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EU coordinated **ME**thods and procedures based on **R**eal **C**ases for the effective implementation of policies and measures supporting energy efficiency in the **I**ndustry

HORIZON 2020 Project Nr. 693845

Analysis of Food and Beverage sector in different Countries

WP4: Picture of efficiency projects implemented by the Industry sector-by-sector and process-by-process

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1 Portugal

1.1 General overview of the sector

The food and beverage industry (F&B) is the manufacturing industry that contributes most to the national economy, both in terms of turnover and Gross Value Added (GVA). It is also the one that most employs in Portugal, having been responsible for more than 108,000 jobs in 2016, according to FIPA's estimate.

It has contributed to the balance of trade balance, with a growth rate of exports that is higher than that of imports. Since 2010 it has maintained a performance above the average national economy.

Despite the crisis and in contrast to the national manufacturing industry, the national food and beverage industry grew between 2013 and 2016 in terms of number of companies and Gross Value Added.

Regarding the external competitiveness, exports of food and drink industry in 2016 increased by 2.0% compared to 2015, reaching 4,550 million (8.95% of total exports of goods Portugal).

1.1.1 Companies

At the end of 2016, the food and beverage industry (F&B) had 11,047 active companies, representing 16.5% of the total manufacturing industry in Portugal.

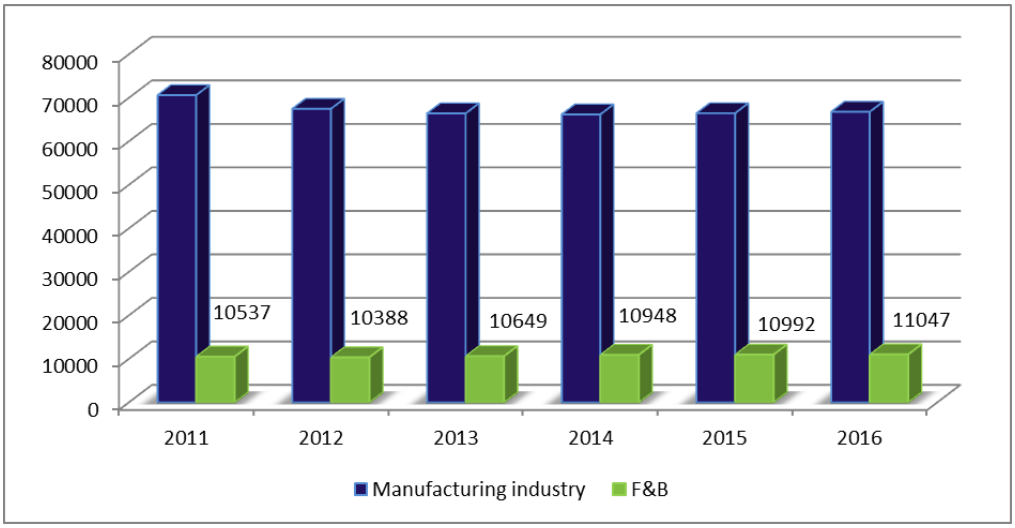

Figure 1: No. of manufacturing companies and F&B in Portugal (2011-2016).

Regarding the number of companies by sector, the one that has greater weight is "bakery and farinaceous products", counting on 57% of the total and in second place is the "Beverage industry" with 16%. It should be noted that, in the first group, INE includes bakeries, which are mostly small and micro-enterprises.

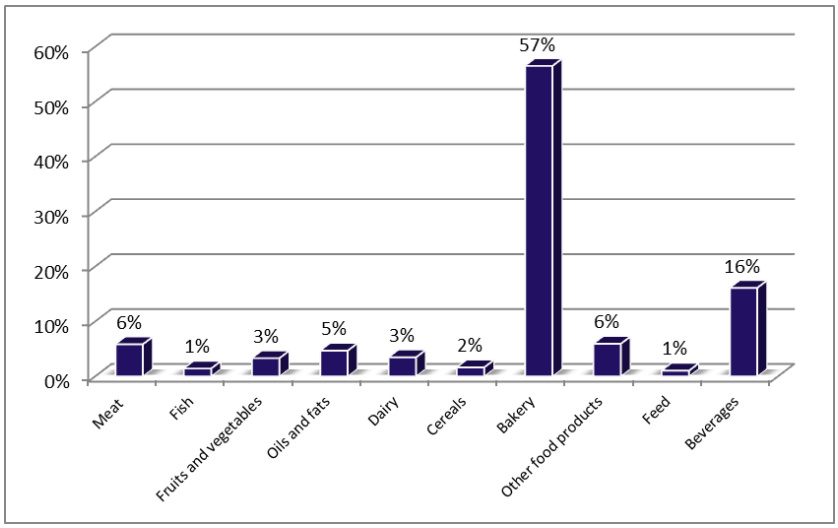

Figure 2: % of companies by sector in Portugal (2016).

Small SMEs (1 to 9 workers) in the food and beverage sector account for 81.5% of the total sector, which, added to companies with between 10 and 49 workers, represents 97% of the total, being in line with the total industry (96.5%) and the economy (99.5%). The weight of medium-sized companies (50 to 249 employees) in the food and beverage industry is similar to that of the manufacturing industry, 2.7% and 3.1%, respectively. The large companies do not exceed 0.3% of the total of companies active in the food and beverage industry, the total economy represents 0.1% and in manufacturing industry 0.4%.

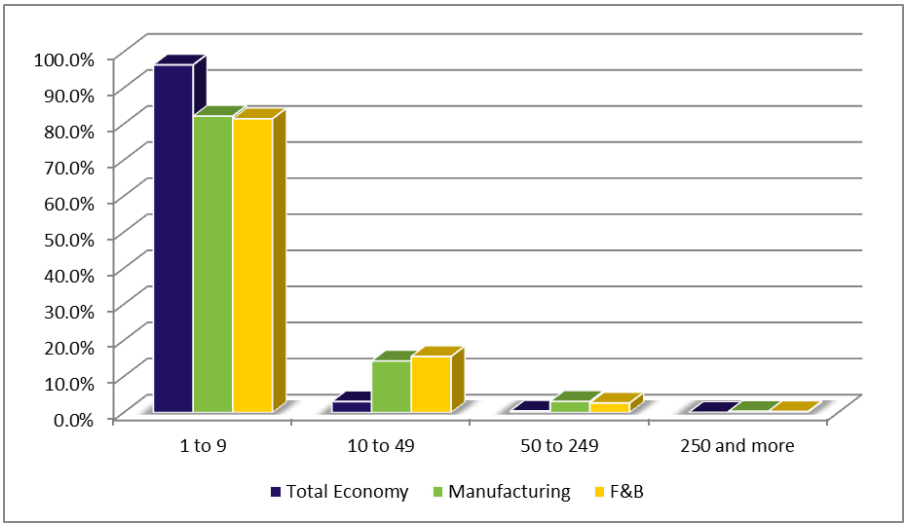

Figure 3: Number of companies by employees number in Portugal (2016).

With regard to the dispersion of companies in the food and drink industry and taking into account the NUTS 2 classification (Nomenclature of Territorial Units for Statistical Purposes - consisting of seven units, five of which on the mainland and the territories of the Autonomous Regions of the Azores and Madeira), most of them in the North and Centre of the country (64%), followed by Lisbon and Alentejo, 13.7% and 13.0% respectively.

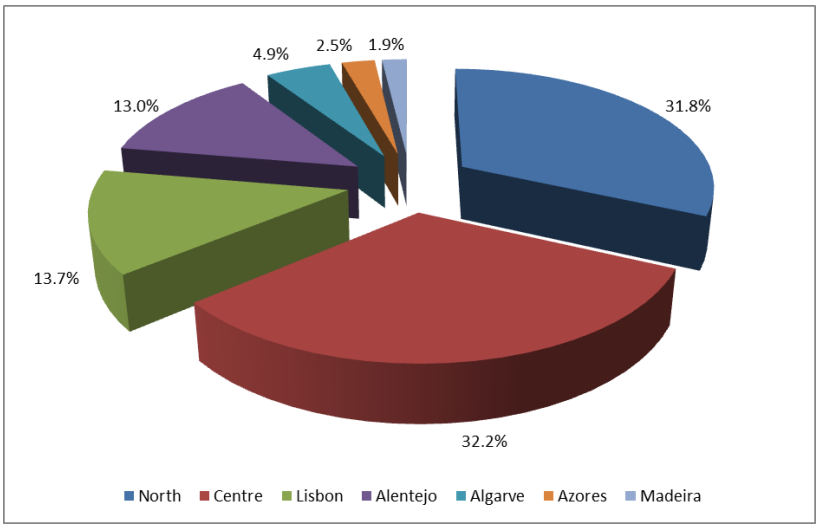

Figure 4: Number of companies by NUTS 2 in Portugal (2016) - FIPA forecast.

The food and beverage industry currently employs about 108,000 people.

In the period from 2011 to 2016, there were two years of negative growth (2012 and 2013), although performing better than the total manufacturing industry.

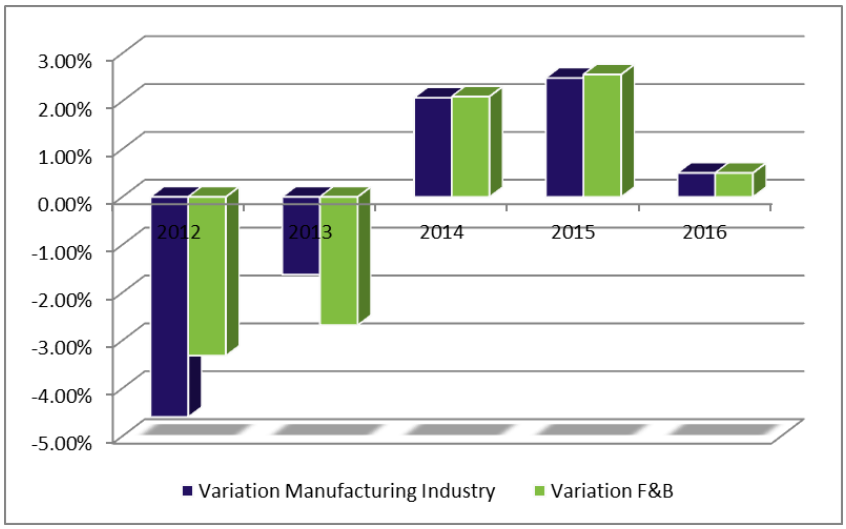

Figure 5: Variation nº of workers in Portugal (2011-2016).

