

## STARTUPPING IN THE BIOECONOMY

# A first attempt to measure the bio-based economy

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# Agenda

**1** Methodology

**2** Main results for European countries

**3** A first watch to global economy with foreign trade

# Bioeconomy: the EU definition

## Innovating for Sustainable Growth: A Bioeconomy for Europe - 2012

*«The bioeconomy encompasses the sustainable production of renewable biological resources and their conversion and that of waste streams into food, feed, bio-based products<sup>(1)</sup> such as bioplastics, biofuels and bioenergy. It includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries.»*

(1) Bio-based products are products that are wholly or partly derived from materials of biological origin, excluding materials embedded in geological formations and/or fossilised

MEMO/12/97

# How worth is bio-economy? The EU table for 2009

Table 1: The bioeconomy in the European Union<sup>2</sup>

Sector	Annual turnover (billion €)	Employment (thousands)	Data source
Food	965	4400	CIAA
Agriculture	381	12000	COPA-COGECA, Eurostat
Paper/Pulp	375	1800	CEPI
Forestry/Wood ind.	269	3000	CEI-BOIS
Fisheries and Aquaculture	32	500	EC***
<b>Bio-based industries</b>			
<i>Bio-chemicals and plastics</i>	50 (estimation*)	150 (estimation*)	USDA, Arthur D Little, Festel, McKinsey, CEFIC
<i>Enzymes</i>	0.8 (estimation*)	5 (estimation*)	Amfep, Novozymes, Danisco/Genencor, DSM
<i>Biofuels</i>	6**	150	EBB, eBio
<b>Total</b>	<b>2078</b>	<b>22005</b>	

\*Estimation for Europe for 2009; \*\*Estimation based on a production of 2.2 million tonnes bioethanol and 7.7 million tonnes of biodiesel at average market price in Europe; \*\*\*EC, Facts and figures on the CFP, Basic Statistics Data, ISSN 1830-9119, 2010 Edition

# Aims of our exercise

## Create a methodology in order to:

- Estimate on a country by country basis
- Use only official statistical figures regularly updated (where available)
- Include foreign trade and competitiveness issues

# Bio-based economy and statistical classifications

EU Commission	NACE Rev.2 with National Account details		
Agriculture	01	Crop and animal production, hunting and related service activities	
Forestry	02	Forestry and logging	
Fisheries and Aquaculture	03	Fishing and aquaculture	
Food	10-12	Manufacture of food products; beverages and tobacco products	
Wood	16	Man. of wood and of products of wood and cork, except furniture; man.of articles of straw and plaiting materials	
Paper and pulp	17	Manufacture of paper and paper products	
Biochemistry (biochemicals, biofuels, enzymes)	20	Manufacture of chemicals and chemical products	

## Biochemicals: need for more detailed statistics

- PRODCOM: very detailed data on production, derived from NACE rev.2
  - 536 products codes for the chemical industry.
- Harmonised System: classification of foreign trade data
  - 473 products codes for the chemical industry

# One question, four answers with the help of nova-Institut

## Can this type of product be considered a bio-chemical?

- **Yes:** the production with renewable sources (excluding fossil input) is both technologically feasible and economically convenient. Es. Biofuels, Inorganic tanning substances; tanning preparations;
- **Yes, but tomorrow:** the production with renewable sources (excluding fossil input) could be (in theory) technologically feasible with current knowledge but, as far as we know, it has never been experienced. Es. Polyacetals, in primary forms; Phenolic resins, in primary forms
- **Yes, but only in part:** only part of the product class can be considered bio-chemical. Es. Herbicides; Prepared pigments, opacifiers, colours and similar preparations for ceramics, enamelling or glass
- **No:** the production with renewable sources (excluding fossil input) is not technologically feasible with current knowledge. Es. Aluminium hydroxide; Prepared explosives (excluding propellant powders).

## Warning n.1

- We do not know if the products classified as bio-chemicals are actually produced with renewable sources. Even considering only this type of products (excluding future biochemicals and partially biochemicals) there is a risk of **overestimation**.
- **We are more precisely measuring a “potential” production of biochemical products and not the actual level.**

## Warning n.2

- PRODCOM statistics on production are not complete, because of confidentiality, especially in small countries (Netherlands, Belgium).
  - We consider only countries in which at least 70% of codes are fully available;
  - We estimate some missing data with the help of the full series from 2009 to 2012;
  - After having estimated the weight of bio-chemicals on total chemical products we apply this percentage on the level of chemical production derived from Eurostat Structural Business Statistics.

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# Production value: 1200 billion euro in EU5...

