



Co-funded by the
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«European priorities and need for training on agriculture, bioeconomy and agri-food sector Management»

FIELDS-ISEKI WORKSHOP, 22nd of June 2021

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fields

ADDRESSING THE CURRENT AND FUTURE SKILL NEEDS FOR SUSTAINABILITY, DIGITALIZATION
AND THE BIO-ECONOMY IN AGRICULTURE EUROPEAN SKILLS AGENDA AND STRATEGY - AGREEMENT

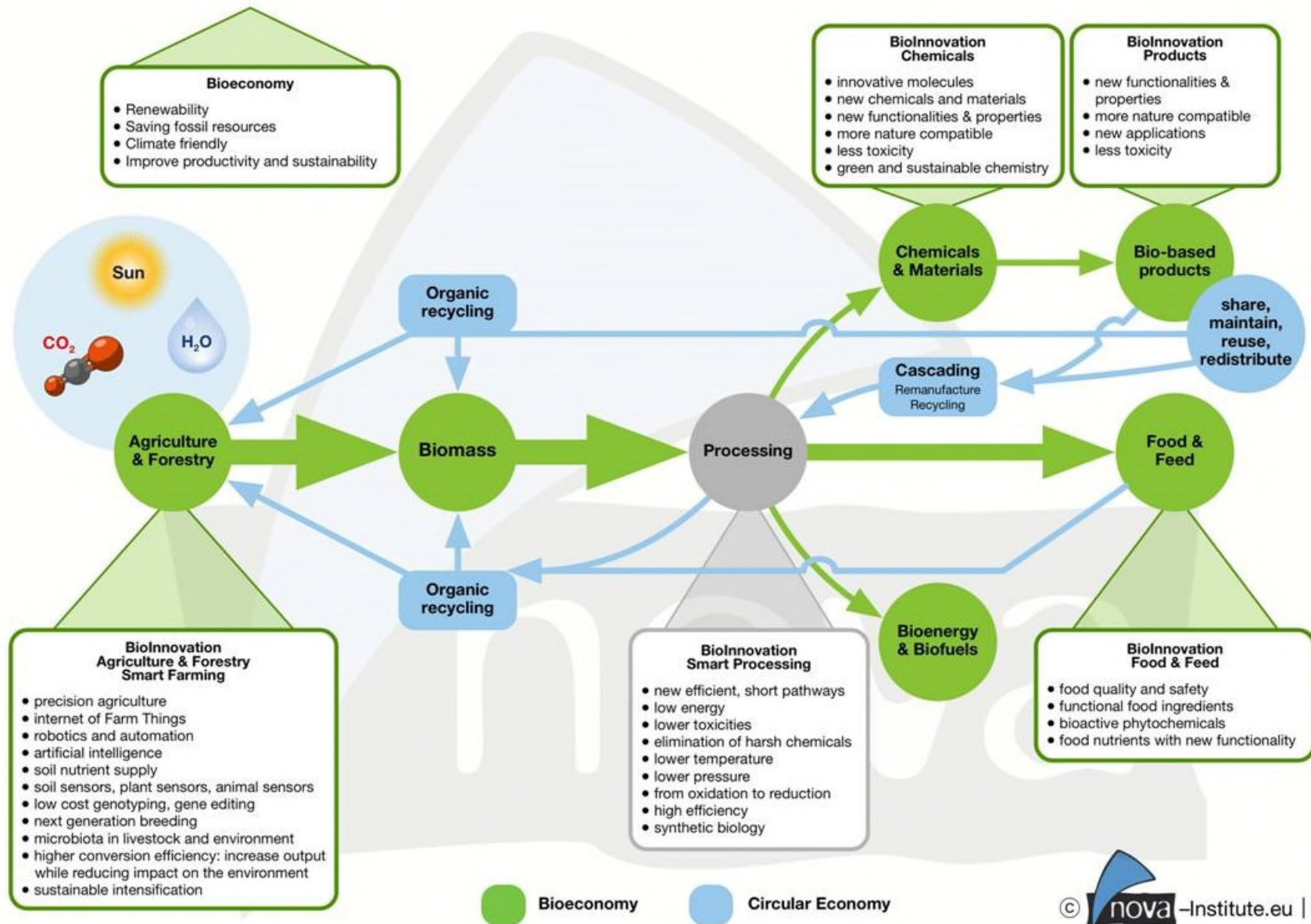
copa*cogeca
european farmers european agri-cooperatives

Bioeconomy since 2005

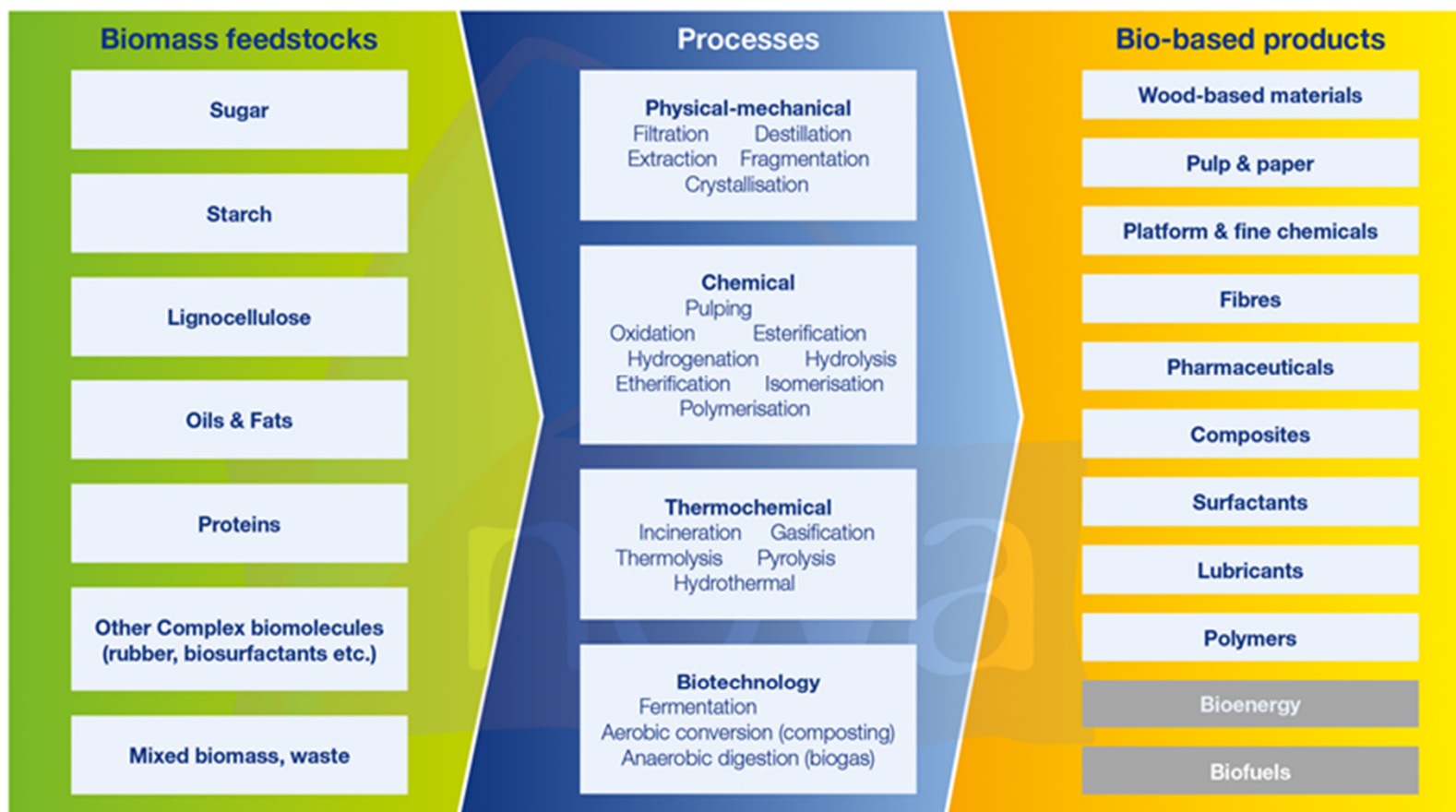
The Bioeconomy of the last 15 years draws on two main pillars:

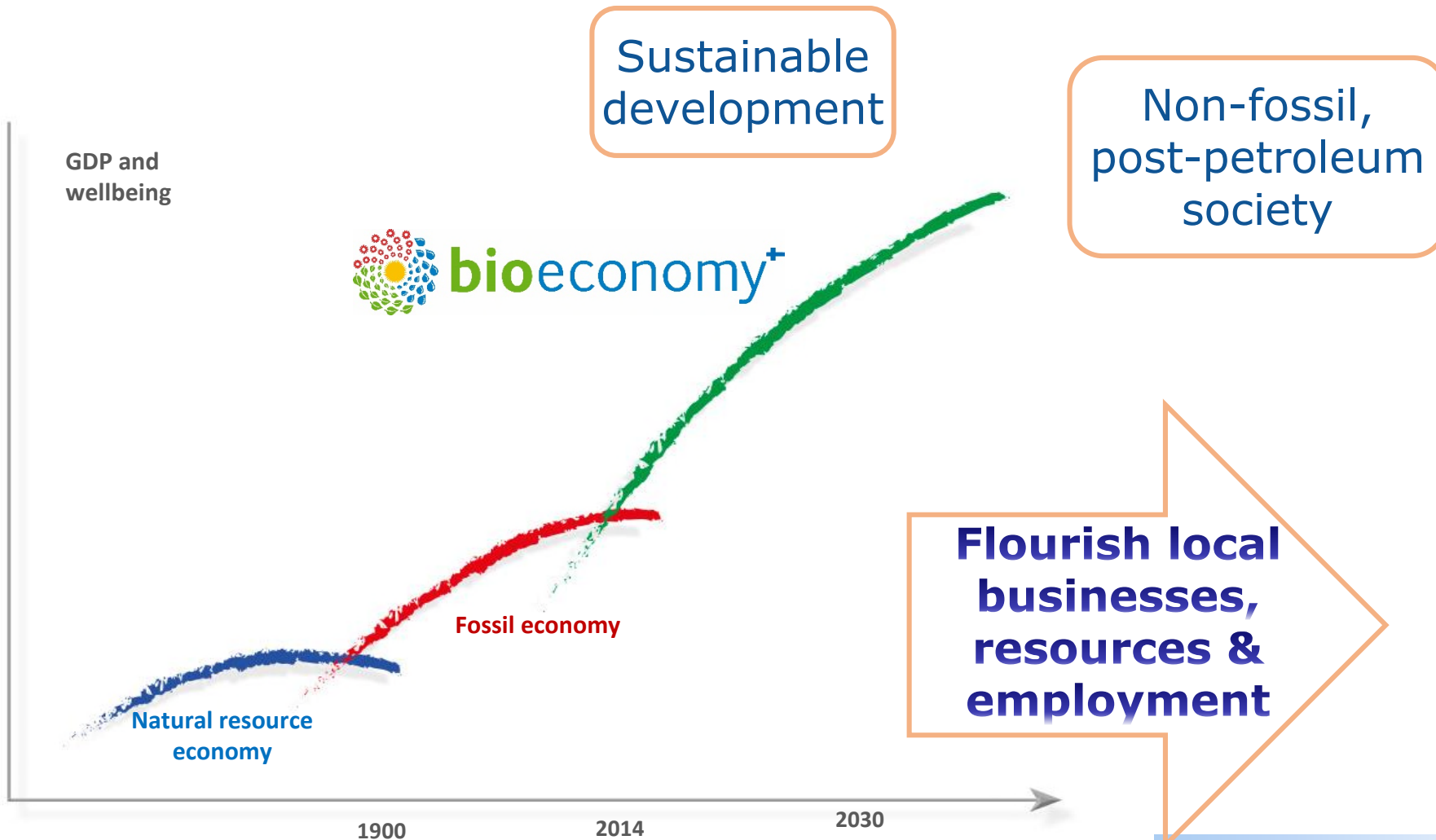
- The potential of biological resources
- The integration of new knowledge stemming from various disciplines, linking it with biotechnologies and life Sciences

Bioeconomy: More than Circular Economy



Bio-based Economy: feedstocks, processes and products (without food & feed)





Source: Finnish Bioeconomy Strategy, 2014

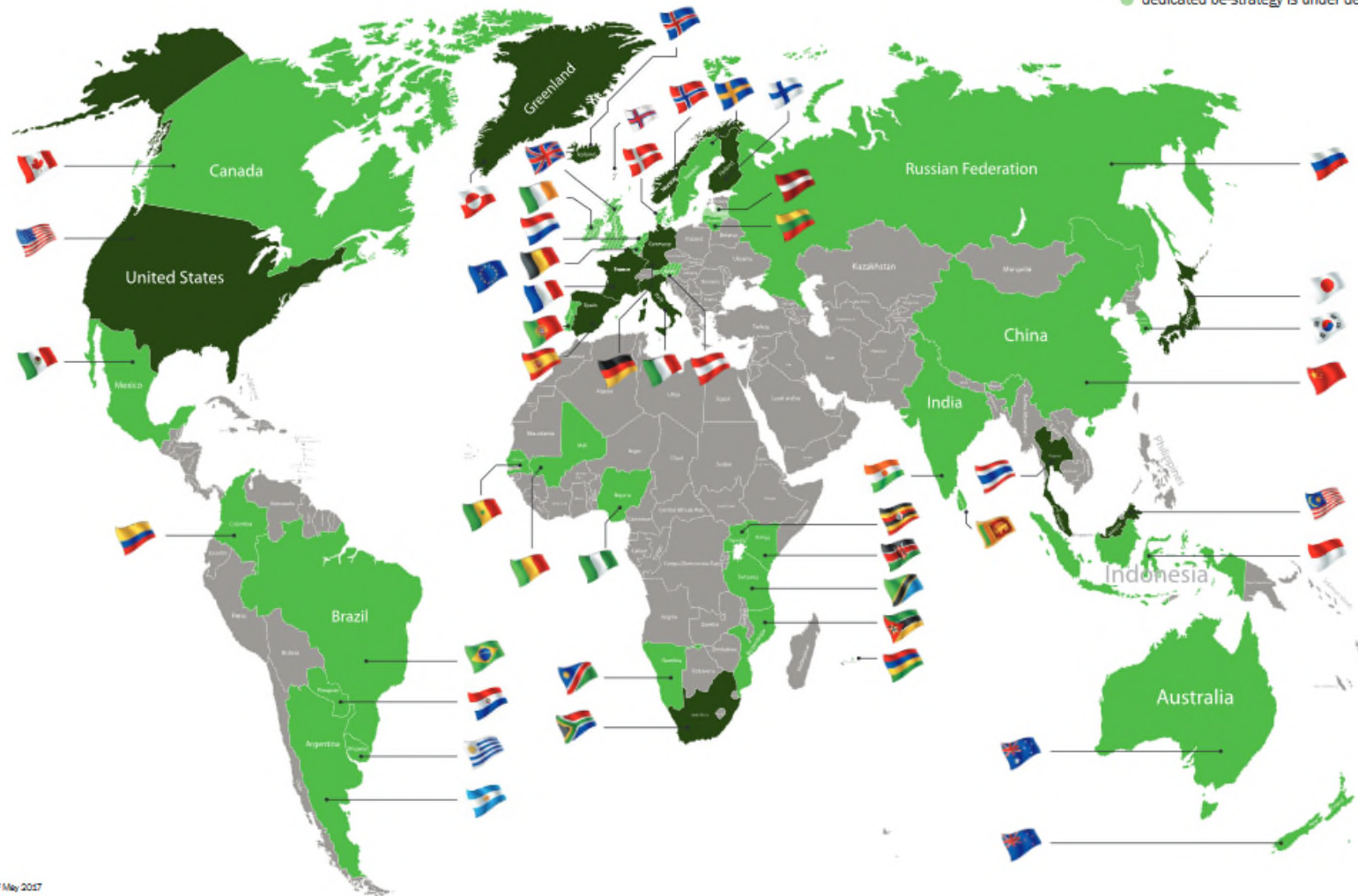
ADDRESSING THE CURRENT AND FUTURE SKILL NEEDS FOR SUSTAINABILITY, DIGITALIZATION AND THE BIO-ECONOMY IN AGRICULTURE: EUROPEAN SKILLS AGENDA AND STRATEGY - AGREEMENT 612664-EPP-1-2019-1-IT-EPPKA2-SSA-B