Turnover in the food and beverage industry has continued to grow steeply. As far as manufacturing is concerned, it has declined in 2012, but since then it has been growing.

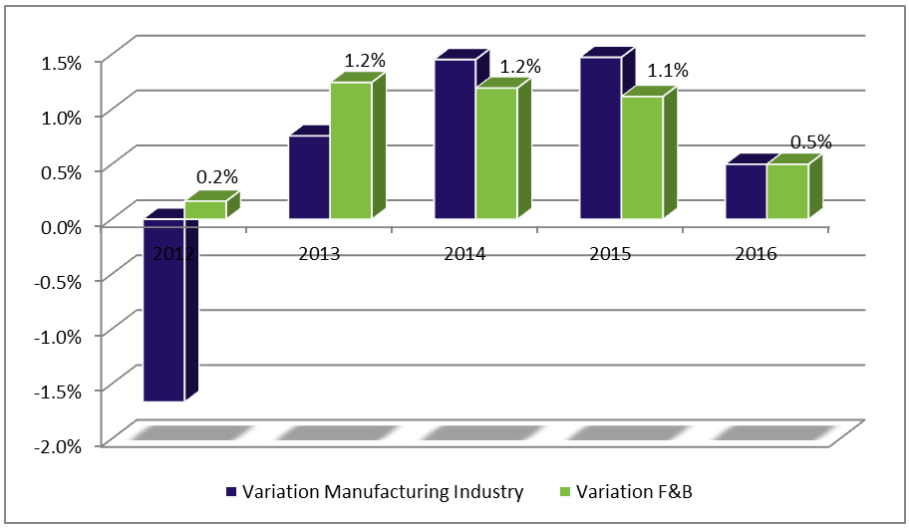

Figure 6: Variation turnover in Portugal (2011-2016).

Among the sectors of the food and beverage industry, the largest volume of business is the "beverage industry" (20%), followed by "slaughter of animals, preparation and preservation of meat and meat products" (15%).

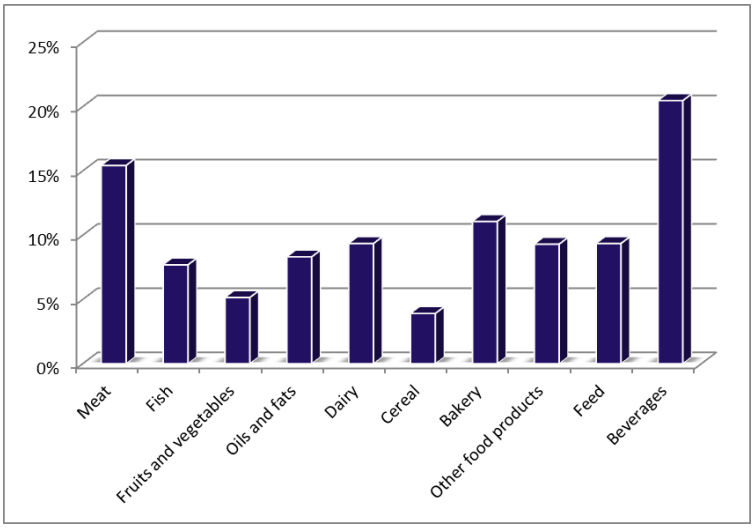

Figure 7: Turnover by sector in Portugal (2016).

Exports from the food and beverage industry amounted to 4,550 million euros in 2016, 2% more than in 2015, according to FIPA forecast, representing 8.95% of total exports of goods in the country. Meanwhile, imports by the sector (6,282 million euros) are 2% above that of 2015, according to FIPA forecast.

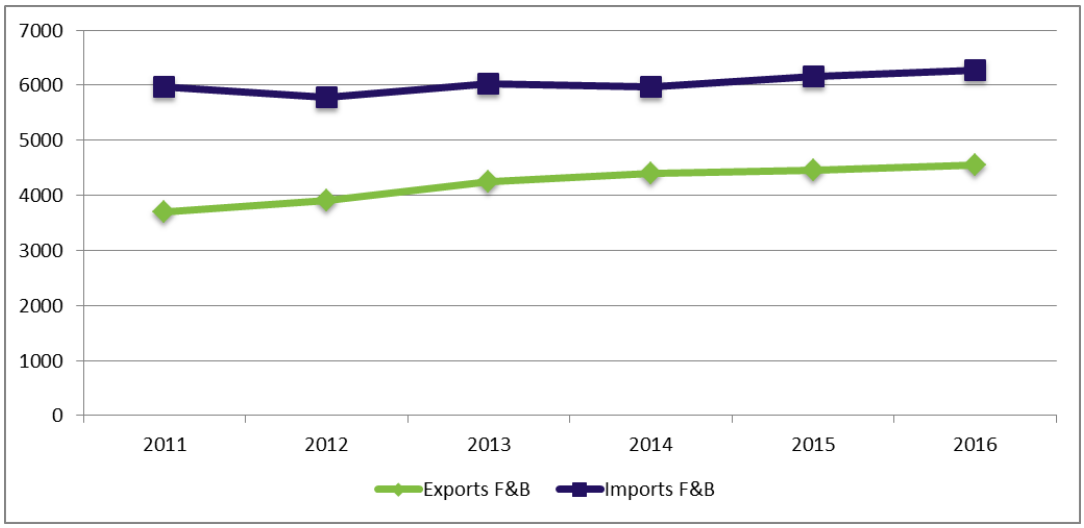

Figure 8: Variation of Exports and Imports in Portugal (2011-2016).

Over the last few years the internationalization of the food and beverage industry has been consolidated. In 2013 and 2014 the number of exporting companies increased by 6.3% and 7.8%, respectively, with the exception of 2012, accumulating a 17% increase in 2016, the year in which the sector had 1,625 exporting companies, plus 0.5% than in 2015, according to FIPA forecast.

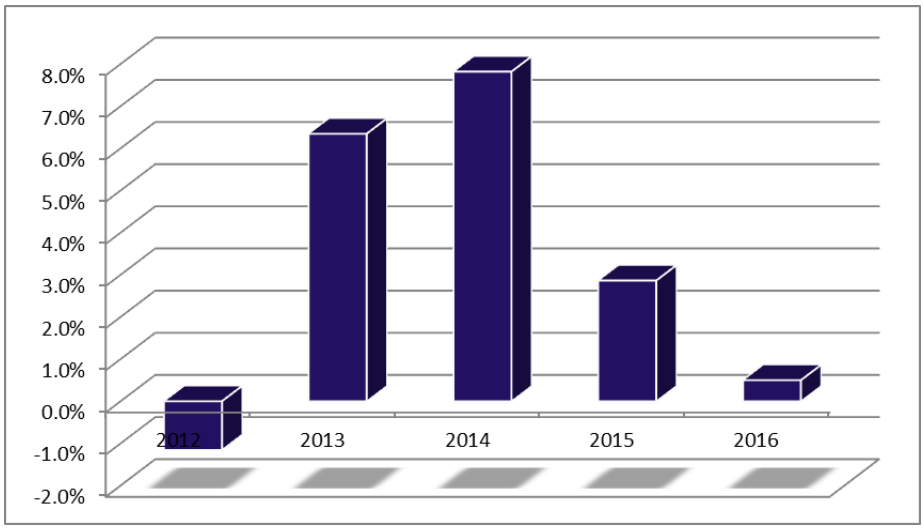

Figure 9: Variation of the number of exporting companies in Portugal.

Regarding importing companies, they increased in 2013 and 2014 and in the previous years their increase was less than 1%. The number of importing companies in 2016 was 2,519, according to FIPA forecast.

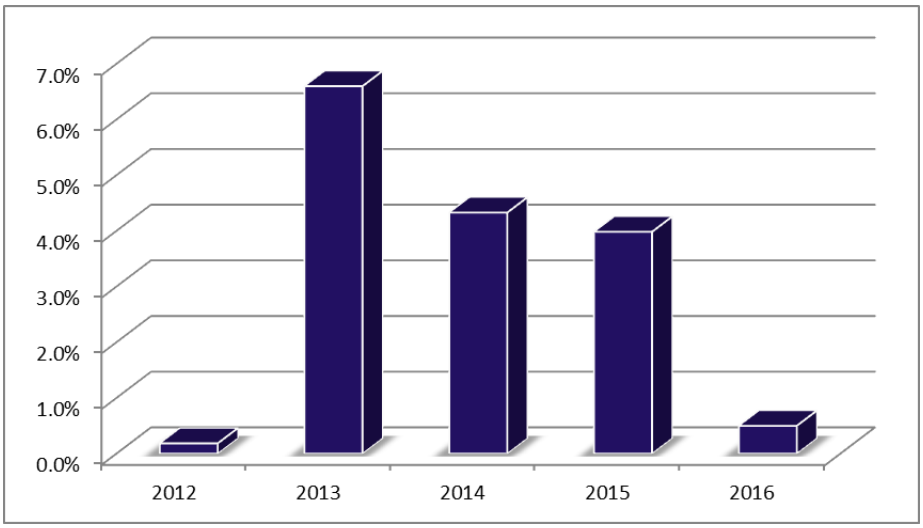

Figure 10: Variation of the number of importing companies in Portugal.

The main products exported are Beverages, Fish and Crustaceans and Fats and animal or vegetable oils, representing 54% of the total value in 2016. In relation to the most imported products we have Fish and crustaceans, Meat products and Cereals, representing 53% of the total in 2016.

Among the main export destinations are Spain, Angola, France and the United Kingdom, representing a total of 58.15%. The main suppliers are Spain, France, the Netherlands and Germany, accounting for 64% overall. In 2016, 1.4% of the EU-28 food and beverage industry exports corresponded to Portugal.

Table 1: Key economic parameters for Portuguese Food and Beverage sector.