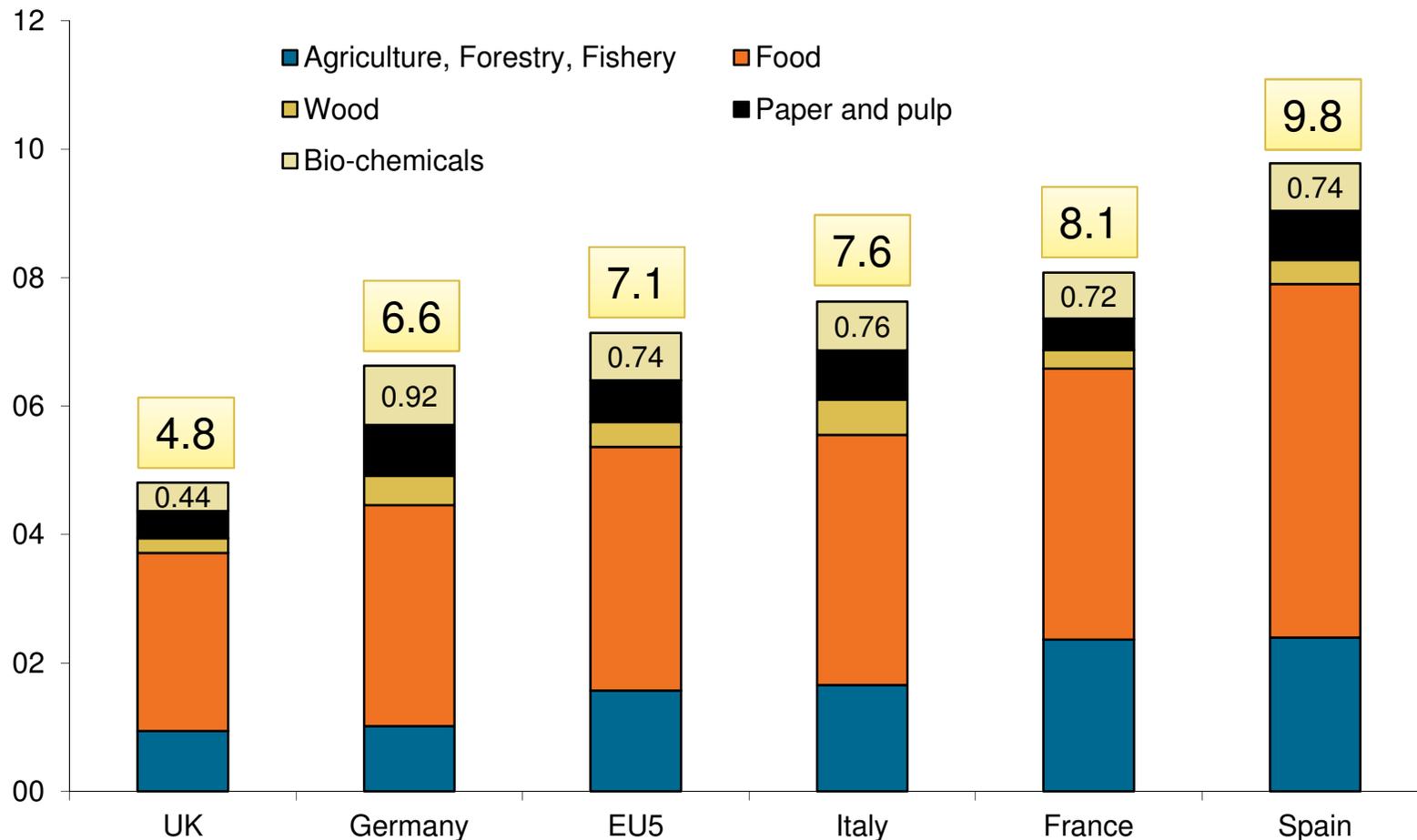
## Production value of bioeconomy in Europe (Million euro, 2011)

	Italy	Germany	France	UK	Spain	EU5
Agriculture, Forestry, Fishery of which:	52,419	50,760	86,409	30,310	45,747	265,644
Agriculture	49,618	45,730	78,813	27,162	n.d.	n.d.
Forestry	690.7	4,560	5,475	1,574	n.d.	n.d.
Fishery	2,110	470	2,121	1,574	n.d.	n.d.
Food	123,165	171,370	154,185	89,372	105,051	643,143
Wood	17,369	22,740	10,709	7,401	7,108	65,327
Paper and pulp	24,207	39,550	17,803	13,603	14,682	109,846
Bio-chemicals	19,796	56,154	28,854	13,696	13,608	132,107
<b>Bio-economy</b>	<b>241,311</b>	<b>330,484</b>	<b>295,366</b>	<b>154,986</b>	<b>186,617</b>	<b>1,208,765</b>

Source: our estimates on Eurostat data

# ...with a important contribution of agro-food industry in Spain, France and Italy

Bio-economy weight on total production (% , 2011)



Source: our estimates on Eurostat data

# Employment: almost 19 million employees in EU27

**Employment in bio-economy in Europe**  
(thousands, 2011)

	Italy	Germany	France	UK	Spain	EU5	EU27
Agriculture, Forestry, Fishery of which:	954	674	761	373	758	3,520	11,721
Agriculture	869	621	705	344	n.d.	n.d.	10955.8
Forestry	26.8	48	30	18	n.d.	n.d.	503.8
Fishery	58	5	27	11	n.d.	n.d.	261.5
Food	461	870	610	409	407	2,756	4,820
Wood	148	135	71	83	67	504	1,090
Paper and pulp	82	139	65	53	51	390	654
Bio-chemicals	53	112	49	31	32	277	436
<b>Bio-economy</b>	<b>1,697</b>	<b>1,930</b>	<b>1,556</b>	<b>949</b>	<b>1,314</b>	<b>7,447</b>	<b>18,720</b>

