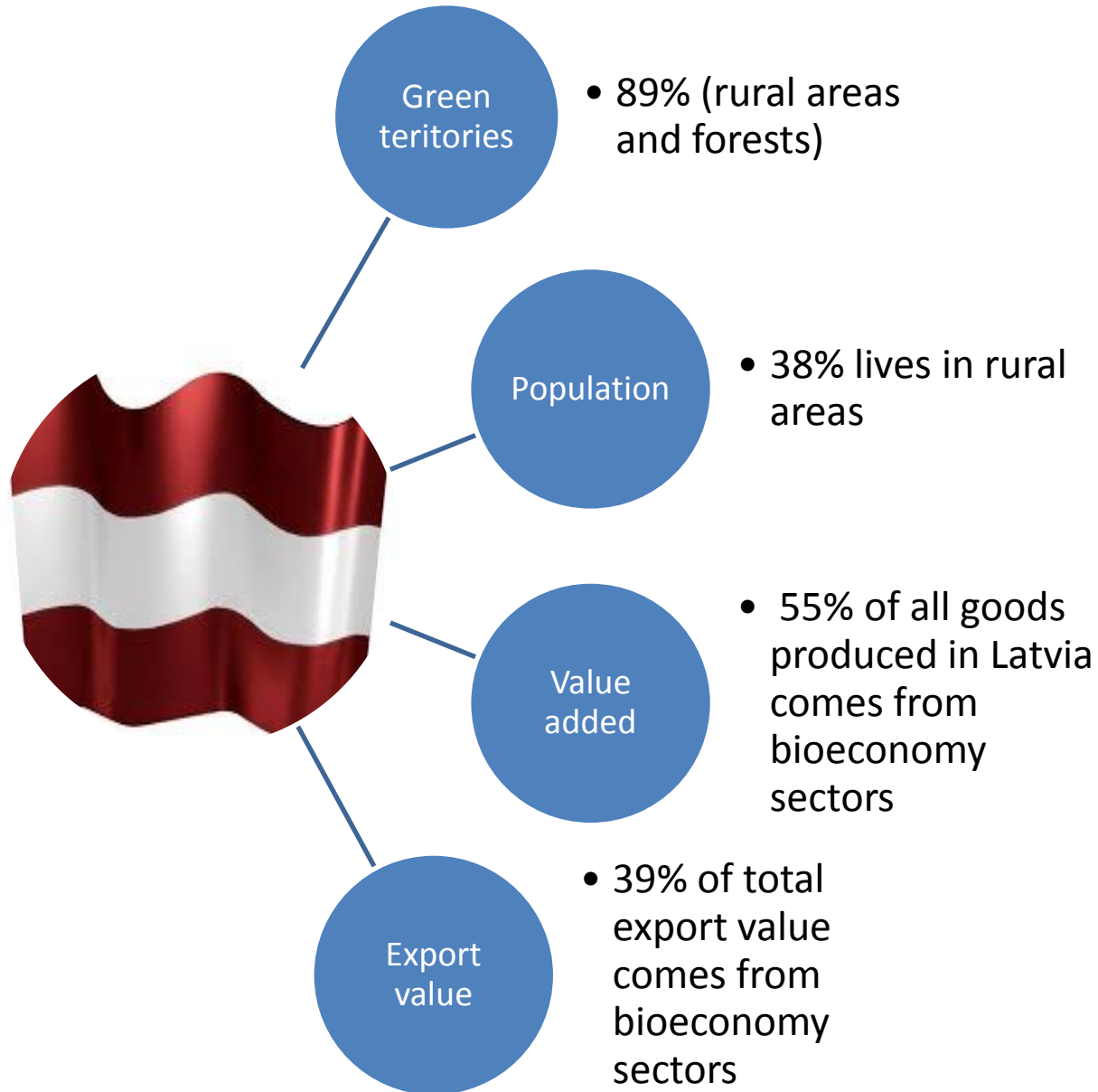
Comparative costs of fossil-based feedstock and biomass (€ per GJ end product)

Product category	Fossil feedstock cost (€/GJ)	Biomass cost (€/GJ end product)
Heat	3 (coal)	4
Power	6 (coal)	22
Transport fuel	8 (oil)	10
Average bulk chemicals	30 (oil)	75