Present status of the bioeconomy

- About 50 states worldwide and half a dozen regions officially support the bioeconomy either via dedicated programmes, strategies, action plans, roadmaps etc. or via closely related political, programmatic and/ or strategic activities, the majority of them still in Europe.
- Many of these activities, however, are limited to biotechnology and/ or biofuels production and use.
- Today, almost 15 years after it's launch there is no more a single bioeconomy but there are many bioeconomies!
- This has an impact on the necessary frameworks, public funding, private investment and thematical content.

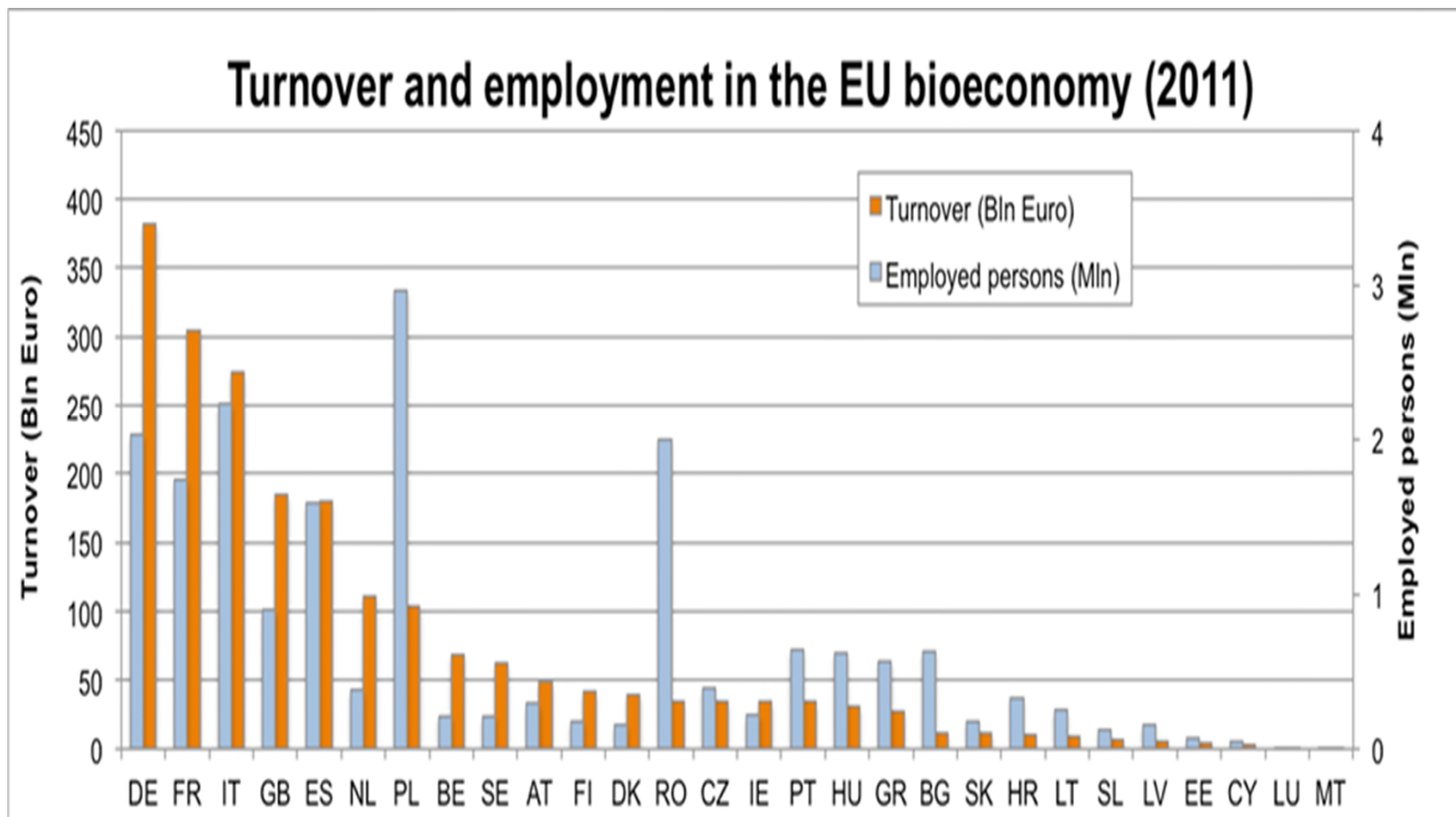
Bioeconomy Policies around the World

- dedicated bioeconomy strategy
- bioeconomy-related strategy
- be-related strategy; dedicated be-strategy is under development
- dedicated be-strategy is under development