6.9%

8.2%

Source: our estimates on Eurostat data

# Bio-economy worth 15% of total UE27 exports...

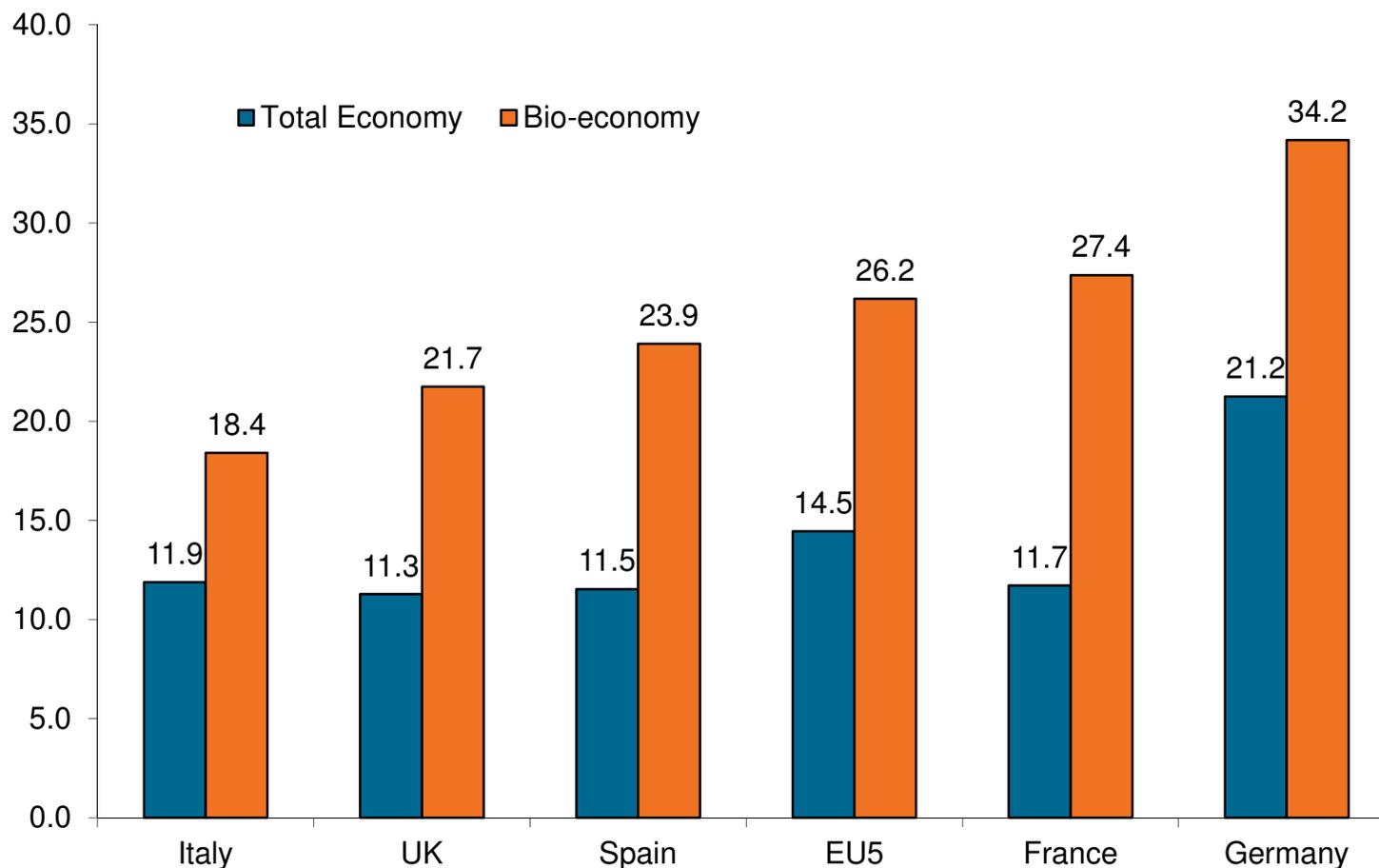
## European Exports flows in bio-economy (million euro, 2011)

	Italy	Germany	France	UK	Spain	EU5	EU27
Agriculture, Forestry, Fishery of which:	5,804	9,527	15,952	3,274	11,601	46,157	99,986
Agriculture	5,453	8,884	14,993	2,411	10,894	42,635	90,080
Forestry	109	385	441	63	168	1,166	3,670
Fishery	241	258	518	800	538	2,356	6,237
Food	24,371	51,716	40,633	19,221	21,419	157,360	305,169
Wood	1,444	6,163	1,815	388	1,164	10,974	34,312
Paper and pulp	6,048	19,405	6,635	2,966	4,277	39,332	86,863
Bio-chemicals	6,742	26,194	15,800	7,854	6,164	62,754	120,639
<b>Bio-economy</b>	<b>44,409</b>	<b>113,004</b>	<b>80,835</b>	<b>33,704</b>	<b>44,625</b>	<b>316,576</b>	<b>646,970</b>
<b>Total Economy</b>	<b>375,904</b>	<b>1,058,897</b>	<b>428,501</b>	<b>363,915</b>	<b>220,223</b>	<b>2,447,440</b>	<b>4,367,039</b>
<b>Bio-economy on total</b>	<b>11.80%</b>	<b>10.70%</b>	<b>18.90%</b>	<b>9.30%</b>	<b>20.30%</b>	<b>12.90%</b>	<b>14.80%</b>