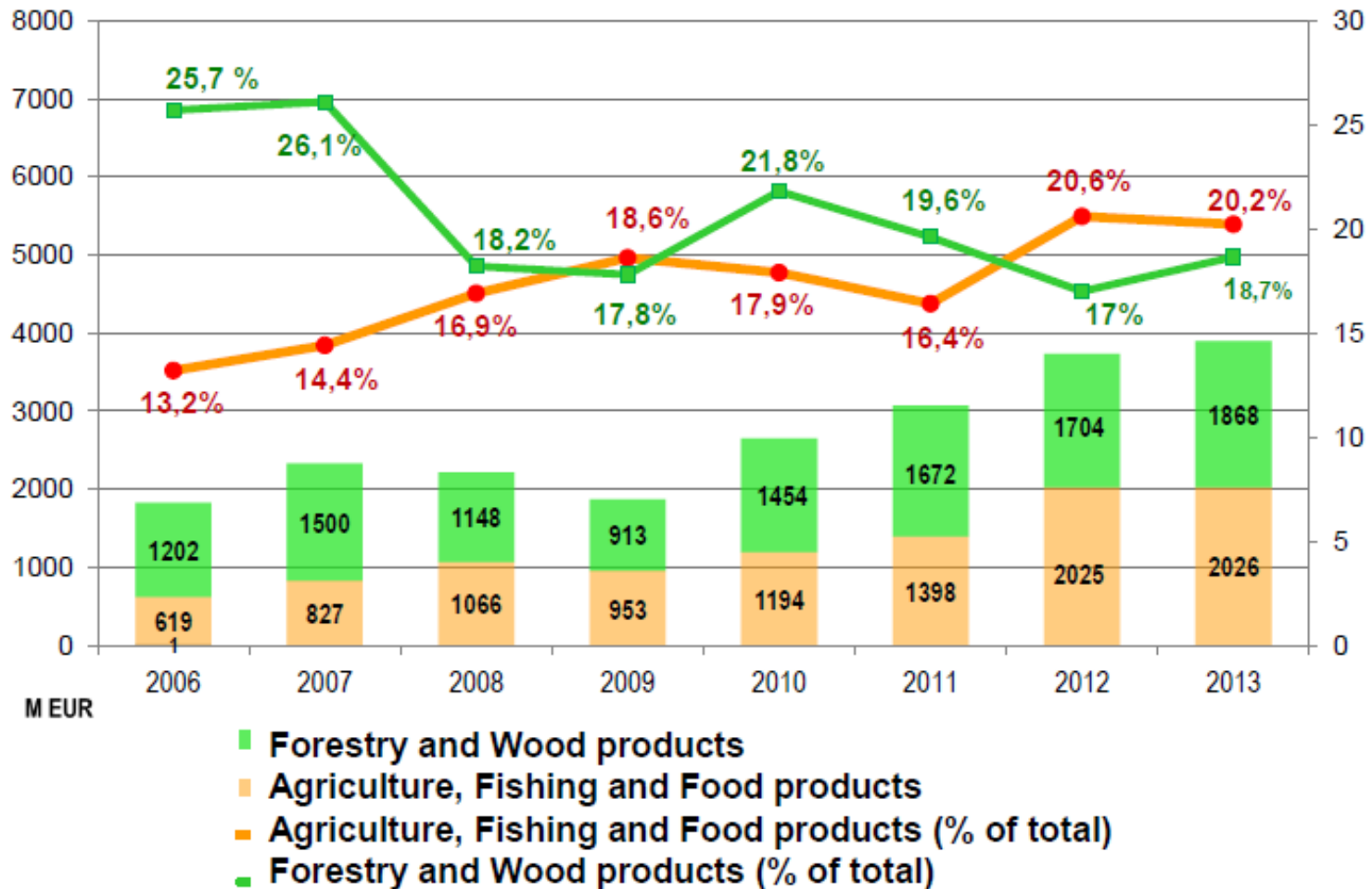
➔ Significant differences between costs

➔ More R&D investments and commercialization support for spurring alternative technologies

Bioeconomy importance in Latvia



Contribution of bioeconomy sectors to total value of export in Latvia, 2006-2013



How to unlock the full potential of Latvia's bioeconomy?