Description	**NACE (group)**	**Number of enterprises 2015**	**No. of persons employed 2015**	**Turnover 2015** [millions €]	**Value added 2015** [millions €]
Manufacture of food products	**C10**	**9,337**	**92,336**	**12,099**	**2,082**
Processing and preserving of meat and production of meat products	C10.1	654	16,530	2,338	351
Processing and preserving of fish, crustaceans and molluscs	C10.2	157	7,148	1,168	175
Processing and preserving of fruit and vegetables	C10.3	372	4,695	768	142
Manufacture of vegetable and animal oils and fats	C10.4	478	2,422	1,268	124
Manufacture of dairy products	C10.5	406	6,155	1,404	200
Manufacture of grain mill products.	C10.6	186	1,738	598	60

starches and starch products					
Manufacture of bakery and farinaceous products	C10.7	6,318	4,1906	1,688	598
Manufacture of other food products	C10.8	651	8,275	1,429	290
Manufacture of prepared animal feeds	C10.9	115	3,467	1,439	142
Manufacture of beverages	**C11**	**1,754**	**15,197**	**3,136**	**774**
Distilling. rectifying and blending of spirits	C11.01	343	678	59	21
Manufacture of wine from grape	C11.02	1,297	9,477	1,601	378
Manufacture of cider and other fruit wines	C11.03	4	N/A	N/A	N/A
Manufacture of other non-distilled fermented beverages	C11.04	1	N/A	N/A	N/A
Manufacture of beer	C11.05	59	1,999	752	195
Manufacture of malt	C11.06	1	N/A	N/A	N/A
Manufacture of soft drinks; production of mineral waters and other bottled waters	C11.07	49	3,015	708	177

1.2 Energy Policies

1.2.1 Energy Supply

According to the most recent available data, Portugal produced 5.6 Mtoe of energy in 2014. In 2014, energy was produced from biofuels and waste (52.2%), hydro (23.9%), wind (18.5%), geothermal (3.1%) and solar (2.3%). Portugal has no fossil fuel production (including coal, oil and natural gas). Wind, solar, geothermal and biofuels and waste increased at an annualised rate of 31%, 20%, 8.4% and 0.2%, respectively during 2013-14. The boom of wind and solar power has been the main driver in growing energy production in Portugal. In 2014, total production was 44.4% higher than in 2004. Portugal relies on imports of fossil fuels for most of its energy needs as domestic energy production accounts for around 27% of TPES. During 2014, Portugal imported 15.2 Mtoe of crude oil and oil products and exported 4.6 Mtoe. Net imports of oil and oil products have declined by 32.7% compared to 2004. Natural gas imports amounted to 3.5 Mtoe in 2014 which is 5.1% higher than in 2004. Coal imports were 2.6 Mtoe, down from 3.2 Mtoe ten years earlier.

1.2.2 Energy Demand

Industry and transport are the largest consuming sectors with 36.7% and 33.3% of TFC in 2013, respectively. The residential sector represented 16.3% while the commercial and other services sector (including agriculture and fisheries) had the smallest share of 13.7%. Over the decade to 2013, the industry sector cut consumption by 26.7%, with its share in TFC falling from 40.6% in 2003.

1.2.3 Final Energy Consumption

Industry is the largest consuming sector in Portugal, with final consumption of 5.9 Mtoe in 2013 or 36.7% of TFC. It is also the sector with the fastest decline in energy demand, down by 26.7% compared to 2003. Most of the decline, namely 21%, has come since 2008.

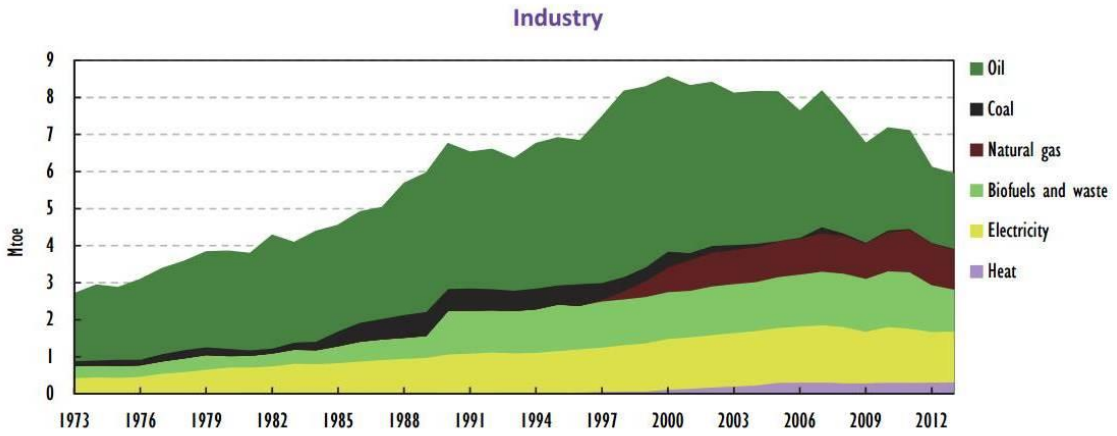

Figure 11: Energy consumption in the industry.

Industry relies on oil, electricity, biofuels and waste and natural gas for most of its energy needs. Oil accounted for 33.9% of industry demand in 2013, electricity for 23.1%, biofuels and waste for 19% and natural gas for 18.2%, rounding up to 94% of demand. The remainder was sourced from heat (5.5%) and coal (0.3%). The use of oil in industry has halved since 2003 while natural gas use has increased by 18%. Biofuels and electricity consumption declined by 14.4% and 4.9%, respectively, while heat use was up by 52.5%.

1.2.4 Policies and measures in Energy Efficiency

Portugal has been developing, since 2008, an energy policy that places a strong emphasis on energy efficiency and on the promotion of renewable energy sources. These policies are the principal tools to tackle climate change and reduce energy import dependence, while maintaining appropriate levels of security of supply. More recently, Portugal adopted a series of measures focused on eliminating the "tariff deficit" and restoring the economic sustainability of the energy system. Portugal submitted its first National Renewable Energy Action Plan to the European Commission in 2007. Significant changes in the Portuguese and European macroeconomic environment (in particular declining energy

consumption and funding constraints) and the need to review the National Energy Efficiency Action Plan, imposed by the EU Energy Efficiency Directive, resulted in a review of energy efficiency and renewable energy programmes.

The National Energy Strategy for 2020 (ENE 2020) established a goal of reducing final energy consumption by 20% by 2020. Subsequently, the government defined a more ambitious goal, corresponding to a 25% reduction in primary energy consumption (30% in the public sector) by 2020.

1.2.5 Funding mechanisms

The Energy Efficiency Fund (EEF) is a financial instrument with the following objectives: funding programmes and measures identified in the NEEAP, encouraging energy efficiency on the part of citizens and businesses, supporting energy efficiency projects and promoting behavioural change. The EEF, by means of specific calls, supports energy efficiency projects in sectors such as transport, buildings, services, industry and public services. The EEF also supports project not covered by the NEEAP but which demonstrably contribute to energy efficiency.

1.2.6 Energy use in industry

A number of measures have been implemented to reduce consumption of energy in industry and services. Among the most significant of these is the Intensive Energy Management Consumption System (SGCIE). The SGCIE is one of the measures integrated in the NEEAP that aims to promote energy efficiency and the monitoring of energy consumption in energy-intensive installations consuming more than 500 toe per year. The SGCIE requires these energy-intensive installations to periodically conduct energy audits in order to determine energy consumption and promote greater energy efficiency, including the use of renewable energy sources.

Table 2: Energy use in industry in Portugal.

Year	**Manufacturing consumption** [PJ]	**Services consumption** [PJ]	**Other industries* consumption** [PJ]	**GDP PPP**** [billion USD]	**Manufacturing VA**** [billion USD]	**Services VA**** [billion USD]
2000	245	54	49	222	27	130
2013	183	69	28	222	27	148

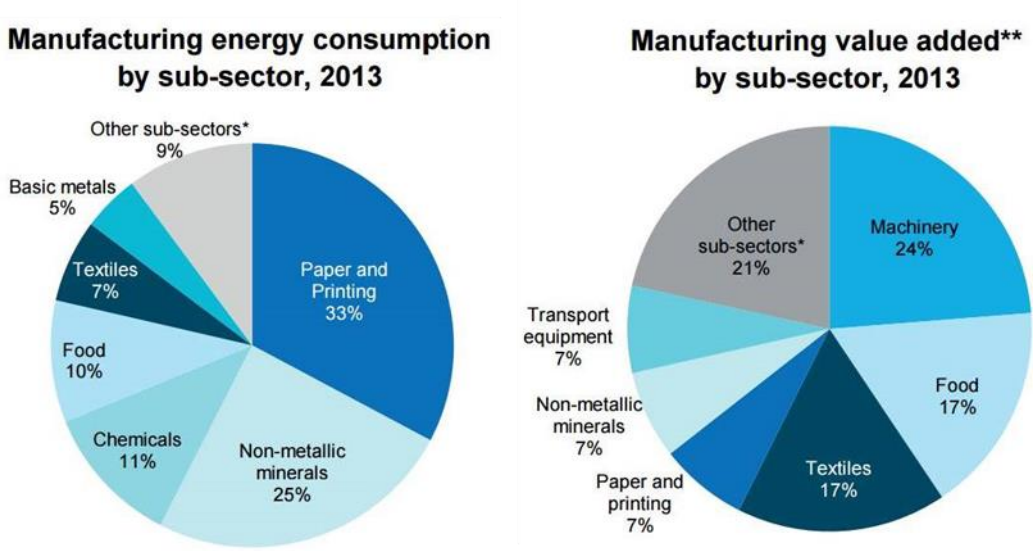

Figure 12: Energy consumption and value added for the industry sectors in Portugal.

*Other industries includes agriculture, mining and construction; other sub-sectors includes all remaining manufacturing sub-sectors beyond the top-6; comb. renewables includes combustibles renewables and wastes; other sources includes heat and other energy sources.

**GDP and VA are at the price levels and PPPs of year 2005; GDP = gross domestic product; VA = value added; PPP = purchasing power parity.