Source: our estimates on Eurostat data

## ...with a high export propensity, especially in Germany

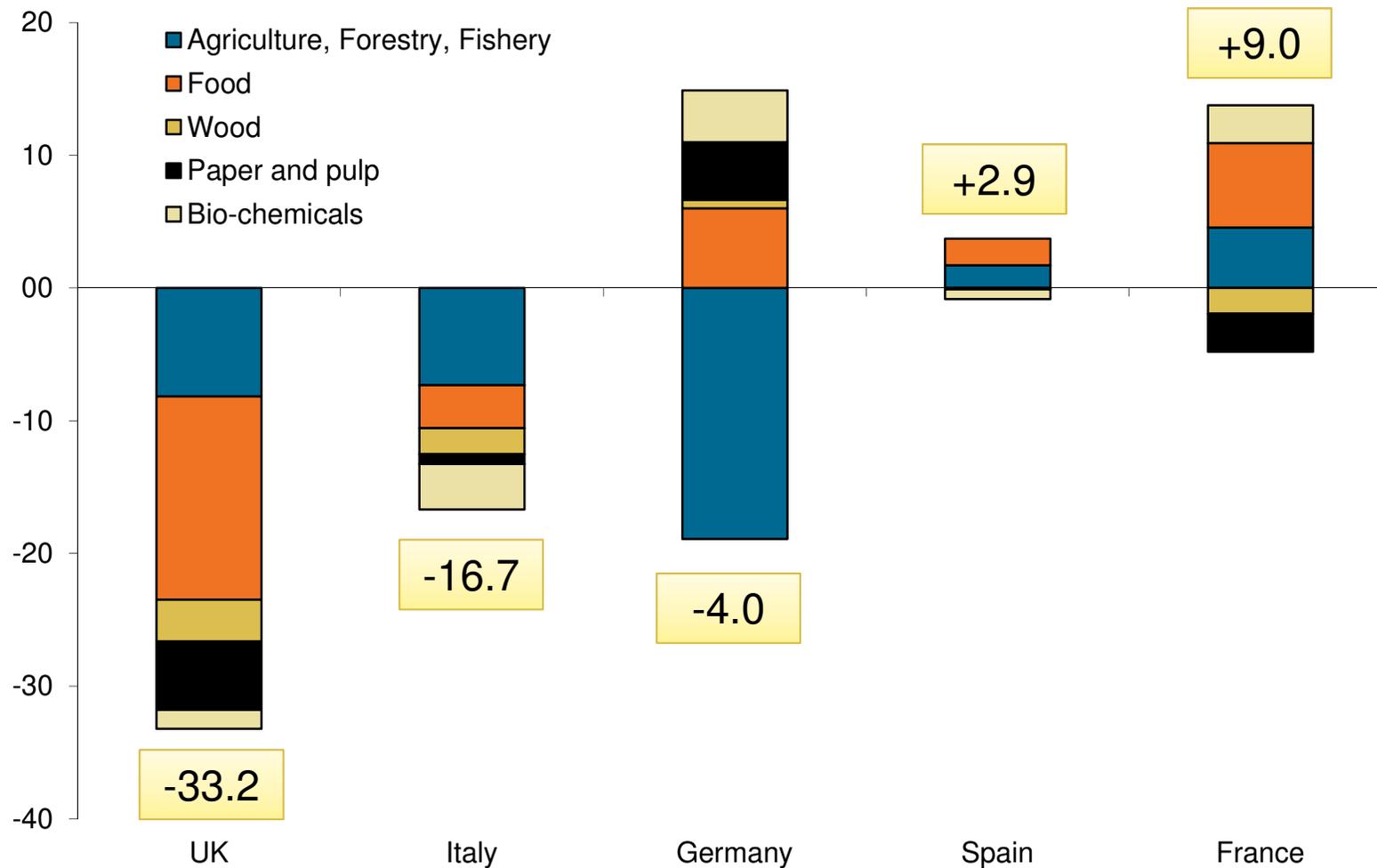
**Export propensity in bio-economy**  
(Exports/production, %,2011)



Source: our estimates on Eurostat data

# Positive foreign trade balance only for France and Spain

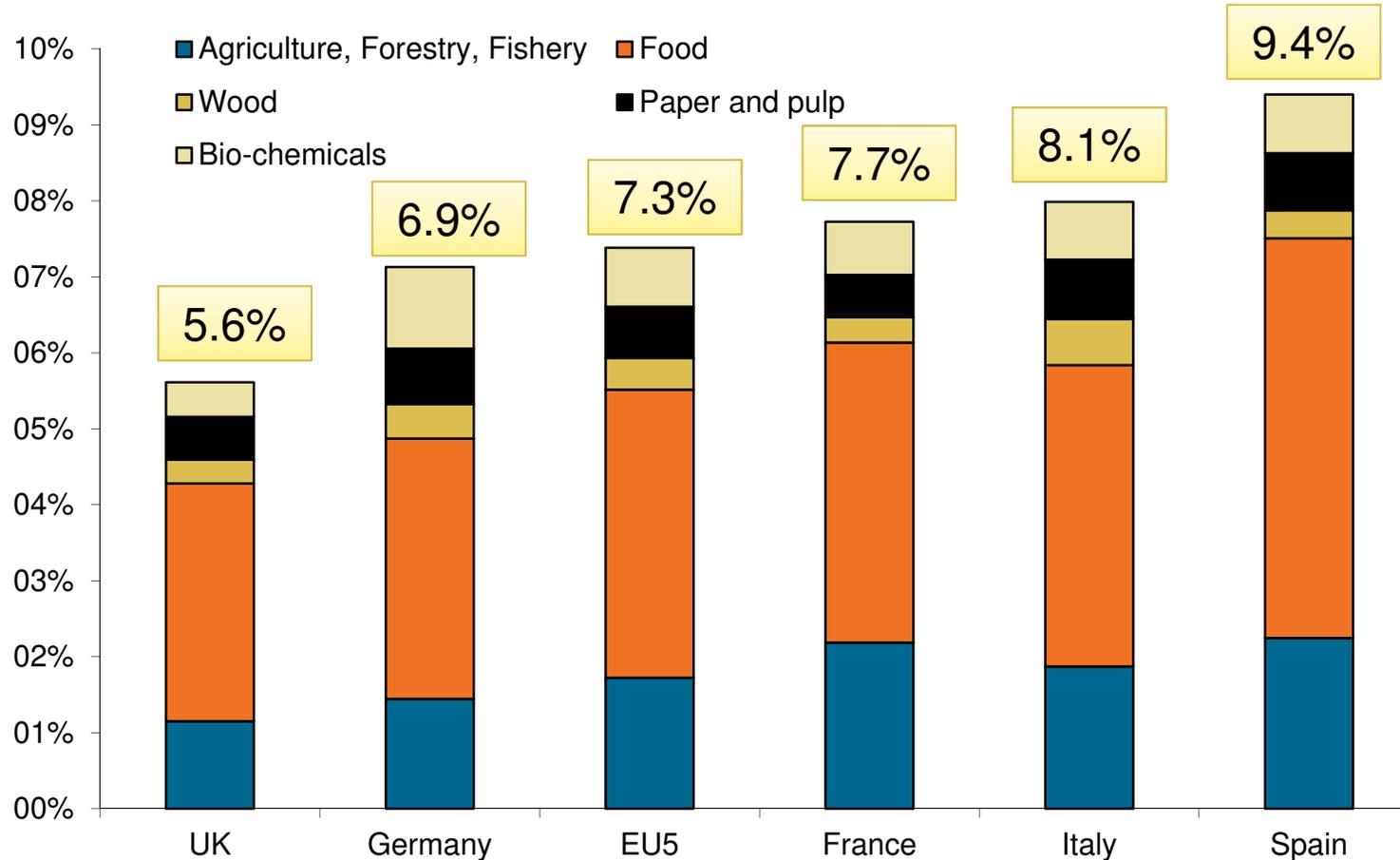
Foreign Trade Balance  
(Billion euro – 2011)