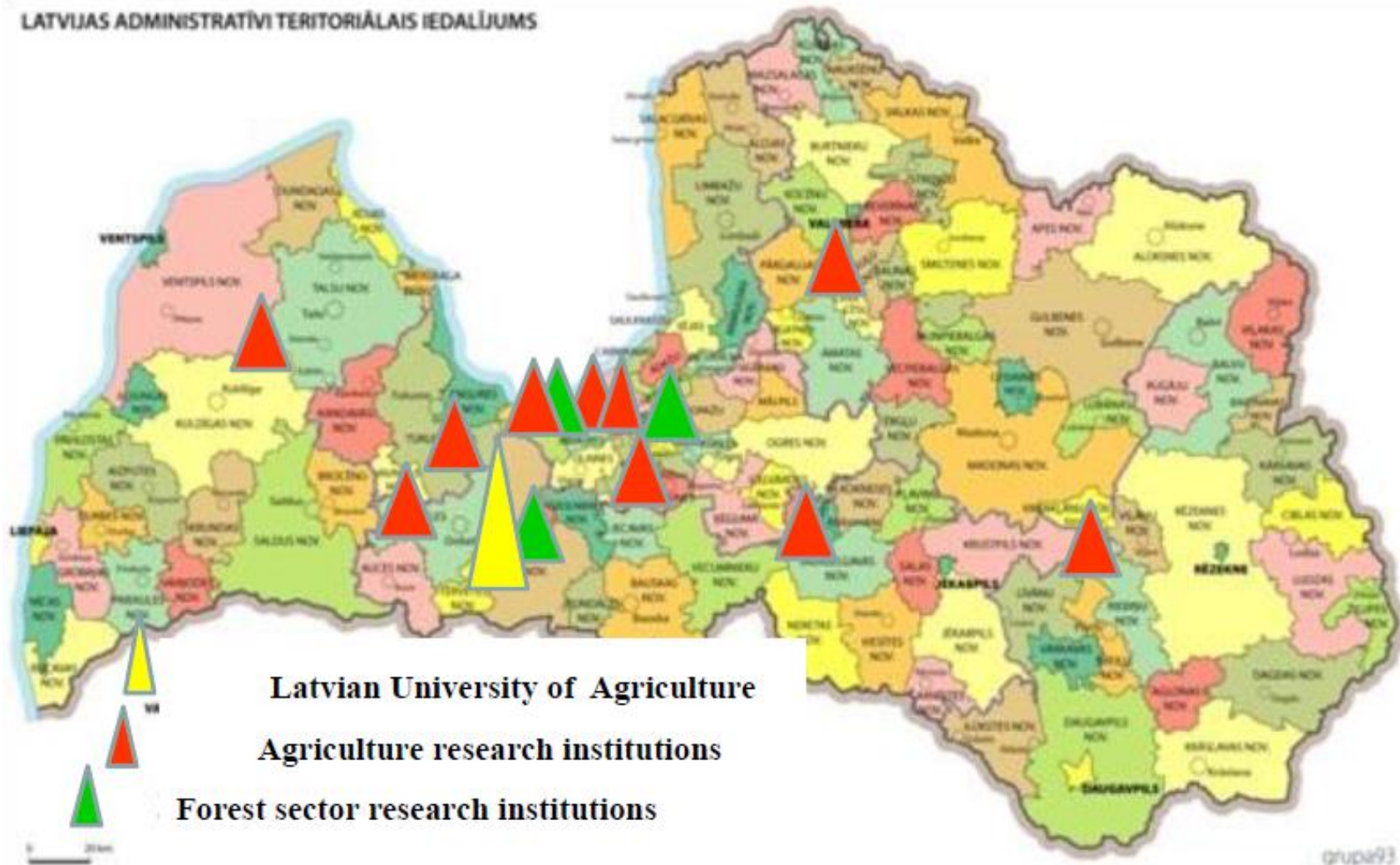
- Coherent approach to deal with complex and interdependent challenges, synergies and complementarities in policies, initiatives and sectors
- To develop innovation - ***the capacity to generate, absorb and use technology and non-technology based knowledge to create new products, services, processes or organizational change that can add higher economic, social or environmental value***
- To develop cross-sectorial interdisciplinary research by joining and consolidating resources
- To develop education at University and vocational education level
- To develop appropriate advisory systems

Bioeconomy Strategic Research Alliance in Latvia, founded: 24.09.2014.

Objectives:

- To enhance the competitiveness of Bioeconomy sectors through research and innovation.
- To contribute the implementation of overall EU 2020 thematic objectives.

Teritorial distribution of members of Bioeconomy Strategic Research Alliance



Research and innovation capacity:

> 400 doctors of science in:

- Latvia University of Agriculture (LUA);
- Agriculture and food Research institutes (7), including 2 private;
- Forest sector Research institutes (3), incl. 1 created by the private sector & LUA.



Latvijas Valsts Augļkopības institūts



SIA "Latgales Lauksaimniecības zinātnes centrs"



Bioeconomy examples from Latvia



Main outputs of bioeconomy in Latvia

- Food
- Drinks
- Functional food
- Feed

Food and feed applications



Non-food applications

- Renewable and bio-based packaging
- Cosmetics
- Bioplastics
- Biopharma



- Wood and wood by-products
- Agricultural biomass

Raw materials



Energy

- Biogas
- Biofuels
- Electricity
- Heat



Bioenergy sector



Biogas sector and bioeconomy



The increased biomass utilisation in a bioeconomy will increase the amount of biomass residues