2 Turkey

2.1 Economic data

Dairy sector is one of the most important sub-sector in Turkey with a 14% share in agriculture. It consists of 1,500 enterprises, 34 thousand employees and sales turnover around 3.2 billion €. Production of milk and milk products have 1,6 billion TL added-value. On the other hand, meat and meat products sector is considered one of the fastest growing sub-sector in global agriculture and food. In Turkey, the red meat sector has 13% share within the food industry.

Table 3: Number of Dairy Cattle Enterprise in Turkey by Capacity.

Capacity Range	2011		2012		2013	
	Number	Distribution %	Number	Distribution %	Number	Distribution %
1 – 5 Head	1,047,778	60.05	811,778	59	701,907	56.11
6 – 9 Head	363,683	20.85	293,399	21	252,776	20.21
10 – 19 Head	234,714	13.45	198,117	14	190,009	15.19
20 – 49 Head	74,920	4.29	60,570	4	85,910	6.87
50 – 99 Head	17,496	1.00	14,228	1	16,204	1.30
100 – 199 Head	4,500	0.26	1,190	<1	3,141	0.25
200 – 499 Head	1,765	0.1	1,190	<1	783	0.06
500 Head and More	-	-	-	-	217	0.02
Total	1,744,859	100	1,382,080	100	1,250,947	100

The total number of dairy cattle enterprise is 1,250,947 in Turkey, 56% of it is enterprise that has 1-5 head capacity. According to the data of Food, Agriculture and Livestock Ministry, the total number of registered bovine livestock enterprises is 1,600,120, 1,250,947 of it is dairy cattle enterprises and 349,173 of it is beef cattle enterprises. The main economic parameters for Turkish Food and Beverage sector are reported in the table below.

Table 4: Key economic parameters for Turkish Food and Beverage sector.

Description	**NACE (group)**	**Number of enterprises 2015**	**No. of persons employed 2015**	**Turnover 2015** [millions €]	**Value added 2015** [millions €]
Manufacture of food products	**C10**	**42,030**	**469,165**	**54,564**	**7,896**
Processing and preserving of meat and production of meat products	C10.1	559	49,222	6,790	759

Processing and preserving of fish, crustaceans and molluscs	C10.2	117	7,299	828	188
Processing and preserving of fruit and vegetables	C10.3	1,730	59,412	10,259	1,158
Manufacture of vegetable and animal oils and fats	C10.4	1,140	15,633	5,652	486
Manufacture of dairy products	C10.5	1,533	41,040	6,330	754
Manufacture of grain mill products. starches and starch products	C10.6	3,143	24,466	5,890	499
Manufacture of bakery and farinaceous products	C10.7	31,406	186,101	6,811	1,611
Manufacture of other food products	C10.8	1,995	75,473	9,126	2,117
Manufacture of prepared animal feeds	C10.9	407	10,519	2,878	322
Manufacture of beverages	**C11**	**499**	**16,214**	**2,911**	**634**
Distilling. rectifying and blending of spirits	C11.01	11	N/A	150	34
Manufacture of wine from grape	C11.02	143	1,706	N/A	N/A
Manufacture of cider and other fruit wines	C11.03	N/A	N/A	N/A	N/A
Manufacture of other non-distilled fermented beverages	C11.04	N/A	N/A	N/A	N/A
Manufacture of beer	C11.05	5	N/A	N/A	N/A
Manufacture of malt	C11.06	N/A	N/A	N/A	N/A
Manufacture of soft drinks; production of mineral waters and other bottled waters	C11.07	340	12,458	2,201	418

An important aspect of Turkish Food and Beverage Industry is the export rate. In the table below the export and import flows are reported.

Year	Chapter	Chapter name	Export Dollar	Import Dollar
2016	1	Live animals	27,926,952	603,821,781
	2	Meat and edible meat offals	370,866,120	42,001,284
	3	Fish, crustaceans and molluscs	744,668,332	174,615,520
	4	Dairy products, birds eggs, natural honey ext.	592,803,365	110,076,941
	5	Products of animals origin, not elsewhere specified or included	50,643,412	46,822,719

	7	Edible vegetables and certain roots and tubers	942,174,735	456,732,961
	8	Edible fruits and nuts, peel of melons or citrus fruits	3,873,122,590	540,768,349
	9	Coffee, tea, mate and spices	195,890,506	215,998,008
	10	Cereals	102,769,585	1,150,612,113
	12	Oil seeds and oleaginous fruit, industrial plants, straw and fodder	372,814,046	1,819,616,989
	14	Vegetables plaiting metarials, vegetable products	17,742,247	10,909,835
	15	Animals and vegetable fats and oils and their cleavage products	1,045,239,934	1,753,046,898
	17	Sugar and sugar confectionery	527,501,031	257,161,050
	18	Cocoa and cocoa preparations	476,436,651	551,467,640
	22	Beverages, spirits and vinegar	290,617,458	249,462,796
	Total:		**9,631,216,964**	**7,983,114,884**
2017	1	Live animals	2,083,214	37,725,876
	2	Meat and edible meat offals	32,524,466	336,852
	3	Fish, crustaceans and molluscs	74,529,365	11,335,455
	4	Dairy products, birds eggs, natural honey ext.	56,369,094	7,465,836
	5	Products of animals origin, not elsewhere specified or included	2,922,637	5,133,729
	7	Edible vegetables and certain roots and tubers	98,210,078	39,865,219
	8	Edible fruits and nuts, peel of melons or citrus fruits	322,205,812	46,561,036
	9	Coffee, tea, mate and spices	14,356,700	31,360,129
	10	Cereals	10,278,064	75,348,072
	12	Oil seeds and oleaginous fruit, industrial plants, straw and fodder	24,429,327	118,592,164
	14	Vegetables plaiting metarials, vegetable products	2,625,506	442,431
	15	Animals and vegetable fats and oils and their cleavage products	97,236,815	150,083,102
	17	Sugar and sugar confectionery	43,544,419	21,246,498
	18	Cocoa and cocoa preparations	44,470,679	53,734,285
	22	Beverages, spirits and vinegar	15,940,690	16,164,578

	Total:		**841,726,866**	**615,395,262**

According to the available data, produced with the cooperation of the Turkish Statistical Institute and the Ministry of Customs and Trade, in January 2017 exports were 11 billion 278 million dollars with a 18.1% increase and imports were 15 billion 586 million dollars with a 15.9% increase compared with January 2016.

2.2 Energy statistics

With a rapidly growing economy, Turkey has become one of the fastest growing energy markets in the world. Turkey has been experiencing rapid demand growth in all segments of the energy sector for decades. Over the last decade, Turkey has been the second country, after China, in terms of natural gas and electricity demand growth. Projections show that demand growth trend will continue.

The limits of Turkey's domestic energy sources in light of its growing energy demand have resulted in dependency on energy imports, primarily of oil and gas. At present, around 25% of the total energy demand is being met by domestic resources, while the rest is being provided from a diversified portfolio of imports.

The primary aim of Turkey is to realize its own energy security. To this end, Turkey aims to

- diversify its energy supply routes and source countries,
- increase the share of renewables and include the nuclear in its energy mix,
- take significant steps to increase energy efficiency,
- contribute to Europe's energy security.

The total primary energy demand is estimated to reach 218 Mtoe by 2023 from the current level of 125 Mtoe. Currently, primary energy demand is met by natural gas (35%), coal (28.5%), oil (27%), hydro (7%) and other renewables (2.5%).)

2.2.1 Energy consumption

Turkish electric energy gross consumption in Turkey increased by 3.6% to 257.2 billion kWh in 2014 (Turkish gross production + import + export). In 2015, it increased by 3.3% to 265.7 billion kWh in 2015.

The split among different sources is given below:

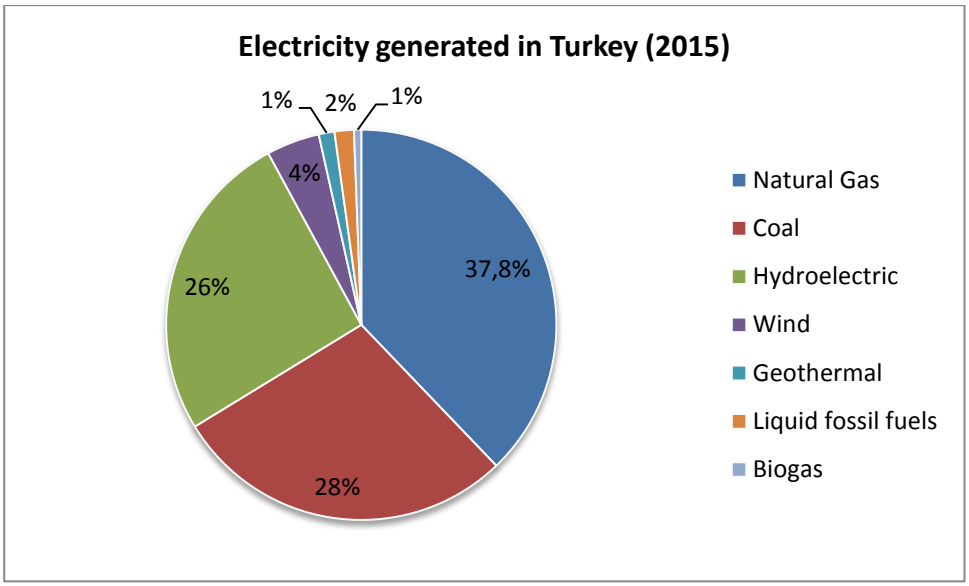

Figure 13: Electricity generated in Turkey (2015)

The total installed power capacity has almost reached 74,000 MWh, and the split among the different sources is given in the below figure.