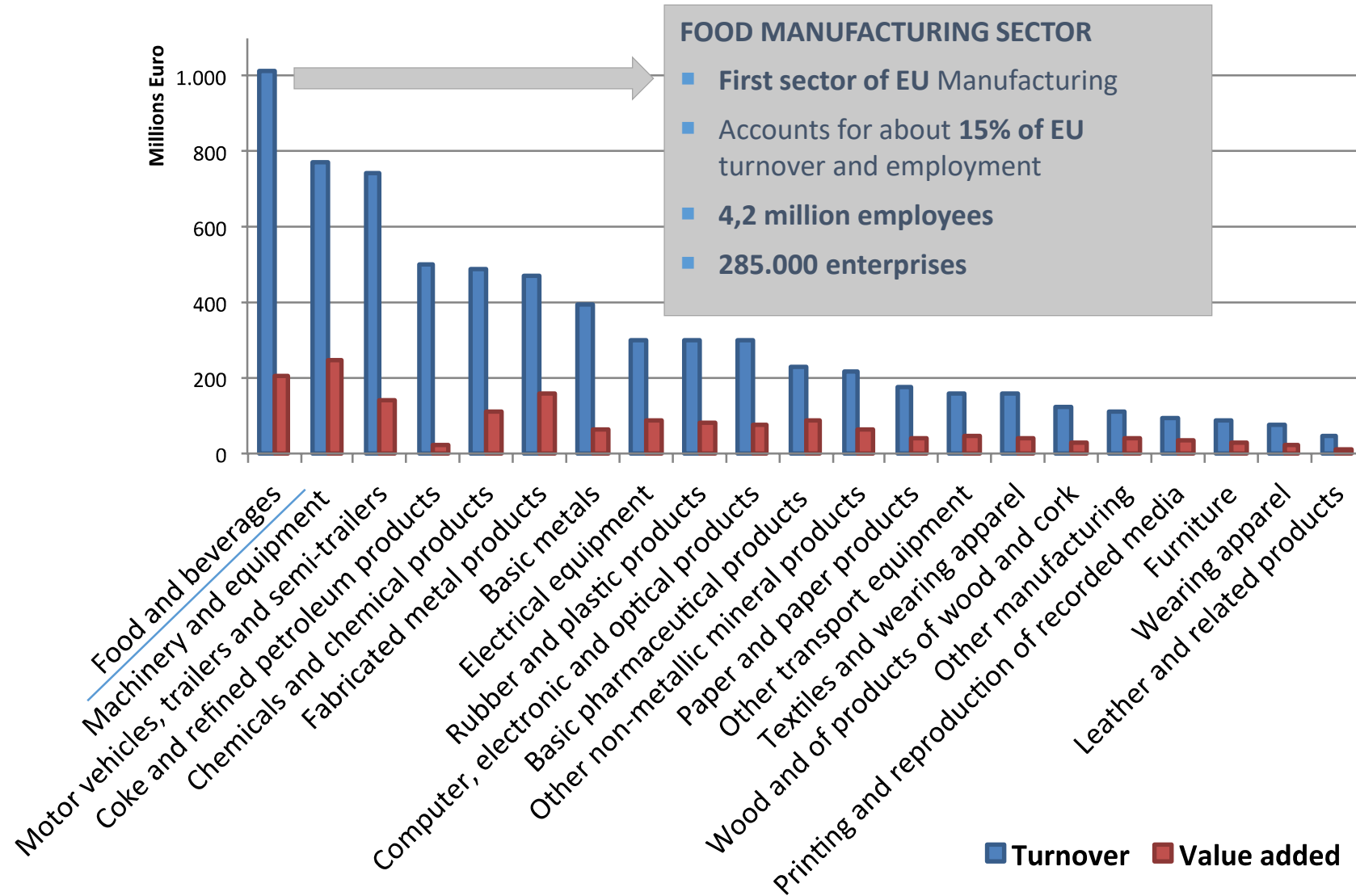


As of May 2017

© German Bioeconomy Council | <http://faii.uscom.fr/aii/>, http://aii_21.frost.com/world-map/



European Manufacturing Sectors



Source: Data & trends of the European Food and Drink Industry 2018 (FoodDrinkEurope)

2018 EU BIO-ECONOMY

EU bio-economy turnover of 2.980 billion € with 21,1 million employees.

Sector	Turnover (Billion €)	Employees (million)	Source
Food & Drink Industry	1.304	4.8	FoodDrinkEurope
Agriculture	473	11,0	COPA-COGECA
Fisheries	16	0.5	FAO
Paper, Leather etc.	470	1,9	CEPI
Forestry	371	2,0	CEI-BOIS
Others (build, textile, seeds, breeds.....)	250	1,2	CEFIC - CIVA
Bio-based materials	96	0,31	
<i>Chemistry</i>	80 (est)*	0,15 (est)*	USDA, Arthur D Little, Festel, McKinsey, CEFIC
<i>Enzymes</i>	6(est)*	0,005 (est)*	Amfep, Novozymes, Danisco/Genencor, DSM
<i>Biofuels</i>	10	0,15	EBB, eBio
Total	2.980	21,71	

What can be concluded from these recent industrial developments inside and outside Europe ?

- There is a growing number of biobased production lines for intermediates and platform molecules, all focused around the renewable “C” !
- There is a shift from science and research activities on the content of biological resources to more optimization of industrialized **processes** (hydrothermal, biological or combination of both).
- There is a shift from the cell factory to the real factory with the necessary growing attention on economics. This requires stronger attention also on elements of the back-end of value chains like norms, standards, marketing and consumer acceptance.

What can be concluded from these recent industrial developments inside and outside Europe ? (cont.)

- In addition CO₂ turns out more and more to become a potential resource, as well as waste and proteins become important objects of the bioeconomy.
- The frontiers among chemical products, biofuels, proteins for food and other purposes as well as for the concrete attribution to diverse industrial application fields start to become „blurred“!
- This might reach a new dimension by a stronger use of big data in the future.

THE NATIONAL PICTURE

A key industry in the economies of the EU Member States

#1 employer

The food and drink industry is the biggest employer in manufacturing in half of the Member States

66%

Share of turnover of the EU's 5 largest food and drink producers

- The food and drink industry ranks among the top three manufacturing industries in terms of turnover and employment in most Member States.
- France, Germany, Italy, the UK and Spain are the largest EU food and drink producers by turnover.

Food and drink industry data as published by FoodDrinkEurope National Federations¹ (2015)

	Employment ranking in manufacturing	Turnover (€ billion)	Value added (€ billion)	Number of employees (1,000)	Number of companies
Austria	5	22.7	5.5	83.3	3,893
Belgium	1	48.6	8.1	88.5	4,452
Bulgaria	2	5.2	1.0	95.6	6,182
Croatia	1	5.3	1.2	61.0	3,256
Czech Republic	4	13.3	2.7	115.4	9,157
Denmark	2	25.4	4.5	61.6	1,607
Estonia	2	1.8	0.4	15.4	575
Finland	4	10.9	2.6	37.6	1,846
France	1	179.9	45.0	427.2	57,290
Germany ²	3	168.6	36.7	569.2	5,812
Greece ³	1	14.2	2.8	87.2	1,225
Hungary	1	11.5	2.0	106.6	6,812
Ireland	1	27.1	-	47.3	1,583
Italy	2	132.0	24.2	427.0	56,315
Latvia	1	1.7	0.4	23.7	1,120
Lithuania	1	4.0	0.8	44.1	1,609
Netherlands	1	70.0	11.3	128.6	6,065
Poland	1	55.6	9.9	417.5	14,534
Portugal	1	15.3	2.9	107.5	10,996
Romania	1	12.0	-	180.8	8,826
Slovakia ²	3	4.0	0.8	29.3	278
Slovenia	3	2.2	0.5	16.5	2,258
Spain	1	104.2	19.3	349.2	26,016
Sweden	4	18.1	4.5	50.5	4,240
United Kingdom	1	131.6	38.9	418.2	6,620

¹ Or by Eurostat (SBS)

² Companies with more than 20 employees

³ Small food and drink producers excluded

FOOD SUPPLY CHAIN

Driving forces in the food supply chain: agriculture, the food and drink industry and retail

6%

Share of the food supply chain in EU gross value added

10%

Share of the food supply chain in EU employment

- In 2014, there were 24 million people employed in the food supply chain.
- The total turnover amounts to €3.9 trillion and the value added almost reaches €700 billion.
- Around 31 million professionals work in the extensive food supply chain across the EU, from agriculture and the input industry to food and drink services.

Structural overview of the food supply chain (2014)

	Agriculture	Food and drink industry	Wholesale of agricultural and food products	Food and drink retail ¹
Turnover (€ billion)	414	1,095	1,254	1,114
Value added (€ billion)	211	219	104	164
Number of employees (million)	11.2	4.2	1.9	6.3
Number of companies (1,000 units)	10,800	292	341	803

Employment in the extensive EU food supply chain (2014,%)



Turnover, value added, employees and companies in the food supply chain (2014,%)



Source: Eurostat (National Accounts, SBS, FSS, Economic Accounts for Agriculture)

¹ 2013 data except for the number of companies

R&D AND INNOVATION

Innovation¹ activities of EU² food and drink companies: crucial for competitiveness

46%

Share of innovative companies

21%

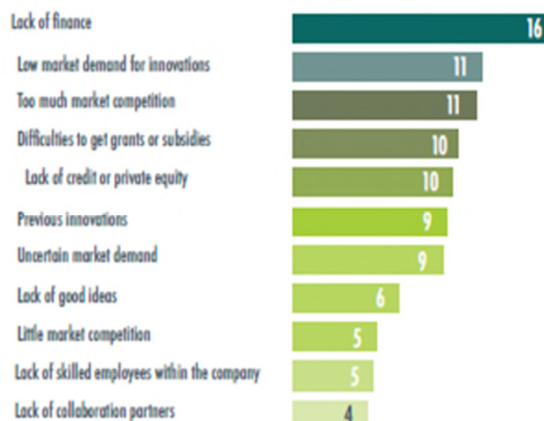
Share of non-innovative companies that did not innovate due to barriers

- During the period 2012-2014, more than one quarter of all food and drink companies reported marketing innovations. Organisation, process and product innovations took place in 20% of all companies.
- Half of product and/or process-innovative food and drink companies were engaged in acquisition of machinery, equipment and software. 45% run in-house R&D activities.
- Key barriers to innovation were: lack of finance, low market demand for innovations and too much market competition.
- 62% of innovative food and drink companies introduced innovations with environmental benefits.