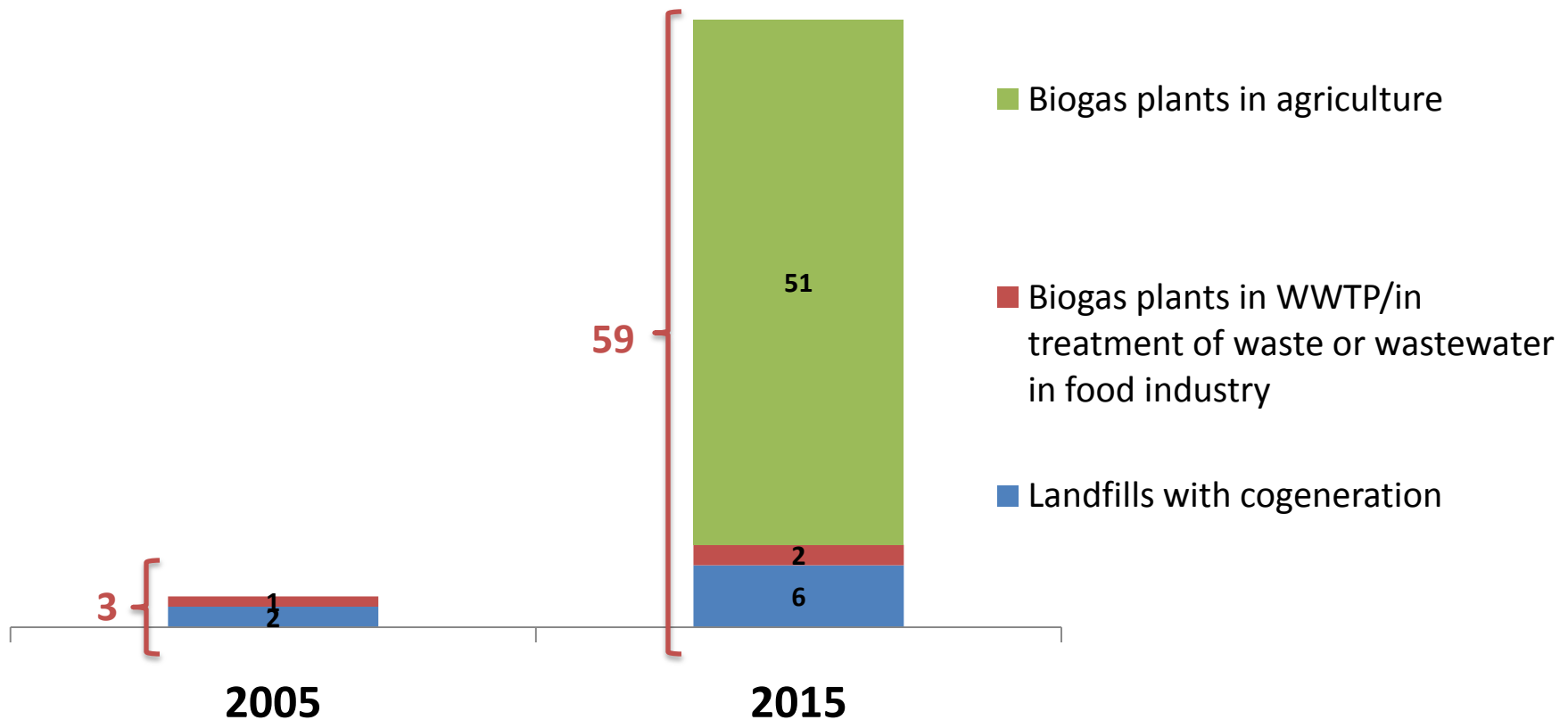


Rising energy costs and geo-political situation produce a trend towards energy self-sufficient production processes



Worldwide nutrient reserves will deplete in the future and demand for recirculating the nutrients from the biomass to the fields will increase

Development of Latvian biogas sector



➔ ***1st biogas plant producing biogas from agricultural biomass was built in 2008 in LUA Training and research farm "Vecauce".***