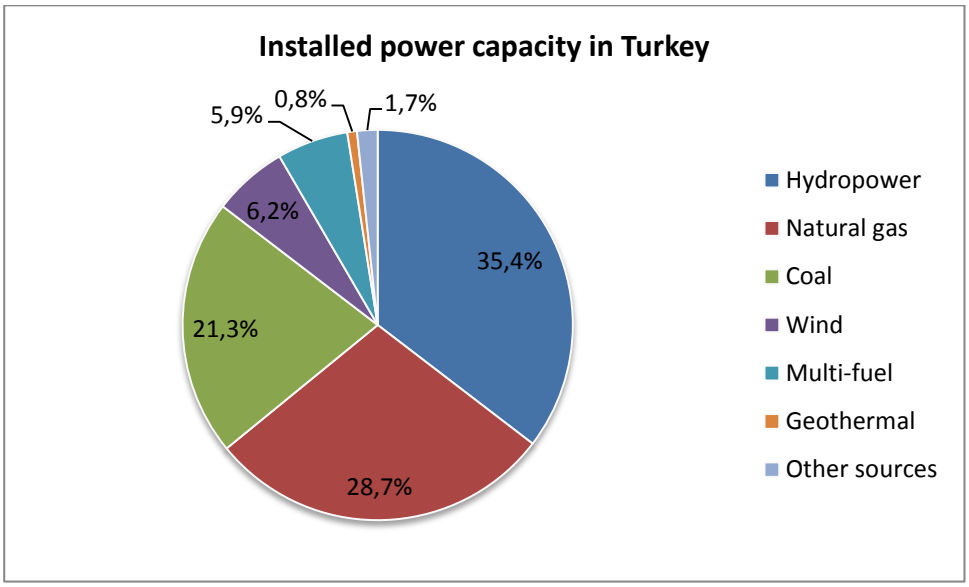

Figure 14: Installed power capacity in Turkey.

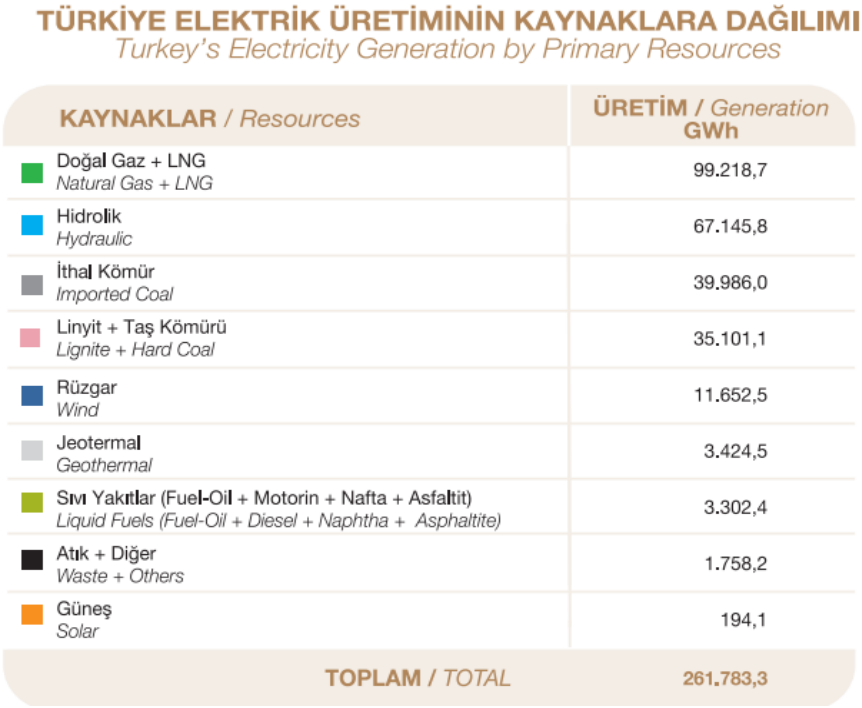

Figure 15: Turkish Electric generation by Primary Resources.

Table 5: Production and Consumption of Turkish Primary Energy Resources.

Type of Resources	**Production of Primary Energy Resources**		**Consumption of Primary Energy Resources**	
	Energy Production [ktoe]	**Percentage** [%]	**Energy Consumption** [ktoe]	**Percentage** [%]
Coal	17,870	55.5	35,841	31.3
Natural Gas	652	2.0	36,909	32.2
Petrol	2,555	7.9	30,499	26.6
Hydraulic	4,501	14.0	4,501	3.9
Biomass	3,555	11.0	3,573	3.1
Geothermal heat	1,463	4.5	1,463	1.3
Other renewable resources	1,633	5.1	1,712	1.5
Total	32,229	100	114,480	100

Energy used per cultivated area in Turkish agriculture is calculated as 82,245.95 toe/TL in the period of 2000-2010. Petroleum and electrical energy consumed per cultivated area in Turkish agriculture was 3,996.83 thousand toe and 4,991 GWh respectively, in the period of 2000-2010.

Table 6: Energy Consumption in industry and agriculture.

Years	**Energy Consumption** [ktoe]			**Share on Total Energy Consumption** [%]	
	Total	**Industry**	**Agriculture**	**Industry**	**Agriculture**

1990	52,987	14,543	1,956	35	5
1995	63,679	17,372	2,556	35	5
2000	80,500	24,501	3,073	40	5
2001	75,402	21,324	2,964	38	5
2002	78,331	24,782	3,030	42	5
2003	83,826	27,777	3,086	43	5
2004	87,818	28,789	3,314	42	5
2005	91,576	29,396	3,340	40	5
2006	77,441	30,996	3,608	40	4.66
2007	82,747	32,466	3,944	39	4.77
2008	79,559	25,677	5,174	32	6.50
2009	80,574	25,966	5,073	32	6.30
2010	83,372	30,628	5,089	37	6.10
2011	86,952	30,830	5,755	35	6.62
Average				*37.85*	*5.35*

Primary energy demand in Turkish agriculture consists of petrol, electricity, natural gas, geothermal and other heaters. Petrol consumption per agricultural area cultivated in agriculture was 0.135 toe/ha in 2006. However it increased to 0.234 toe/ha in 2011. Between 2006 and 2011 period, the average consumption petrol and electricity per cultivated agricultural land was 3,996.83 thousand toe and 4,991 GWh, respectively in Turkey. In this period, the average consumption of petrol and electricity per cultivated area was calculated as 0.185 toe/ha and 0.302 MWh/ha, respectively.

2.2.2 Energy consumption in Food and Beverage industry in Turkey

Table 7: Energy consumption in Food and Beverage sector in Turkey.

			Final energy consumption				Energy consumption in transformation processes				
NACE Division	**No of enterprises**	**Total energy consumption**	**Prod. of goods and services**	**Space heating**	**Transportation**	**Total**	**Electricity generation**	**Heat prod.**	**Coke oven/ Blast furnace**	**Total**	**Non-energy use**
10 Manufacture of food products	1,099	2,576,197	1,867,818	156,572	140,546	216,437	180,247	220,418	-	400,665	10,595
11 Manufacture of beverages	63	140,260	117,443	4,987	13,113	135,544	-	4,664	-	4,664	52

Table 8: Energy Balance Table (Thousand tonnes of equivalent petrol).

NACE division	**FAT COAL**	**LIGNITE**	**COKE**	**PETROL PRODUCTS**	**PET- COKE**	**FUEL OIL**	**DIESEL OIL**	**LPG**	**NATURAL GAS**	**ELECTRIC**	**GEO. HEAT AND OTHER HEATS**	**TOTAL**
Manufacturing of Food, Beverage, Tobacco Products (10,11,12)	**151**	**334**	**32**	**70**	**5**	**36**	**6**	**23**	**810**	**669**	**112**	**2,178**
Manufacturing of Food Products (10)	149	276	N/A	37	5	7	4	20	553	618	N/A	1,633
Manufacturing Beverage Products (11)	N/A	N/A	N/A	5	N/A	0	2	2	25	31	N/A	61
Manufacturing of Tobacco Products(12)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18	11	N/A	29
Sugar Production (10)	2	59	32	28	N/A	28	N/A	N/A	214	9	112	455

2.2.3 Biomass

It is estimated that the biomass potential in Turkey is about 8.6 million tonnes of equivalent petrol (Mtoe) and biogas quantities that can be produced from biomass is 1.5-2 Mtoe. 2023 target for biomass installed capacity was determined as 1000 MW.

Table 9: Animal Waste Potential of Turkey Corresponding Amount of Biogas To Be Produced And Coal Equivalent.

Animal	**Number of Animals**	**Amount of wet fertilizer** [tonnes/year]	**Amount of Biogas** [m^3/year]	**Coal Equivalent** [tonnes/year]
Bovine	11,054,000	39,794,400	1,313,215,200	1,181,894
Sheep- Goat	38,030,000	26,621,000	1,544,018,000	1,389,616
Chicken- Turkey	243,510,453	5,357,230	417,863,937	376,078
Total	292,594,453	71,772,630	3,275,097,137	2,947,587

3 Czech Republic

The food and beverage sector is characterised by NACE Codes 10 (Manufacture of food products) and 11 (Manufacture of beverages). In many official statistics, also NACE Code 12 (Manufacture of tobacco products) is included in the same sector.

3.1 Sectoral organisation

The entire food and drink sector including feed manufactures is in the Czech Republic represented by the Potravinářská komora České republiky (*FFDI*, *Federation of the Food and Drink Industries of the Czech Republic*). About 100 companies are direct members of the federation. In addition, 22 subsector organisations are members of the federation and also 44 partners from food connected branches.

- Asociace výrobců lahůdek *(AVL)* – delicatessen
- Česká asociace barelových watercoolerů *(ČABW)* – water barrels
- Českomoravská drůbežářská unie *(ČDU)* – poultry breeders, eggs
- Českomoravský cukrovarnický spolek *(ČMCS)* – sugar
- Českomoravský svaz mlékárenský *(ČMSM)* – dairy
- Český svaz pivovarů a sladoven, *(ČSPS)* – brewery, malting
- Český svaz zpracovatelů masa *(ČSZM)* – meat, charcuterie
- Český škrobárenský svaz *(ČŠS)* – starch
- Rybářské sdružení České republiky *(RS ČR)* – fish, aquaculture
- Sdružení drůbežářských podniků *(SDP)* – poultry
- Společenstvo mlynářů a pekařů ČR *(SMP ČR)* – mill and bakery products
- Spolek pro komodity a krmiva *(SKK)* – feed processing and commodity storage
- Svaz lihovarů České republiky *(SL ČR)* – spirit and biofuels
- Svaz minerálních vod *(SMV)* – spring and mineral waters
- Svaz pekařů a cukrářů v České republice, *(SPC ČR)* – bakery products
- Svaz průmyslových mlýnů České republiky *(SPM ČR)* – mill products and pasta
- Svaz vinařů České republiky *(SV ČR)* – wine
- Svaz výrobců nealkoholických nápojů *(SVNN)* – soft drinks
- Unie destilatérů *(UD)* – distillates

- Unie výrobců a dovozců lihovin České republiky *(UVDL ČR)* – spirit drinks
- Vinařská unie *(VU)* – wine
- Zájmové sdružení právnických osob konzervárensko - lihovarského průmyslu *(KOLI)* – canned products

In addition to these subsector organisations that are members of *FFDI*, there are some less important subsector organisations, including edible oils and fats, tea and roasted coffee and ice creams.