Source: our estimates on Eurostat data

# Apparent consumption: 7.3% in EU5, with higher weights in Spain and Italy

**Apparent consumption in bio-economy**  
(production+exports+imports, % on total, 2011)



Source: our estimates on Eurostat data

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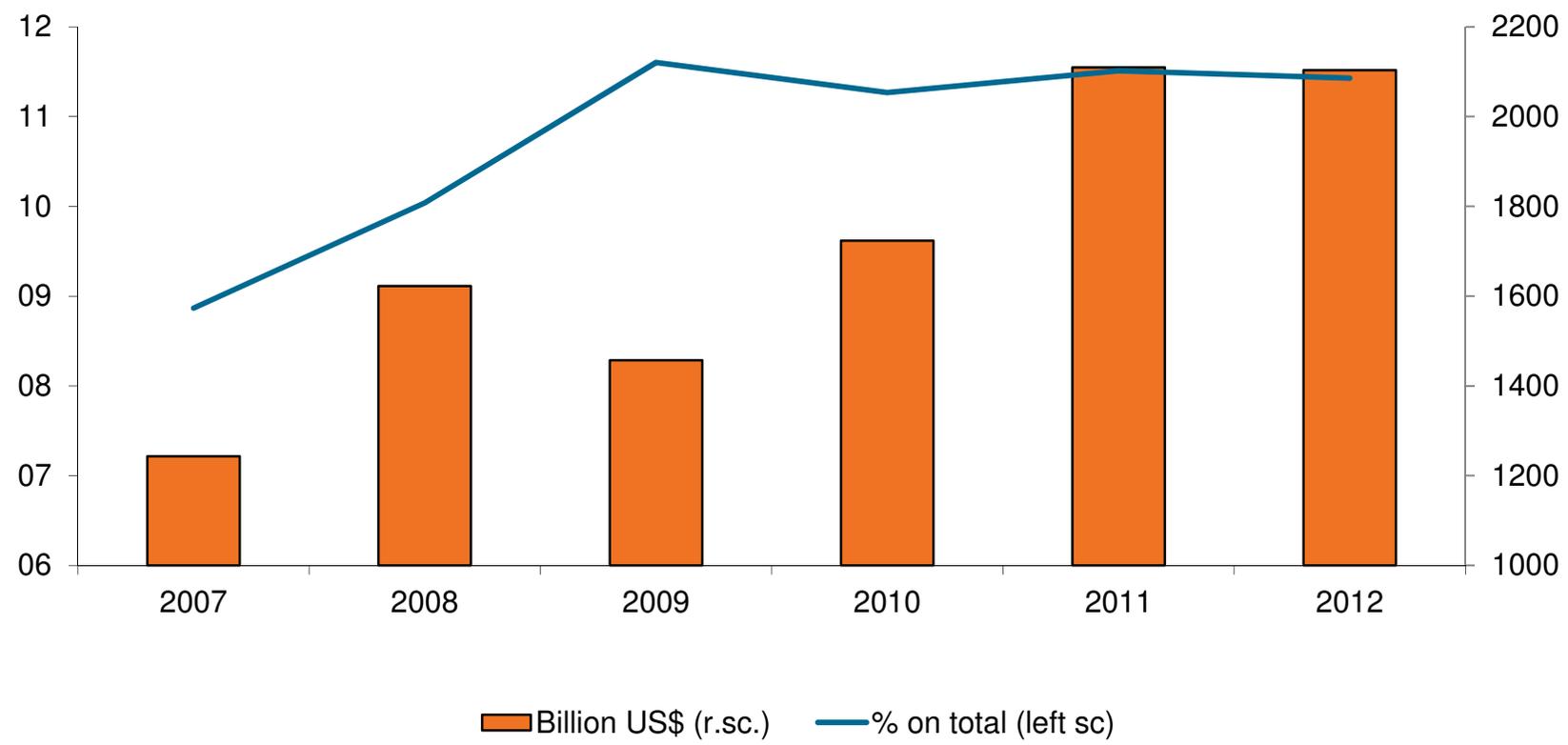
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# Increasing global trade: in 2012 2,100 billion US\$, i.e. 11.4% of total world exports...