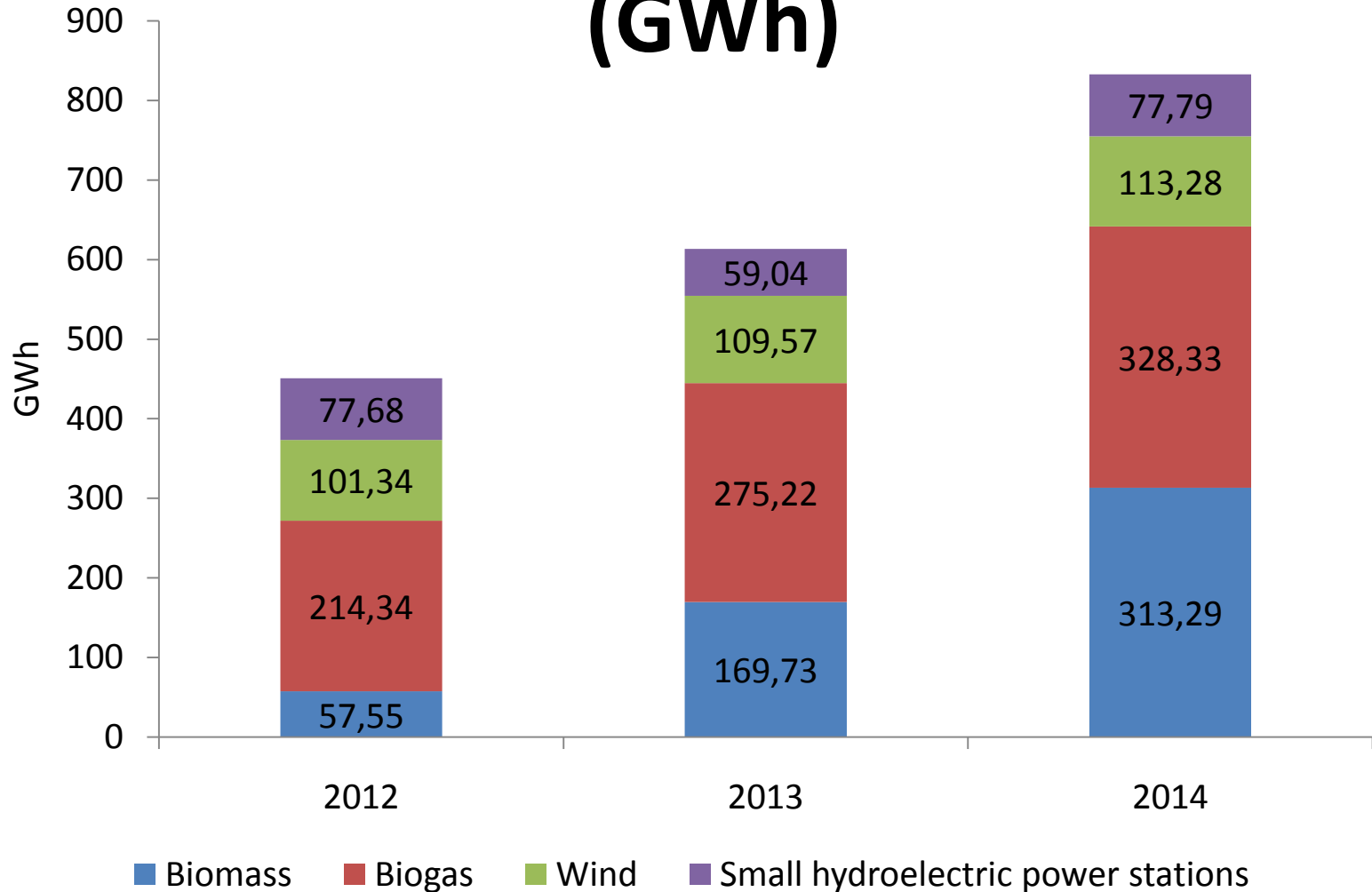
Main drivers

- Introduction of feed-in tariffs for selling the electricity generated from renewable resources (19-21 euro cents/KWh – fourth highest price in EU).
- Guaranteed price under the mandatory electricity purchase obligation.
- Tax relieves for electricity from renewables.
- Public (EU) co-funding for investment and public tenders for the construction of new power plants or the reconstruction of existing ones (up to 40% from investment).

Regulatory policies

Fiscal incentives and
public financing

Generated electricity from renewable energy resources in Latvia, 2012-2014 (GWh)



Biogas plants - effective GHG reduction measure

- In 2015 29 biogas plants (57% from all biogas plants in agriculture) were using manure for biogas production. Thus:
 - ➔ *Forming 52% from total biomass used for biogas production*
 - ➔ *Utilizing more than 0.6 mln t of animal manure which is ~ 5% from total manure amount produced in Latvian livestock sector*

Example: LUA Training and research farm “Vecauce”

Input biomass

Biogas plant

Output products

Manure
Maize
Grass silage



Electricity



Heat



Digestate
(used as
fertiliser)