3.2 Economic indicators

In 2015, there were 9,286 companies in the Czech food and beverage industry, of which about 99% companies are middle and small enterprises (less than 250 employees). A substantial part of these small companies (42.5%) are active in the bread and bakery products subsector. Together these companies employ about 99,896 persons directly. This is about 8.1% of the entire Czech industrial sector. Indirectly, the food and beverage industry also results in hundreds thousand indirect jobs, among others in commercial services, agriculture and the transport sector.

The total output of the sector was 14.07 billion € with a value added of 2.6 billion €. Compared to the total output of all industrial sectors combined (143.88 billion €), the food and beverage sector makes up 9.78% of the Czech industrial sector.

The companies in the sector imported for 5.6 billion € from abroad, while the total value of export was 4.44 billion €. Looking specifically at the agrifood sector, the most important products for the Czech export are dairy (9.5%), tobacco (9.1%), cereals (8.3%) and drinks (8%). The four key countries for exports (together 53.9% of total exports value) are Germany, the UK, France and Belgium.

Table 10: Key economic parameters for Czech Food and Beverage sector.

Description	**NACE (group)**	**Number of enterprises 2015**	**No. of persons employed 2015**	**Turnover 2015** [mil €]	**Value added 2015** [mil €]
Manufacture of food products	C10	7,450	86,124	11.51	1.83
Processing and preserving of meat and production of meat products	C10.1	1,829	20,416	2.12	0.347
Processing and preserving of fish. crustaceans and molluscs	C10.2	20	756	0.074	0.014
Processing and preserving of fruit	C10.3	145	2,679	0.229	0.053

and vegetables					
Manufacture of vegetable and animal oils and fats	C10.4	15	937	0.535	0.046
Manufacture of dairy products	C10.5	167	8,078	1.48	0.204
Manufacture of grain mill products. starches and starch products	C10.6	211	2,390	0.367	0.057
Manufacture of bakery and farinaceous products	C10.7	3,167	30,784	1.205	0.431
Manufacture of other food products	C10.8	1,526	15,461	1.848	0.429
Manufacture of prepared animal feeds	C10.9	370	4,623	1.396	0.25
Manufacture of beverages	**C11**	**1,836**	**13,772**	**2.56**	**0.773**
Distilling. rectifying and blending of spirits	C11.01	N/A	N/A	N/A	N/A
Manufacture of wine from grape	C11.02	N/A	N/A	N/A	N/A
Manufacture of cider and other fruit wines	C11.03	N/A	N/A	N/A	N/A
Manufacture of other non-distilled fermented beverages	C11.04	N/A	N/A	N/A	N/A
Manufacture of beer	C11.05	N/A	N/A	N/A	N/A
Manufacture of malt	C11.06	N/A	N/A	N/A	N/A
Manufacture of soft drinks; production of mineral waters and other bottled waters	C11.07	N/A	N/A	N/A	N/A

3.3 Energy statistics

The total energy consumption of the industry sector (NACE code C) in the Czech amounted in 2014 to about 7,481 ktoe. Divided among energy carriers, the main sources in 2015 were oil (3,596 TJ), natural gas (12,864 TJ), electricity (2,393 GWh) and coal (2,609 TJ). Divided among industrial sectors, the sectors with the highest energy consumption were basic metals (1,944 ktoe), chemicals (1,066 ktoe) and petroleum (1,014 ktoe). See the graphs and table below for a more detailed overview.

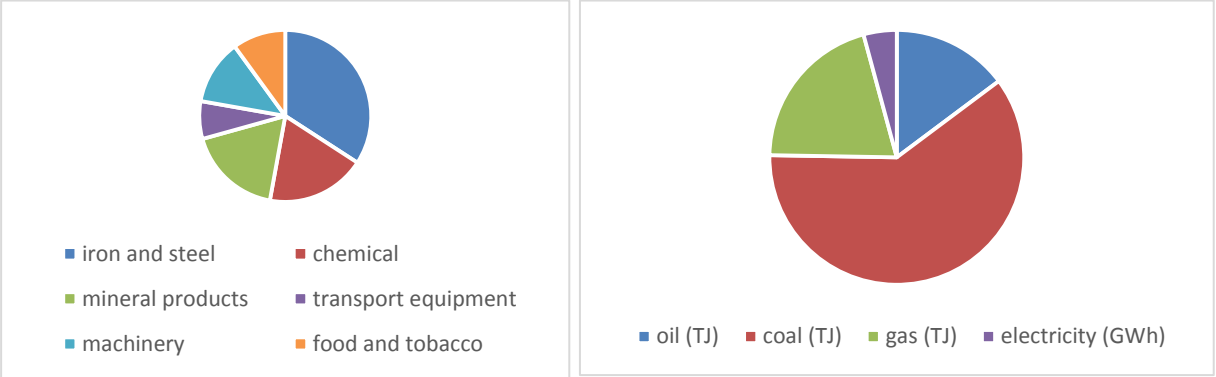

Figure 16. Energy consumption in Czech industry, by subsector (left) and by energy carrier (right).

Table 11: Energy consumption per industrial sector per energy carrier in Czech Republic.

Description	**NACE (group)**	**Total energy consumption, 2014** [ktoe]	**Percentage of industrial energy consumption** [%]	**Key energy carriers 2015**
Entire industry sector	C	7,481	100.00	Liquid fuel (28,918 TJ), solid fuel (199,145 TJ), natural gas (88,327 TJ), electricity (18,101 GWh)
Food and tobacco	10, 11, 12	570	7.62	Liquid fuel (3,596 TJ), solid fuel (2,609 TJ), natural gas (12,864 TJ), electricity (2,393 GWh)
Refined petroleum and chemistry	19, 20	1,066	14.25	Liquid fuel (16,787 TJ), solid fuel (45,105 TJ), natural gas (24,988 TJ), electricity (3,957 GWh)
Building materials	23	1,217	16.27	Liquid fuel (2,617 TJ), solid fuel (5,493 TJ), natural gas (27,394 TJ), electricity (2,330 GWh)
Basic metals and metal products	24, 25	1,944	25.99	Liquid fuel (3,014 TJ), solid fuel (145,364 TJ), natural gas (38,684 TJ), electricity (4,550 GWh)
Machinery	28	695	9.29	Liquid fuel (1,213 TJ), solid fuel (237 TJ), natural gas (4,046 TJ), electricity (1,557 GWh)
Motor vehicles, other transport equipment	29, 30	404	5.4	Liquid fuel (1,526 TJ), solid fuel (328 TJ), natural gas (7,366 TJ), electricity (3,100 GWh)
Other	32	1,585	21.18	Liquid fuel (165 TJ), solid fuel (9 TJ), natural gas (379 TJ), electricity

				(214 GWh)

3.3.1 Food industry

For 2015, the total energy use of the food manufacturing industry (NACE C10) and for the beverage manufacturing industry (NACE C11) and tobacco (NACE C12) is estimated at 570 ktoe.

Based on 2014 data, the total energy use of the food and beverage industry (including tobacco production) accounts for about 7.6% of the energy use by Czech industries.

3.3.2 Energy prices

For industrial consumers, the natural gas prices in 2016 in the Czech Republic were 29.555 €/MWh (excluding VAT but including taxes and levies that are not recoverable).

The electricity price for industrial consumers in 2016 in the Czech Republic amounted to 87.925 €/MWh (excluding VAT but including taxes and levies that are not recoverable).

Looking at oil, there is specific information on the consumer prices of petroleum products by the end of 2016. For petrol (Euro-super 95), the price wit taxes and duties was 1.11 € in the Czech Republic. For automotive diesel, the price with taxes and duties was 1.08 €. For LPG motor fuel, the values for the Czech were 0.49 €.

4 France

4.1 Global presentation and economic performances of the sector

Exports are of major importance for the French food sector (especially for the beverages segment), positively contributing to the French trade balance.

- Weaker bargaining power for food producers and processors
- Beverage subsector performs well due to exports
- The meat and dairy segments still face challenges

Turnover of the French agri-food industry amounted to 172 billion € in 2016. French food sector value added growth is expected to increase 1.0% in 2017, followed by 1.6% in 2018. Growth has been steady over the last couple of years, although at a lower pace than French GDP growth.

In the domestic market the margins of many food producers are negatively impacted by decreasing producer prices (down 1.2% in 2016), the fierce price competition in the French retail segment and contractual price-adjustment mechanisms. The on-going concentration process of retail chains has further weakened the bargaining power of food producers and processors, who are at the same time in competition with other European food businesses which in some cases have lower production costs. Many French food manufacturers or processors try to increase their leverage through acquisitions or by strengthening their brand image.

Exports are of major importance for the French food sector (especially for the wine, champagne and spirits segment), positively contributing to the French trade balance. In 2016 the trade balance surplus generated by beverage exports alone amounted to more than 11 billion €. While volumes of French wine exports are decreasing since 2012 (down 2% in 2016), the value of exports continues to increase since 2009 (up 7% in 2016). France remains the second-largest producer of wine worldwide behind Italy.

Generally, French food businesses are highly dependent on bank finance and many companies have high short-term debts to finance their working capital requirements. Banks are generally willing to lend to food businesses. The profit outlook for most companies active in this industry remains stable.

The level of non-payment notifications and insolvencies in the food sector is rather low compared to other industries and no substantial increase is expected in the coming months.