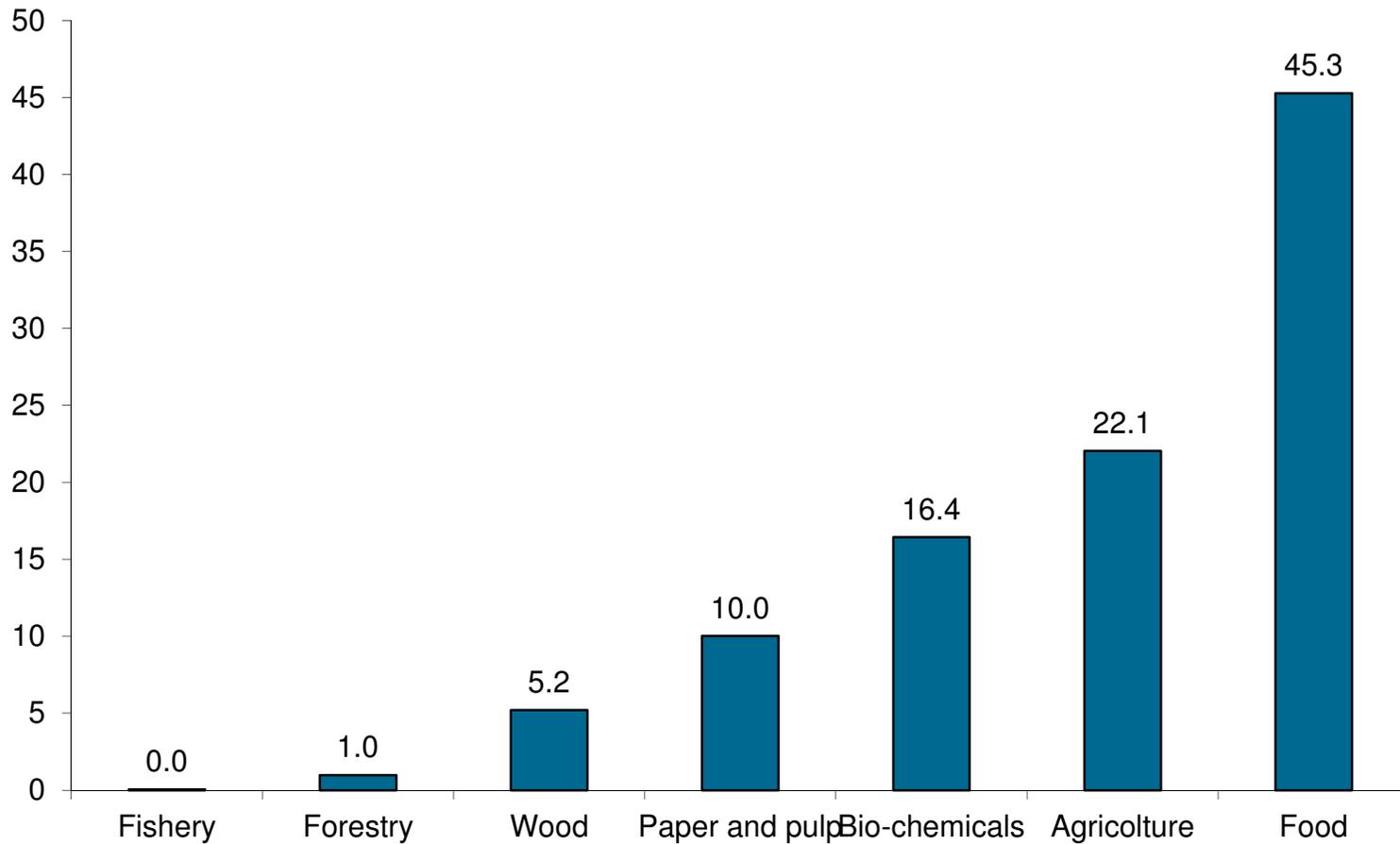
**Global trade in bio-based products**  
(billion US\$ and %)



Source: our estimates on UNCTAD Comtrade

# ...with a relevant weight of food products

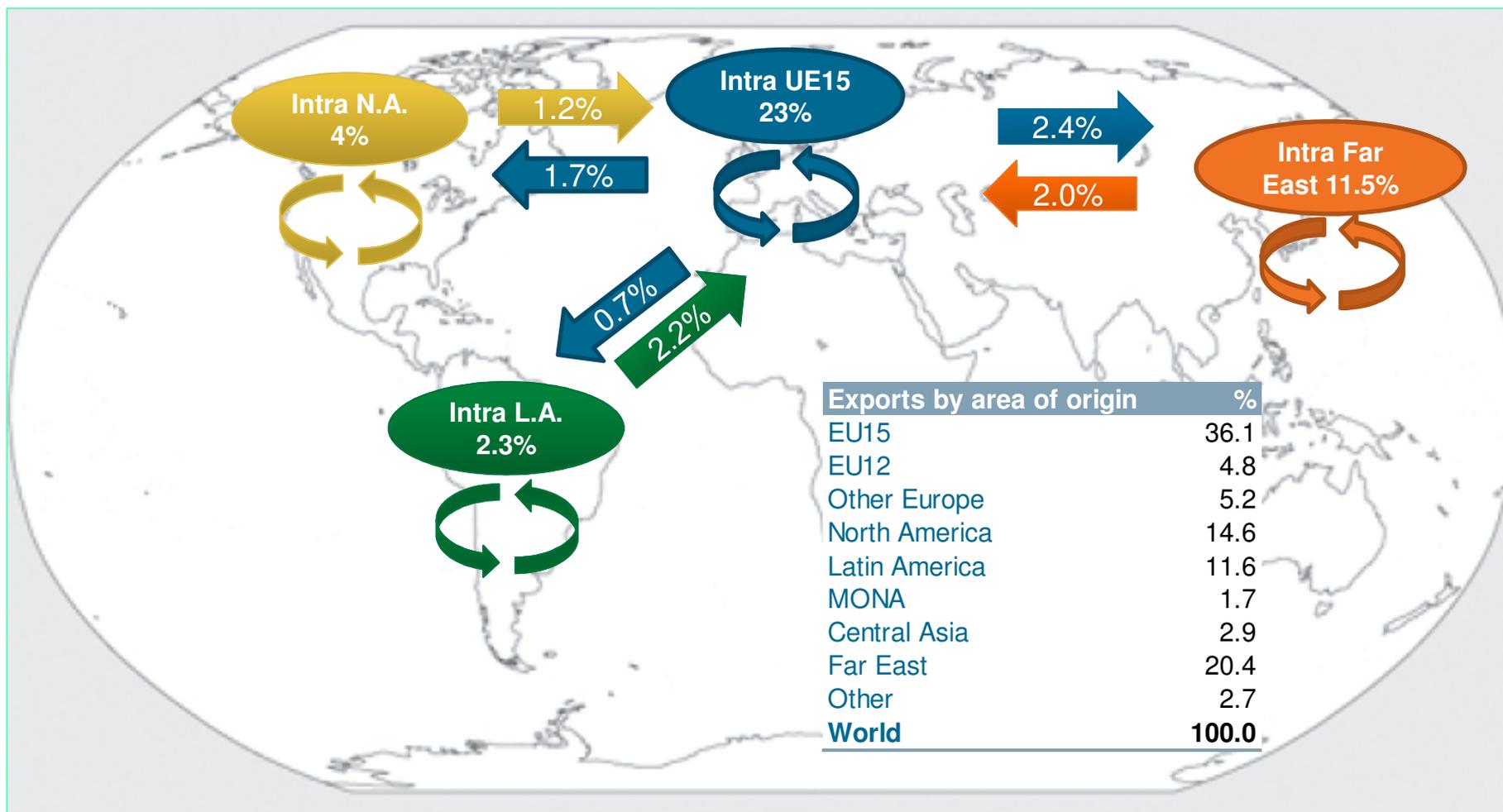
Bio-economy exports by industry  
(%, 2012)