**Heat generation
and distribution**



Storage of digestate

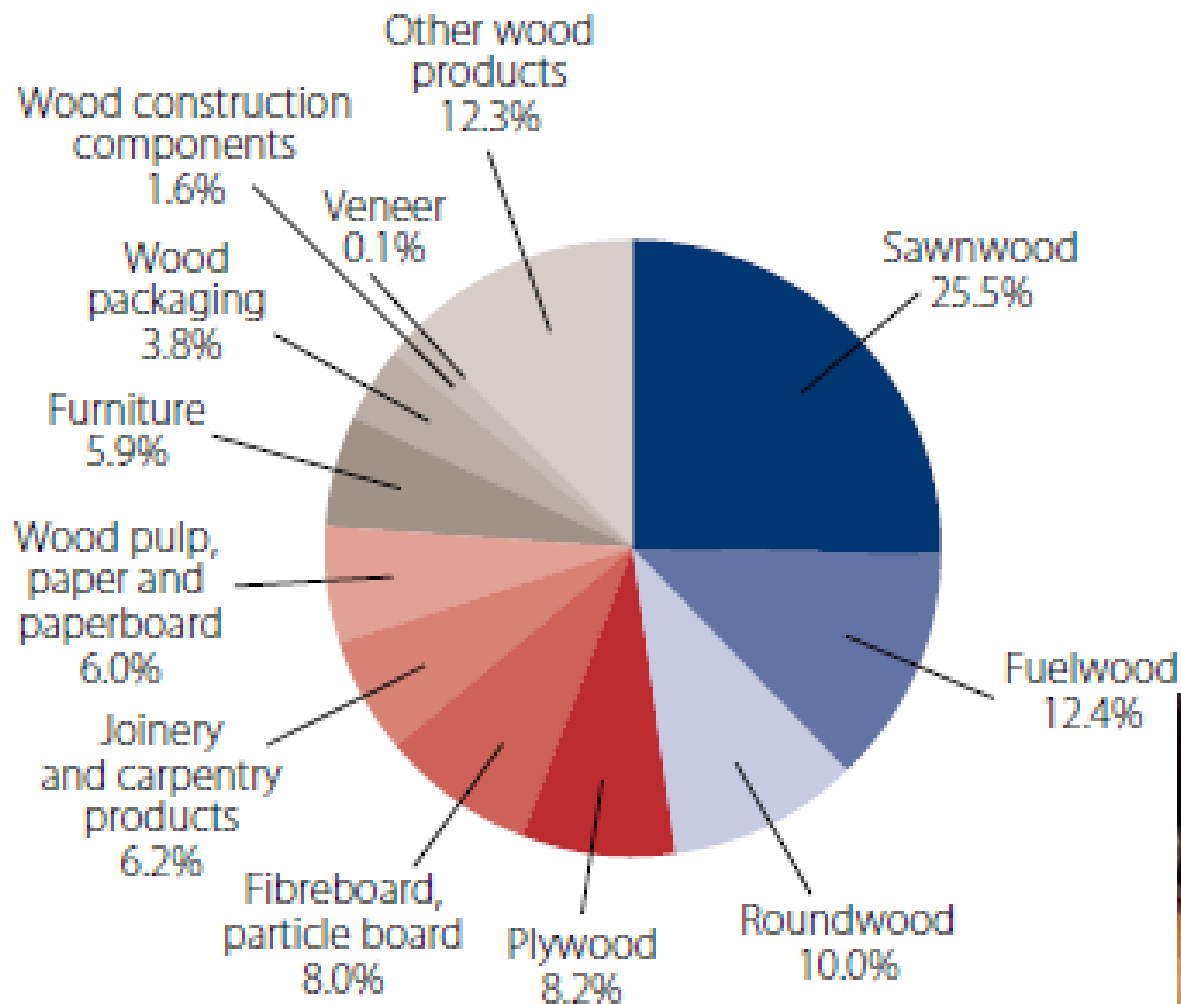
**Use of digestate
as fertilizer**



Forestry sector



Latvia's woodworking product export by type of product, 2013 (%)



Value-added wood products

- Sawnwo
- Furniture
- Products
- Wood-ba
- Wood Packaging
- Pulp and Paper



Commercial Production of Hybrid Aspen Planting Material

- Productivity of best hybrid aspen clones in 18 years \sim 400-500 m³/ha.
- Productivity 2x higher as of best aspen clones.