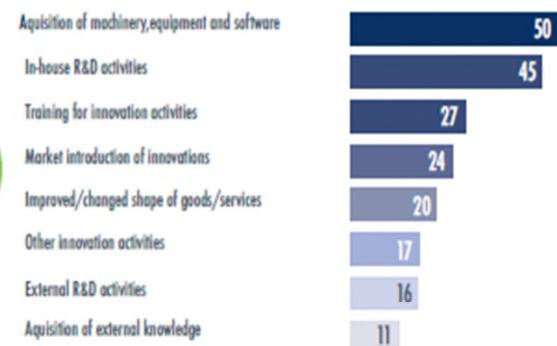
Types of innovation of EU² food and drink companies (2012-2014,% of total)³



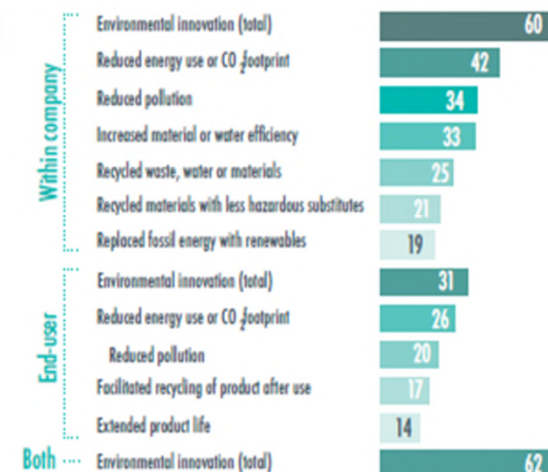
Important barriers to innovation for EU² food and drink companies (2012-2014,% of non-innovative companies)



Innovation activities of EU² food and drink companies (2012-2014,% of product and/or process-innovative companies)³



EU² food and drink companies that introduced innovations with environmental benefits (2012-2014,% of innovative companies)³



¹ Innovation is defined here as: the implementation of a new or significantly improved product or process; a new marketing method; a new organisational method.

² Based on available data

³ Individual companies may have introduced more than one of these types of innovation.

Source: Eurostat (Community Innovation Survey, 2014)

INNOVATION AND CONSUMER TRENDS

Innovation key to greater consumer choice

Pleasure

Leading driver of food innovation in Europe

#1

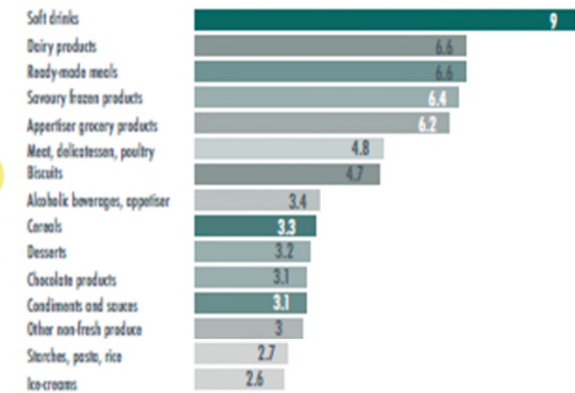
Soft drinks are the world's most innovative food sector

- Drivers of innovation can be divided into 15 trends, grouped along five axes, corresponding to general consumer expectations: pleasure, health, physical, convenience and ethics.
- Pleasure, including variety of senses and sophistication, is the leading driver of food innovation in Europe, with a 54% share in 2016.
- Health accounts for nearly one in four innovations launched. All the health trends (natural, medical and vegetal) gained ground in 2016, making health the most dynamic driver of food innovation in Europe in terms of growth.
- Soft drinks are world's leaders in innovation in 2016, pushing dairy products to second place. Ready-made meals stay at the third place.

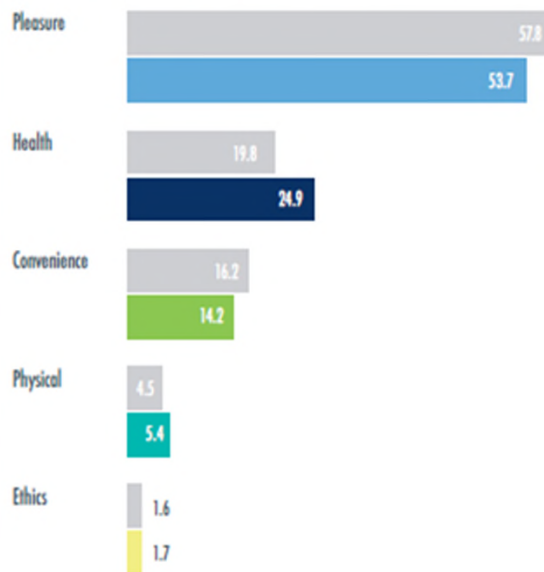
Food innovation trends



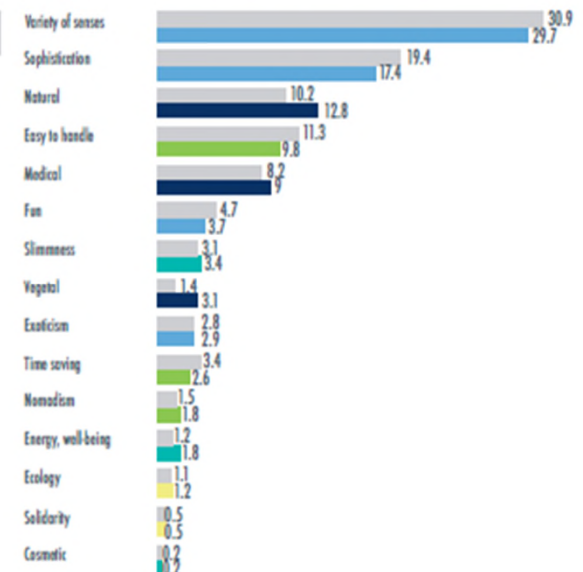
The world's 15 most innovative food sectors (2016,%)



Drivers of innovation in Europe (2015-2016,%)



Food innovation trends in Europe (2015-2016,%)



Source: XTC World Innovation Panorama 2017
Copyright © XTC www.xtcworldinnovation.com

■ 2015
■ 2016

SUSTAINABILITY OF THE FOOD AND DRINK INDUSTRY

Implementing the United Nations Sustainable Development Goals

9 billion

Global population in 2050

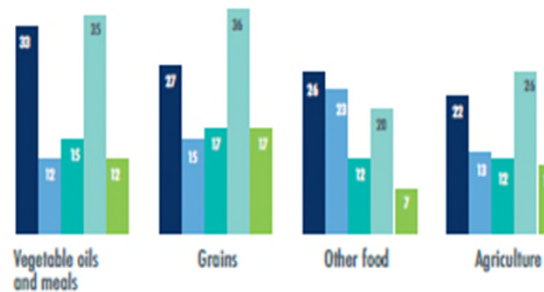
60%

Increase in global food supplies by 2050

- Price volatility of agricultural commodities was peaking in the 1997-2009 period. Prices were more stable in more recent years. Overall highest volatility is noticeable for grains, followed by vegetable oils.
- In 1960, one hectare of land fed 2 people while in 2050 one hectare of land will be required to feed 5 people.
- Climate change increases the likelihood of more extreme temperatures and unpredictable weather events, which affect food production.
- Natural resources, upon which food production relies, will come under increased pressure in the future to meet a growing demand for food worldwide.