Source: our estimates on UNCTAD Comtrade

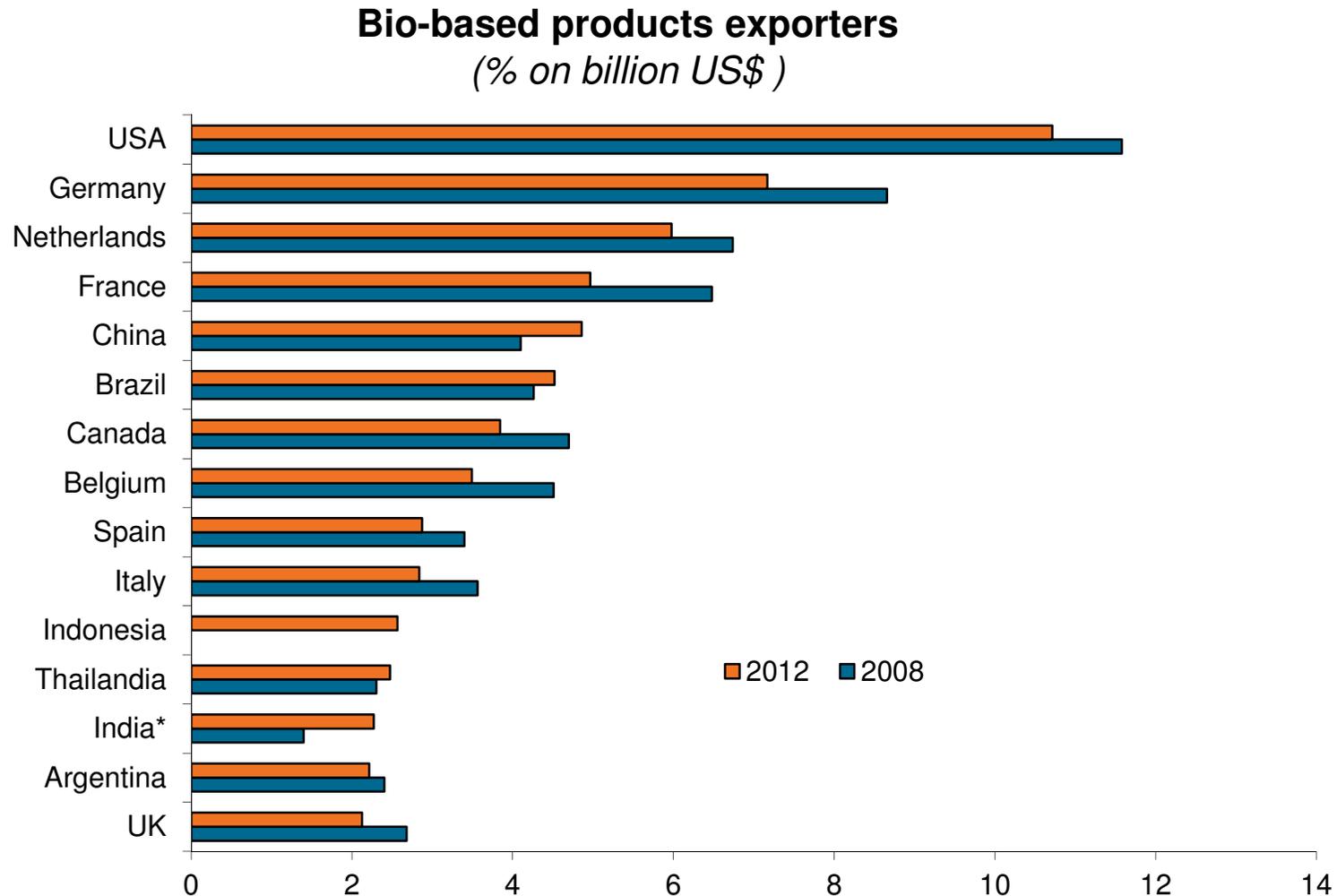
# EU15, Far East and North America major exporters