Agricultural sector

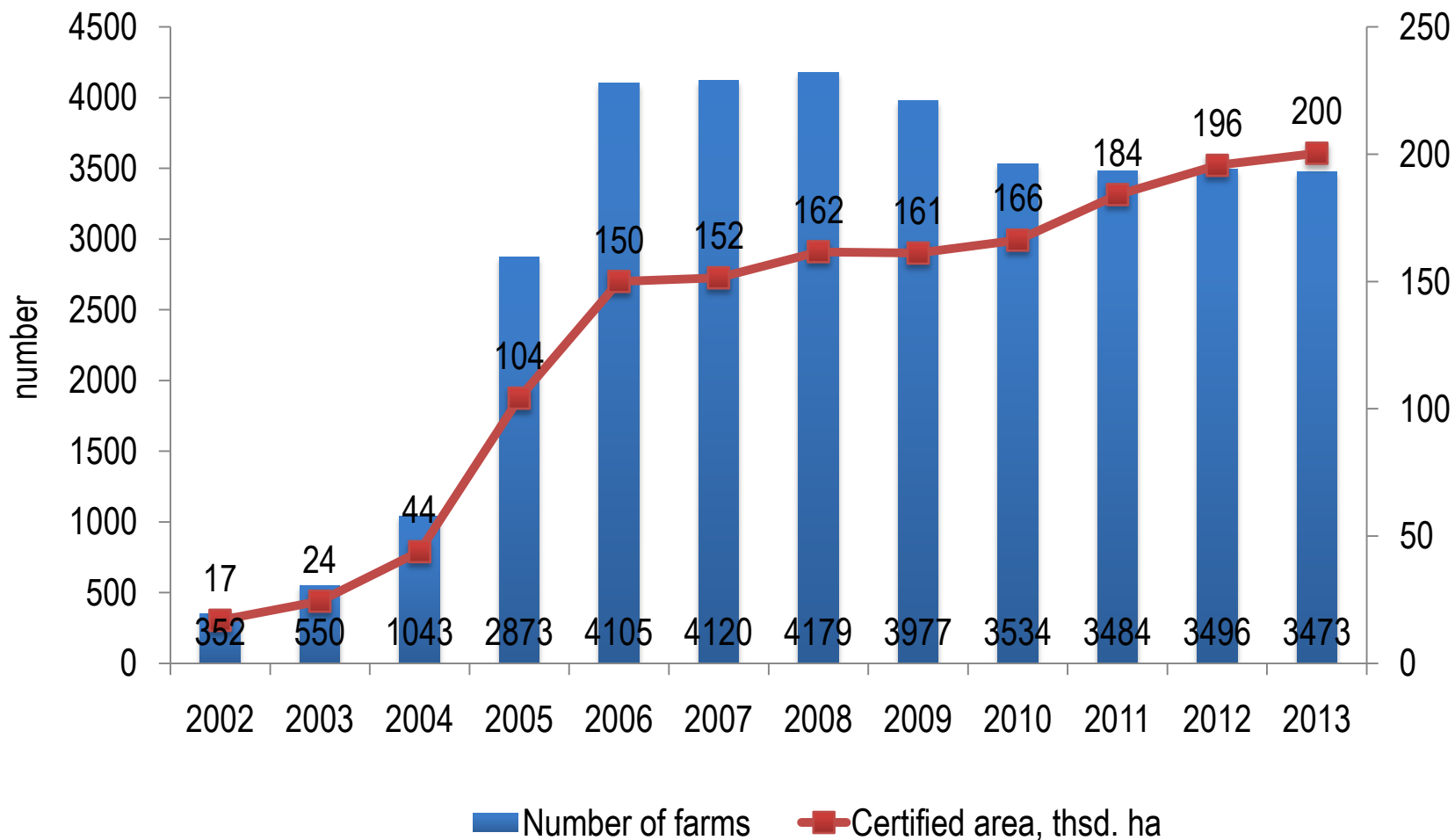


Why organic farming is important in the context of bioeconomy?

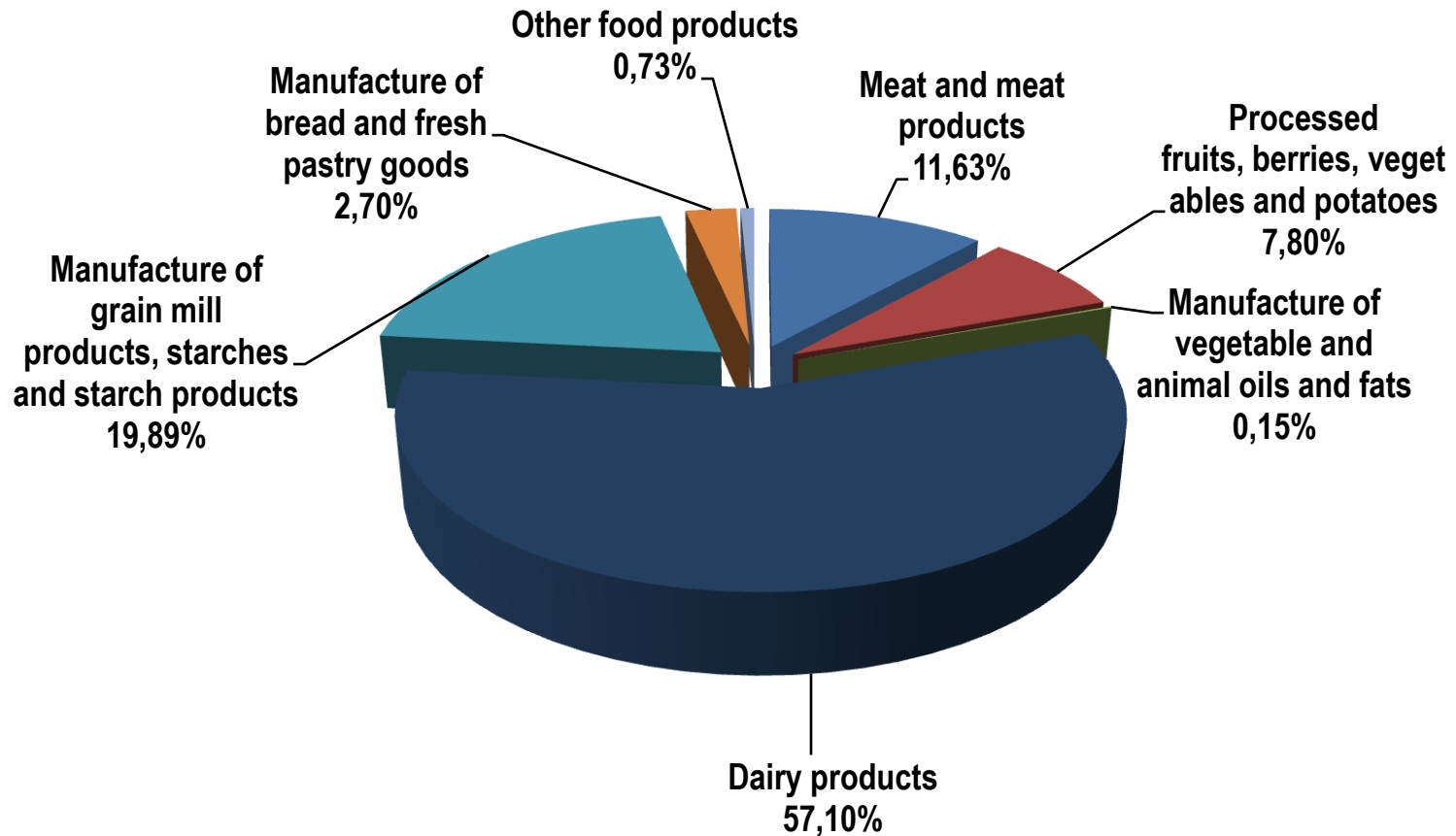
- Addresses sustainable production of high quality food
- Reduces dependency on high energy inputs
- Improves environmental and nature conservation
- Ensures climate change adaptation
- Provide animal welfare
- Develops rural livelihoods
- Have a big potential for innovation and improved solutions