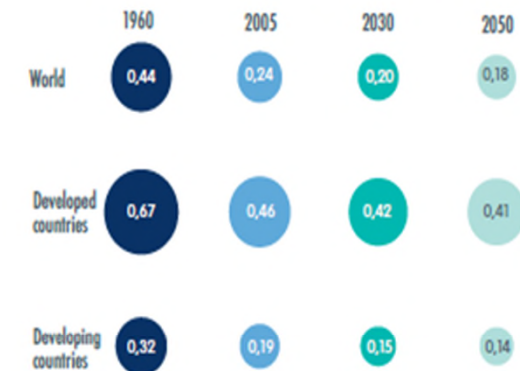
Volatility of world prices of agricultural commodities (%)

■ 1961-1973 ■ 1973-1985 ■ 1985-1997 ■ 1997-2009 ■ 2009-2014



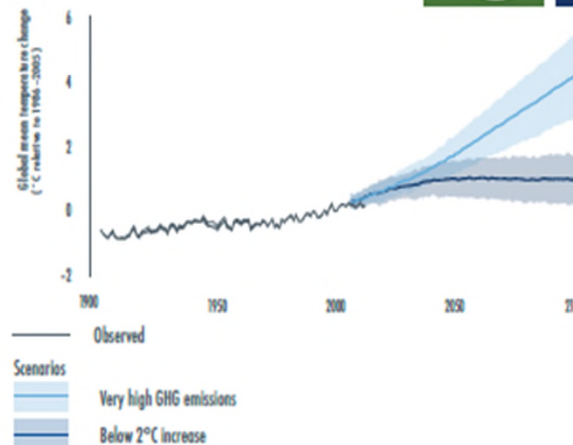
Source: European Commission, DG Agriculture and Rural Development

Arable land per capita (hectares in use per person)



Source: World agriculture towards 2030/2050: the 2012 revision, FAO

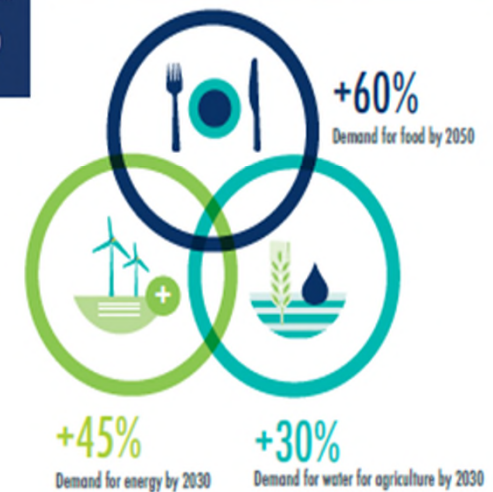
Past and projected global temperature change



Source: Climate Change 2014: Synthesis Report, IPPC



Future global challenges (% increase)



Sources: The Future of Food and Farming (2011), FAO

F&D INDUSTRY FUTURE TRENDS



- Wide variety of products.
- Convenience, ready to eat.
- Authenticity, Origin, Territory, Landscape, Narrative.
- Attention to specific nutritional needs.
- Tasty products, texture, density, colour, portion, pack.
- Products affordable in price / quality ratio.
- Attention to specific needs: religious / ethnic / ethical .
- Attention to environment, sustainability, organic, naturalness, no waste , recovery.
- New occasions: brunches, aperos, happy hours, street food, catering, slow food, grazing, gastros.

Challenges and responses for Food Manufacturers

- Scarcity in **raw materials**;
- **Globalization** to manage;
- **Local food chains and markets** enhanced;
- **Buyers and Retailers concentration**;
- **New ways of consumption**;
- High **stratification** of consumption;
- **New glocal values**: ethics, envi, ethnic, authentic, natural ...;
- **New nutritional** and diet values;
- **New policies** on food&drink: neo protect, neo prohibi, neo info;
- **New trade policies**: Europe, Efta, Nafta, Asian, Ttip, Med, Mercosur.

- **Precision farming** and sustainability;
- Raw materials **diversity**; nutritional values
- **Low cost technologies** and downscaling
- Resource and manufacturing **efficiency** to improve;
- **Horizontal** Innovation to be incorporated: new mats., ICT, process, pack, low cost technologies
- From old to **young generation of entrepreneurs**;
- **Food Supply Chain** and **Collaborative Networks**;
- **New distribution systems** and **business models**;
- **Flexibility and differentiation** to face new ways of consumption;

Circular Economy: Global Challenges after 2008 crisis & 2020 coronavirus

- Food & Nutrition security and climate change: sustainable food supply system (SDGs, SFSP-FAO UNEP ESIF EU S3 Platforms EIT Food Kic PPP);
- Access to enough, safe and nutritious food : EU JPI FACCE and Healthy Diet for a Healthy Life and WANA;
- A more resource – efficient agriculture, marine and food chain, in rural and urban dimensions: FAO Agrifood Task force, IPCC, CFP, Logistic, new business models, e-comm...
- Developing the human and social capital: High level panel of experts (FAO UNEP EU+ EFFOST+ERASMUS +ISEKI+PACT4SKILLS+CODEofCONDUCT+FIELDS);
- Land use and rural development strategy: CAP, EU COHESION; OECD WP on rural growth and CIHEAM, PRIMA;
- Long term strategy for the circular bioeconomy : EU biobased PPP – Green Economy and IAASTD and ETC group and Horizon Europe and BB Partnership).
- Long term strategy for renewable energies: BIOGAS, BIOMETHAN european development; BIOENERGIES (solar/eolic/geotermic...)
- PRECISION FARMING (Ict,Space, Digitization, Big Data,Sensors...)



INNOVATIVE FARMERS & AGRI-COOPERATIVES

- **Enhanced Knowledge Exchange**
 - - Farmers learning from farmers
 - - Farmers leading Innovation
 - - Links between conventional and organic systems

- **Green Growth;**
 - - Efficient / Precision use of resources
 - - Active management of natural resources
 - - Climate change mitigation and adaptation
 - - Closing the yield gap/ sustainable intensification
 - - Improved agrifood system productivity

- **Fair and Competitive Value Chains**
 - - Collaboration & Cooperation across all sectors in the chain
 - - New strategy for value chains and new business models
 - - Digitization, ICT, Big Data management, Artificial Intelligence

- **Healthy Farming;**
 - - Integrated pest management and soil/water health
 - - Dealing with emerging pests and diseases
 - - Enhancing biosecurity in housed livestock
 - - Plant and animal breeding for resilience and robustness – nbts/ngts



The European Way - Industry Hot Topics

- The food human axis: effect of ingredients, processing and way of consumption on human wellbeing;
- Low Scale Low Cost new technologies (ict, pilots, niches, efficiency ...)
- High quality stable and fresh food ready to eat with packaging extended shelf life;
- Consumer response to food price instability: from raw materials to retailers supplier;
- Valorization of genetic resources and technological improvements to increase the nutra-functional values of processed foods;
- New track systems and sustainable transportation and logistics, losses and waste reduction;
- Markers identification , integrity of varieties used in the production of traditional materials and food and DOP/IGP
- Sustainable production and new business models and value chains strategies

R&I EU statements and joint statements on priorities & methods (AgriFood):

- . FoodDrinkEurope R&I
- ETP Food4Life – SRIA – Impl. Plan
- ETP Plants 4 Future
- ETP Organic
- ETP Animal farm & Welfare
- NFTP Meetings/Position Papers
- Copa Cogeca RES
- ETP F4L – NFTP EU
- ETP F4L – Copa Cogeca
- ETPs in Cluster 6
- Copa Cogeca – DG Agri, Growth, Employ, Envi, Health, RTD.....
- EFFOST – NFTP
- EIT Food – NFTP
- FIELDS Pact for Skills
- SUSFOOD – ERANETS
- JPIs – Health & Facce
- SCAR – AKIS
- National & Regional Authorities/S 3



Political Opportunity



Juncker Priorities & Modern CAP

10 priorities

01		A new boost for jobs, growth and investment.	06		A reasonable and balanced free trade agreement with the United States.
02		A connected digital single market.	07		An area of Justice and Fundamental Rights based on mutual trust.
03		A resilient Energy Union with a forward-looking climate change policy.	08		Towards a new policy on migration.
04		A deeper and fairer internal market with a strengthened industrial base.	09		Europe as a stronger global actor.
05		A deeper and fairer Economic and Monetary Union (EMU).	10		A Union of democratic change.