While our underwriting stance towards this sector remains generally relaxed, we are keeping a closer eye on certain subsectors, especially meat and dairy, because of the challenging market conditions in those segments. The French meat industry is composed mainly of small companies and even French groups are quite small compared to their foreign competitors. Pressure on meat prices remains high,

affecting business margins. Exports of dairy products have been severely impacted by decreased global demand.

Table 12: Key economic parameters for French Food and Beverage sector.

FRENCH FOOD PROCESSING INDUSTRY	Year 2016
Number of companies	17,647
Number of employees	427,213
Turnover (billion €)	172
Export income (billion €)	44.2

4.2 Energy consumption in the French industry

The French food industry is one of the 5 most energy consuming french industrial sector (4.5 Mtoe in 2012). In the Figure below, the variety of energy sources used by the different industrial sectors is shown.

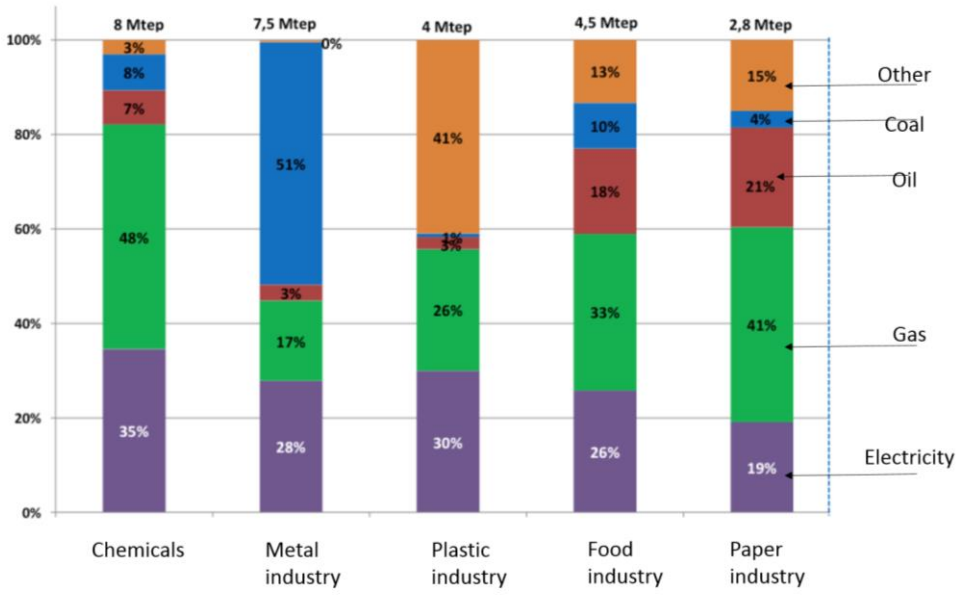

Figure 17: Energy consumption in different sectors of French industry.

4.3 Energy use in the French food industry

Energy use accounts for 71% of greenhouse gas emissions. Efficient use of energy represents an environmental and a competitiveness challenge for the French food industry, which is the 3rd most energy-consuming industrial sector behind chemistry and metallurgy. This is linked to the high energy

requirements of manufacturing processes and the safety requirements (wet processing, drying, combustion, cold chain, etc.).

Energy represents on average the second item of cost of production behind the raw materials. Many actions have been implemented by the food industries in order to efficiently use energy:

- Improve the energy efficiency of manufacturing processes,
- Recover energy and heat,
- Using less polluting fuels and renewable energy,
- Train and educate employees on energy savings.

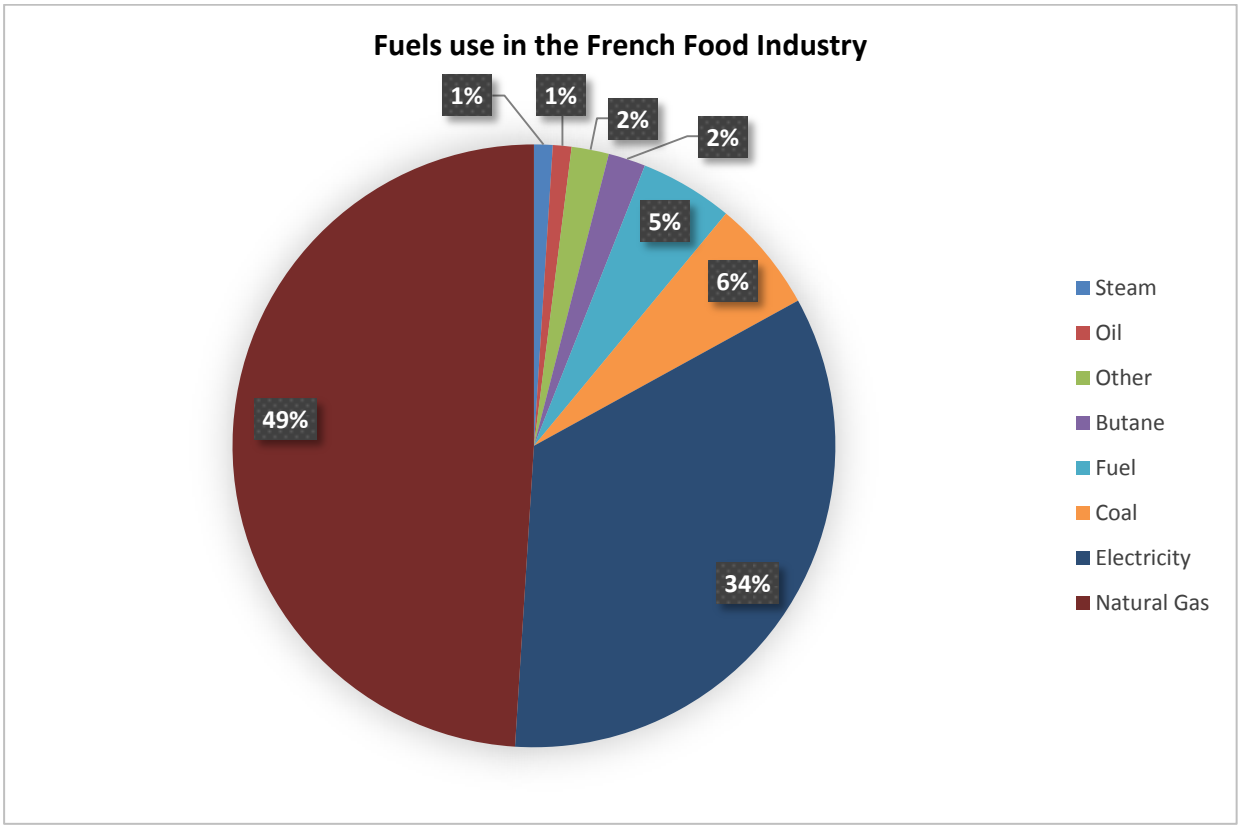

Figure 18: Fuels use in the French food industry.

At European level, between 1990 and 2012, the agri-food sector reduced its energy-related greenhouse gas emissions by 27%. At French level, the energy consumption of the agri-food industries decreases too:

Consumption and purchases by type of energy in 2011

	Energy consumption		Energy purchases	
	2011 en millier de tep	Évolution 2011/2010 en %	2011 en million d'euros	Évolution 2011/2010 en %
Electricity	1682	- 3,5	1255	+ 5,8
Fossil Fuels	3226	- 1,7	1248	+ 9,9
Natural gas	2453	- 1,4	923	+ 7,3
Fuel	250	- 4,2	135	+ 22,7
Oil	43	- 8,5	34	+ 14,8
Butane	102	- 5,1	70	+ 8,4
Coal	296	- 3,0	81	+ 33,1
Steam	159	- 41,2	52	- 35,0
	5101	- 3,6	2555	+ 6,4

Figure 19: Consumption and purchases by type of energy in the French food industry.

The increase in the prices of energy resources, which accompanies the explosion in commodity prices, has a strong impact on the profitability of the companies in this sector. This includes environmental taxation and consumer pressure, which encourages companies to take measures to reduce their energy consumption and greenhouse gas emissions.

To cope with rising energy prices and to control the stakes, french food companies are increasingly involved in energy efficiency. The political framework surrounding the issue of responsible energy management in companies also plays an important role in raising awareness. On 25 October 2012 the EU adopted an Energy Efficiency Directive establishing a Common Measurement Framework to promote it in the EU, with the aim of increasing it by 20% by 2020. This text also provides for the obligation for large companies to carry out an energy audit every 3 years.

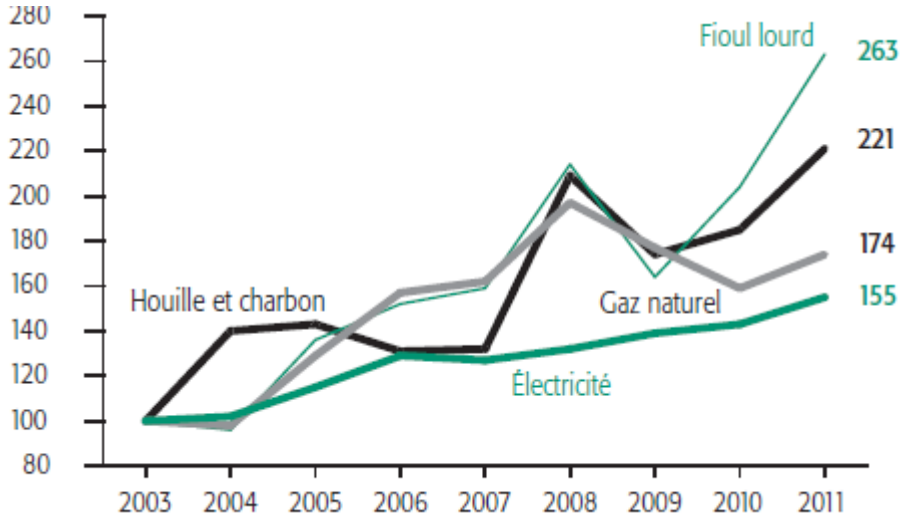

Figure 20: Energy prices in France.

More discreetly than renewable energy, but probably more solidly, energy efficiency is becoming a new and fast-growing economic sector for decades to come.

5 Spain

Spanish Food and Beverage Industry is the first industrial sector of the MS.