Bio-economy exports by main geographic areas  
(%, 2012)



Source: our estimates on UNCTAD Comtrade

# US still dominant but an increasing role for emerging countries



\*2009 instead of 2008 Source: our estimates on UNCTAD Comtrade

# Agriculture: China is the lead importer with a high deficit

## Major players\* in agriculture, fishery and forestry trade flows (2012)

	Exports			Imports			Trade balance
	Billion US\$	% share	Ranking	Billion US\$	% share	Ranking	Billion US\$
USA	75.8	15.6%	1	39.9	8.4%	2	35.90
China	13.3	2.7%	10	79.3	16.7%	1	-66.00
Netherlands	30.2	6.2%	3	21.6	4.5%	5	8.60
Germany	11.7	2.4%	12	35.0	7.4%	3	-23.30
Brazil	36.5	7.5%	2	4.6	1.0%	25	32.00
Canada	22.7	4.7%	4	10.1	2.1%	13	12.60
France	18.8	3.9%	6	13.1	2.7%	10	5.70
Spain	15.5	3.2%	8	12.1	2.5%	11	3.40
Japan	0.7	0.1%	68	25.7	5.4%	4	-25.00
Russian Federation	8.7	1.8%	19	14.2	3.0%	8	-5.60
Belgium	8.8	1.8%	18	13.8	2.9%	9	-5.00
Italy	7.2	1.5%	20	14.6	3.1%	7	-7.40
India	13.3	2.7%	11	8.6	1.8%	15	4.70
Australia	19.4	4.0%	5	1.4	0.3%	48	17.90
Indonesia	11.4	2.3%	14	8.3	1.8%	17	3.00

\* Classified according to total imports plus exports Source: our estimates on UNCTAD Comtrade

# Food: US and Japan main importers with Europe with high market shares

## Major players\* in food trade flows (2012)

	Exports			Imports			Trade balance
	Billion US\$	% share	Ranking	Billion US\$	% share	Ranking	Billion US\$
USA	75.9	8.0%	1	88.8	9.9%	1	-12.9
Germany	70.2	7.4%	2	58.4	6.5%	3	11.8
Netherlands	63.2	6.6%	3	39.6	4.4%	7	23.6
France	53.7	5.6%	4	45.2	5.0%	5	8.4
China	46.8	4.9%	5	44.1	4.9%	6	2.7
United Kingdom	26.3	2.8%	14	47.4	5.3%	4	-21.1
Italy	33.4	3.5%	8	35.1	3.9%	8	-1.7
Japan	4.3	0.5%	40	58.9	6.6%	2	-54.6
Belgium	33.9	3.6%	7	25.6	2.9%	10	8.3
Spain	29.5	3.1%	10	24.5	2.7%	12	5.1
Brazil	43.7	4.6%	6	6.9	0.8%	31	36.8
Canada	24.9	2.6%	16	25.0	2.8%	11	-0.1
India	27.8	2.9%	12	13.1	1.5%	17	14.7
Thailand	29.7	3.1%	9	9.4	1.1%	26	20.3
Indonesia	28.4	3.0%	11	9.7	1.1%	25	18.7

\* Classified according to total imports plus exports Source: our estimates on UNCTAD Comtrade

# Bio-chemicals: US and Germany as leader exporters while China is by far the most important importer

## Major players\* in bio-chemicals trade flows (2012)

	Exports			Imports			Trade balance Billion US\$
	Billion US\$	% share	Ranking	Billion US\$	% share	Ranking	
USA	44.0	12.7%	1	26.7	7.3%	3	17.3
Germany	36.8	10.7%	2	29.7	8.2%	2	7.2
China	11.3	3.3%	10	50.0	13.7%	1	-38.7
Netherlands	24.7	7.1%	3	15.2	4.2%	6	9.5
Belgium	22.1	6.4%	4	17.4	4.8%	4	4.8
France	21.7	6.3%	5	16.8	4.6%	5	4.9
Rep. of Korea	15.4	4.5%	7	8.2	2.3%	14	7.2
Singapore	15.9	4.6%	6	7.2	2.0%	15	8.7
Italy	9.1	2.6%	13	13.9	3.8%	7	-4.7
United Kingdom	10.8	3.1%	11	12.1	3.3%	8	-1.4
Japan	12.1	3.5%	9	8.6	2.4%	13	3.5
Spain	8.6	2.5%	14	9.7	2.7%	10	-1.1
Canada	8.3	2.4%	15	8.9	2.4%	12	-0.5
Saudi Arabia	14.1	4.1%	8	2.6	0.7%	30	11.5
India	5.4	1.6%	19	9.8	2.7%	9	-4.5

\* Classified according to total imports plus exports Source: our estimates on UNCTAD Comtrade

# Conclusion

- According to our estimates the Bio-economy in EU27 accounts for 18 million employees in 2011, i.e. 8.2% on total employment. Bio-economy weights 15% of total UE27 exports, with a high export propensity, especially in Germany.
- In EU5 countries the bio-economy production is worth 1,200 million euro in 2011, with France and Spain registering a higher weight on total production, thanks to their agri-food industry.
- In Italy in 2011 bio-economy production worth 241 billion euro (7.6% on total production), occupying 1.6 million employees.
- At a world level, the US plays a leading role, but emerging countries are gaining market shares. China is the most important outlet, with a significant trade deficit especially in agricultural and bio-chemicals products.
- Italy suffers an important trade deficit (16.7 billion euro in 2011). Among the EU5 countries only France and Spain register a trade surplus.