Source: European Parliament, European Commission

Sustainable Development Goals

A grid of 17 Sustainable Development Goals (SDGs) icons, numbered 1 to 17. The icons are arranged in three rows: the first row has 6 icons, the second row has 6 icons, and the third row has 5 icons. The 17th icon is the 'THE GLOBAL GOALS' logo.

COP21+



World Food Day 2017

A banner for World Food Day 2017. It features a colorful, abstract graphic of a flame or leaf shape in shades of yellow, orange, and red. Below the graphic, the text reads 'Climate is changing. Food and agriculture are too.'

IPCC

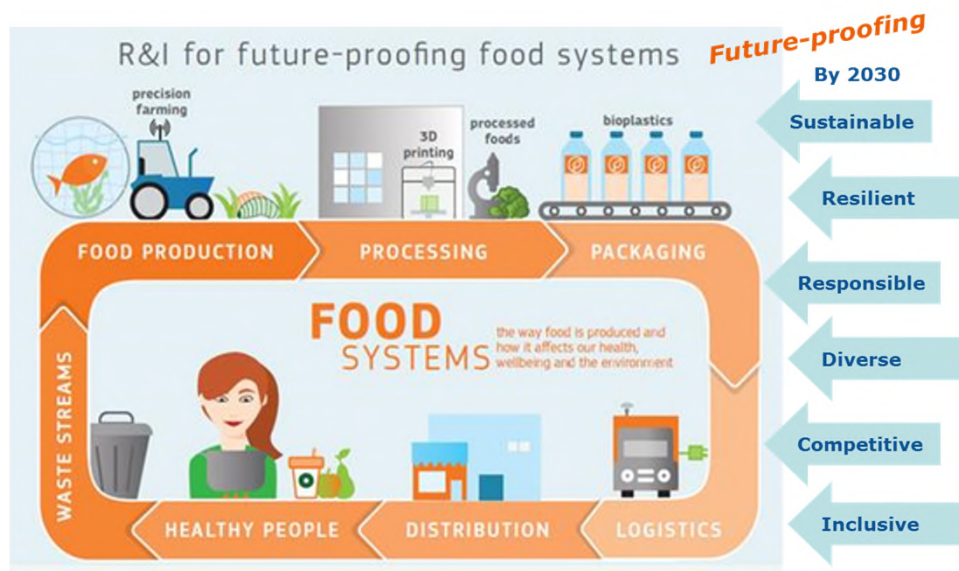
A photograph of a meeting, likely the IPCC, with a text overlay. The text reads: 'The IPCC's priorities for the next six years: 1.5C, oceans, cities and food security'. The photo shows a man in a suit speaking at a podium.

Research and Innovation



FOOD 2030

EU R&I Policy Framework to future-proof our nutrition & food systems



- Need for a systemic approach to future-proofing food systems by structuring, connecting and scaling-up R&I
- To provide evidence for policies and solutions (knowledge, methods, technologies, services, business models, etc.) addressing 4 priorities.

Research and Innovation

Priorities	
	NUTRITION for sustainable and healthy diets
	CLIMATE smart and environmentally sustainable food systems
	CIRCULARITY and resource efficiency of food systems
	INNOVATION and empowerment of communities
Drivers	
	Research breakthroughs
	Innovation and Investment
	Open Science
	International collaboration

#FOOD2030EU

Working with the private sector

- stakeholder fora (academia, research, authorities & industry)
- mobilise stakeholders on agreed priorities, R&I agendas & roadmaps at EU/national level
- ETP 'Food for Life', NFTP's, 'Animal Farm & Breeding', 'Plants for The Future', TP Organics, ...
- EIT Food <https://www.eitfood.eu/about-us/>
- PublicPrivatePartnerships(SFoodSystems,AgroEcology,AgriData...)
- Addressing innovation,VET education,new businesses,co-creation...
- Pact 4 Skills – Code of Conduct – Centre 4 VETs – Cooperation....



HORIZON EUROPE FP 9 (COM 2018, 7 5 2021)

Budget 2021-2027 95,5 bilion



- **Open Science:**
 - ERA 16,0 b;
 - Marie Curie 6,6 b;
 - Research Infrastructure 2,4 b.
- **Open Innovation:**
 - EIC 10,1 b;
 - European innovation ecosyst. 0,5 b;
 - EIIT 3,0 b.
- **Global Challenges and Industrial Competitiveness:**
 - Health 8,25 b;
 - Culture & Inclusive Society 2,28 b;
 - Civil Security 1,60 b;
 - Digital Industry & Space 15,35 b;
 - Climate, Energy & Mobility 15,12 b;
 - Food, Bioec., Natural Resources 8,95 b;
 - Joint Research Centre JRC 1,97 b;
 - Missions (Soil Health & Food...) (9%);
 - Partnerships (Co-Programmed, Co-Funded, Institutionalised.)
- **Strengthening the European Research Area:**
 - Sharing excellence 2,96 b;
 - Reforming and enhancing the European R&I System 0,44 b.
 - Euratom 1,98 b.
 - InvestEU R&I 6,60 b.





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Summary from calculation for DG EMPL. «foreseen costs of training» agrifood sector

2° of March, 2021 - Pact 4 Skills
Daniel Rossi & Remigio Berruto

Calculation methods to foresee the cost of training for bioeconomy

- Hours of training:
 - 80 for professionals (50 online+30 in class)
 - 160 for akis (100 online+60 in class)
 - 600 for students (EQAVET, ECVET certificate, 350 online and 250 in class)
- Cost of training:
 - Professionals (Farmers, Agrifood) 530 EUR/person
 - AKIS (Technician, consultants) 1060 EUR/person
 - Students: 4150 EUR/perso