Organic farming practices

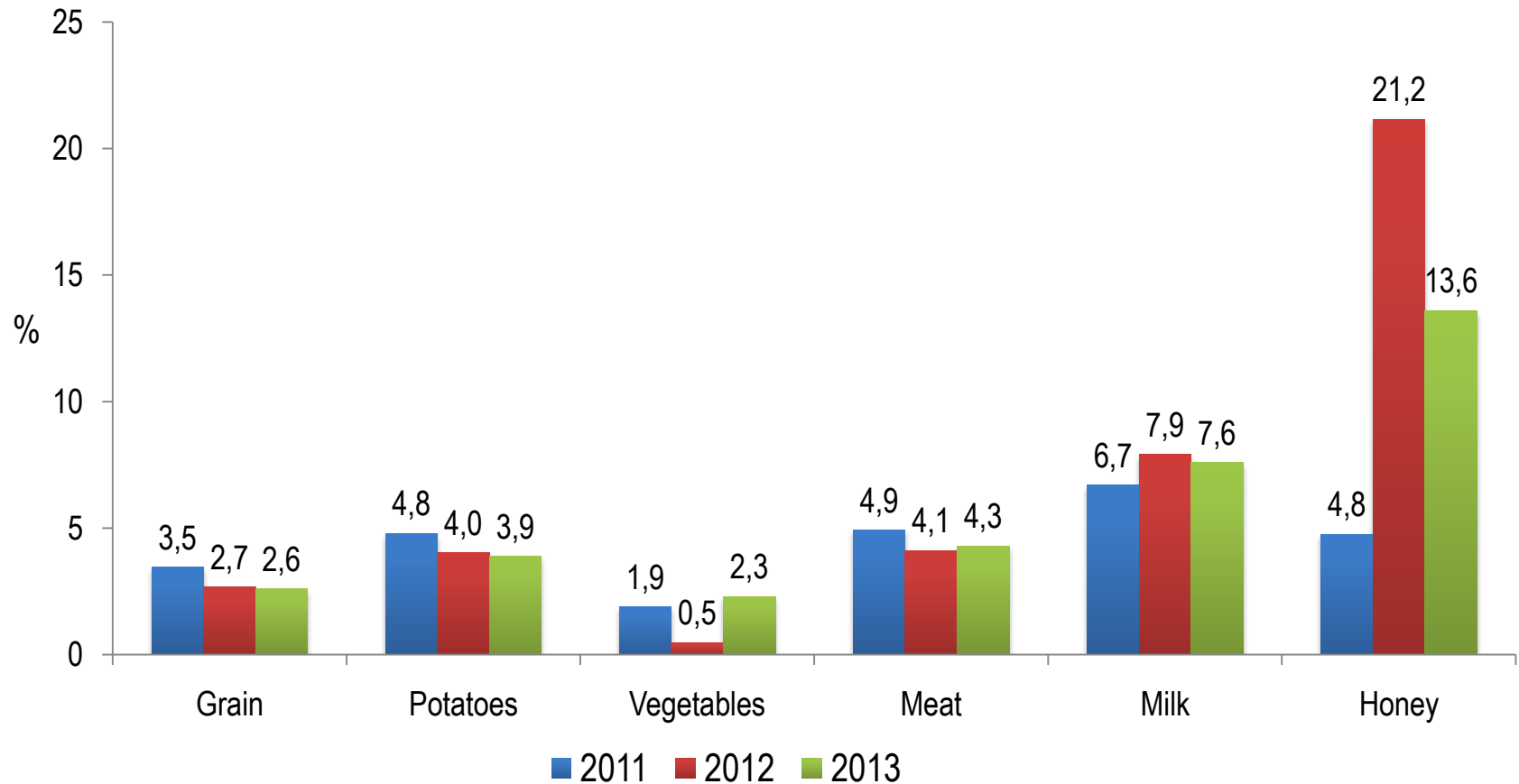
- Constantly increasing sector since 2004



Structure of processed organic agricultural production in Latvia, 2013 (%)



Share of organically produced goods in total agricultural production in Latvia, 2011-2013 (%)



Food and beverages sector



Children and baby food «RUDOLFS»

- Made from organic-grown, certified raw material.
- Developed in 2012-2014 by SIA «Latecofood» in collaboration with Latvia State Institute of Fruit-Growing and LUA.
- **Gold medal «Riga food 2012».**
- **Latvian Academy of Sciences award (2014).**



ALOJAS fruit-juice jelly



- No synthetic colours or any other harmful ingredients are used in the production



Economic or Environmental sustainability?



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Why not both?

Köszönöm!