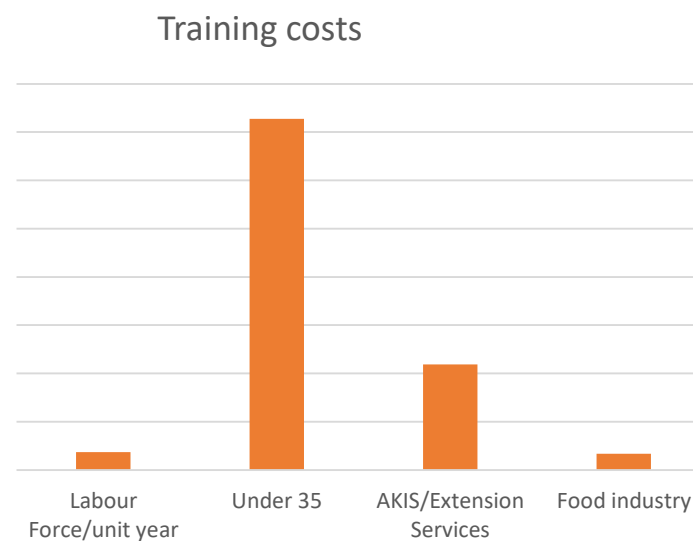
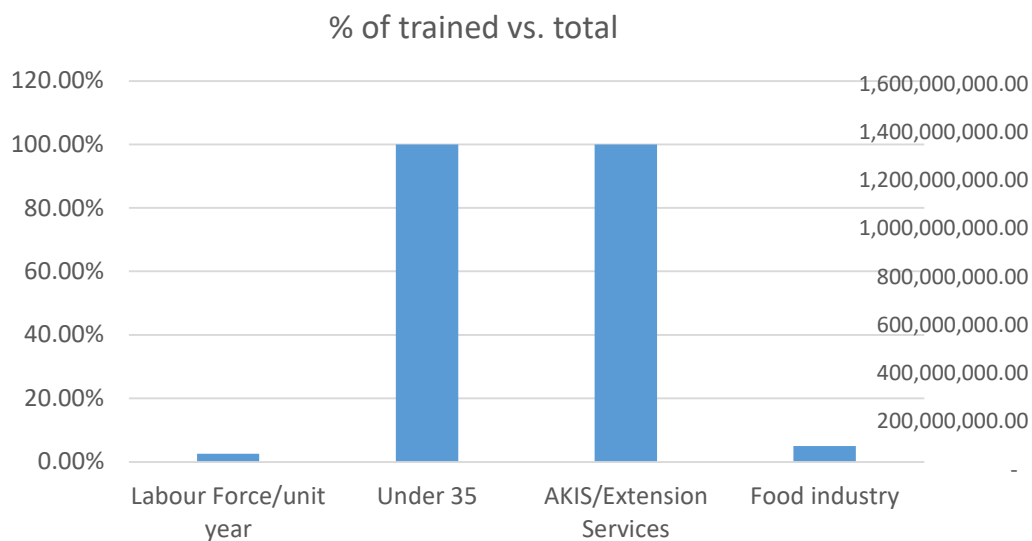
Cost assumptions per trainee based on VET providers av. cost in Italy

AGRI FOOD Sector:employees to be trained in Europe

	Agriculture					Food and Drink Industry Employees
	Total employees	Farms	Labour Force/unit year	Under 35	AKIS/Extension Services	
Austria	318.840	132.500	111.000	15.370	9.275	83.300
Belgium	70.910	36.890	57.000	1.510	2.582	88.500
Bulgaria	439.740	202.720	320.000	16.300	14.190	95.600
Croatia	318.060	134.460	175.000	9.600	9.412	61.000
Cyprus	72.910	34.940	17.000	590	2.446	5.200
Czechia	130.290	26.520	105.000	1.200	1.856	115.400
Denmark	73.320	35.050	54.000	970	2.454	61.600
Estonia	38.380	16.700	22.000	1.440	1.169	15.400
Finland	111.860	49.760	58.000	4.630	3.483	37.600
France	859.750	456.520	725.000	41.640	31.956	427.200
Germany	653.760	276.120	523.000	19.520	19.328	569.200
Greece	1.198.390	684.950	464.000	36.890	47.947	87.200
Hungary	814.420	430.000	434.000	30.170	30.100	106.600
Ireland	265.180	137.560	164.000	8.730	9.629	47.300
Italy	2.045.410	1.145.710	817.000	45.680	80.200	427.000
Latvia	162.630	69.930	82.000	4.100	4.895	23.700
Lithuania	255.570	150.320	145.000	9.660	10.522	44.100
Luxembourg	4.780	1.970	4.000	180	138	1.530
Malta	15.420	9.310	4.000	360	652	1.950
Netherlands	172.660	55.680	153.000	2.080	3.898	128.600
Poland	3.088.250	1.410.700	1.919.000	173.560	98.749	417.500
Portugal	603.720	258.980	323.000	6.510	18.129	107.500
Romania	6.061.200	3.422.030	1.553.000	171.960	239.542	180.800
Slovakia	79.180	25.660	51.000	1.910	1.796	29.300
Slovenia	196.040	69.900	82.000	3.470	4.893	16.500
Spain	1.866.210	945.020	814.000	35.700	66.151	349.200
Sweden	129.280	62.940	59.000	2.930	4.406	50.500
Total	20.046.160	10.282.840	9.235.000	646.660	719.799	3.579.280

Training costs – optimistic scenario

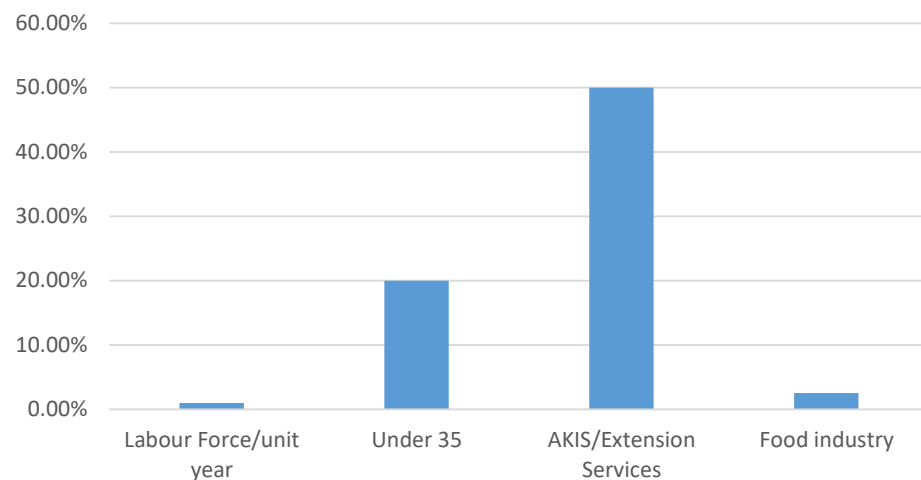
	Labour Force/unit year	Under 35	AKIS/Extension Services	Food industry	total cost	train the trainer (5% of total cost)
trained vs. total	2,50%	100%	100%	5%		
training costs	73.345.000	1.455.481.000	437.343.000	67.928.000	2.034.097.000	101.704.850



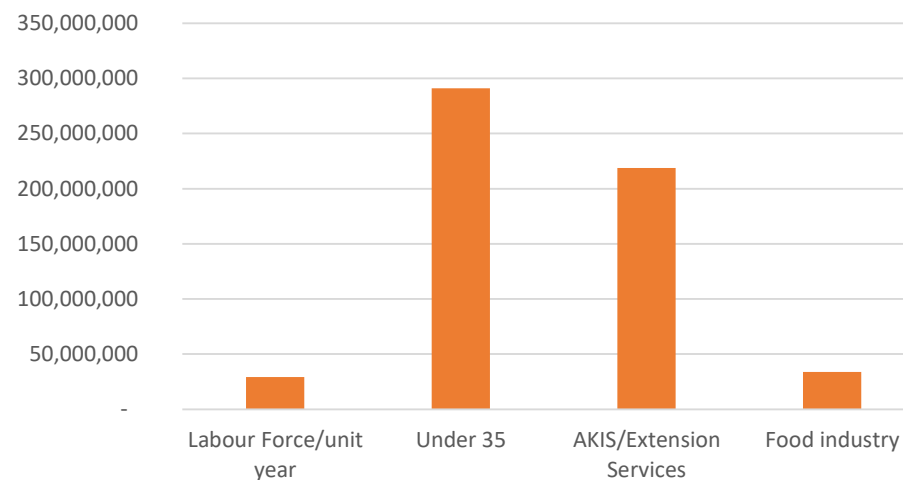
Training costs – pessimistic scenario

	Labour Force/unit year	Under 35	AKIS/Extension Services	Food industry	total cost	train the trainer (5% of total cost)
trained vs. total	1,00%	20%	50%	3%		
training costs	29.339.000	291.093.000	218.670.000	33.965.000	573.067.000	28.653.350

% of trained vs. total



Training costs



Thank you for your attention!



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