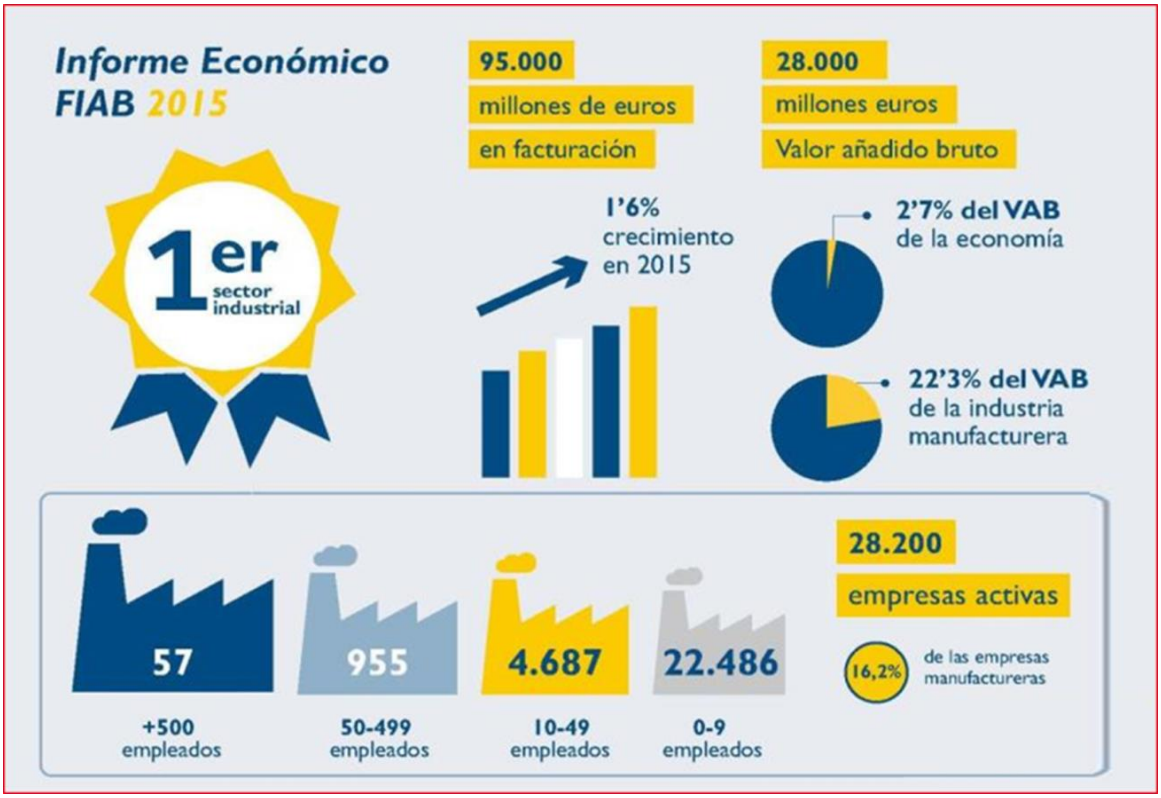

Figure 21: Spanish Food and Beverage industry overview.

The main economic data are:

- Turnover of 95 billion euros
- Gross value added of 28 billion euros
- Active Industries: 28,200 – 16. 2% of the manufacturing companies
- Industry workers: 470,000

Spanish Food and Beverage Industry exports about 30% of production:

- 25, 4 billion in exports
- 6th EU exporting MS
- 10th exporting country worldwide
- 10 billion trade surplus

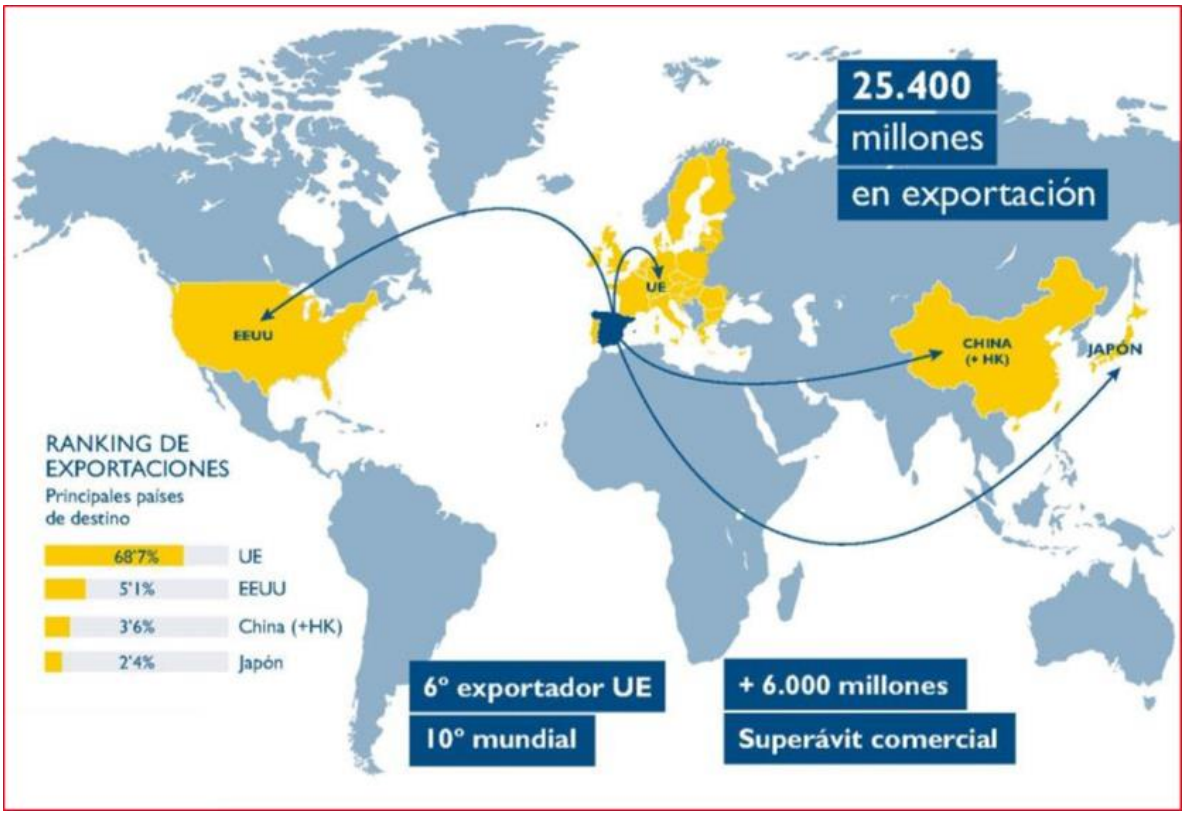

Figure 22: Exports from Spanish Food and Beverage industry.

Spanish Food and Beverage Industry is spread all over the country, as shown in Figure 23.

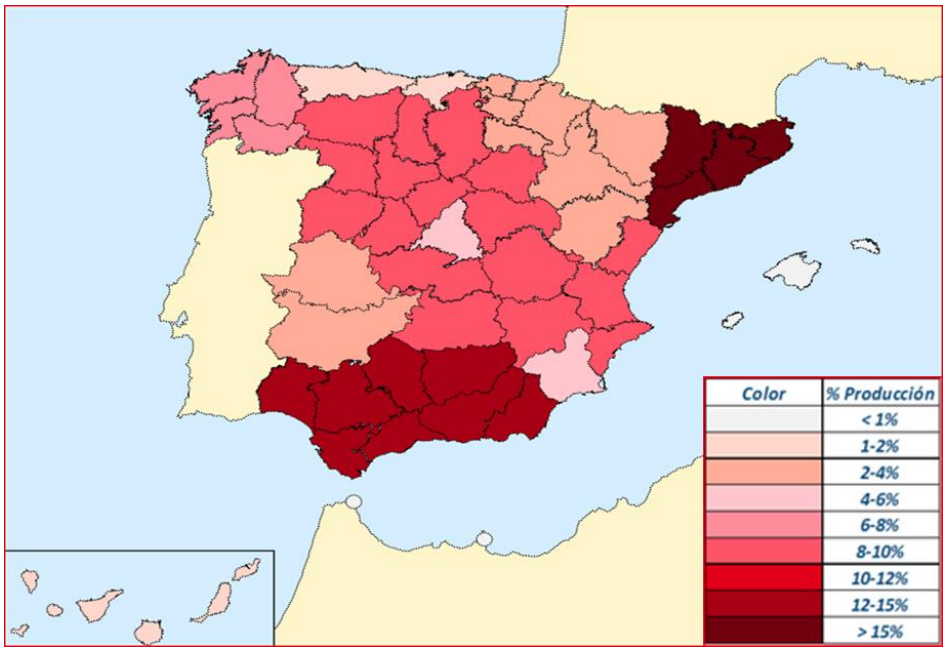

Figure 23: Spanish food and beverage production.

A comparison among the different manufacturing sectors in Spain is available in Figure 24.

Industrial Ranking	Turnover 2015 (million €)
Food and Beverages	95.000
Metal	70.000
Automobile	61.000
Chemist	56.400
Pharmacist	15.000
Textile	14.000
Other non industrial sectors	
Construction	150.000
Tourism	130.000

Figure 24: Spanish manufacturing sectors comparison.

5.1 Energy consumption

Final Energy consumption in Spain is reported in Figure 25, while in Figure 26 is reported the situation of Food and Beverage industry.

BALANCE DEL CONSUMO DE ENERGÍA FINAL

2015 (Avance) (ktep)	CONSUMO FINAL DE ENERGÍA																														
	CARBONES					PRODUCTOS PETROLÍFEROS								GASES			RESIDUOS			ENERGIAS RENOVABLES								ENERGÍA ELÉCTRICA	TOTAL
	Hulla, Antracita y Aglomerados	Coque de coquería	Gas de coquería y horno alto	Alquitranes de Carbón	TOTAL	GLP	Gasolina	Queroseno	Gasóleo	Fueóil	Coque de petróleo	Otros productos petrolíferos	TOTAL	Gas Natural	Otros Gases	TOTAL	Residuos industriales no renovables	RSU no renovable	TOTAL	Solar térmica	Geotermia	Biomasa	Biogás	Biocarburantes	RSU renovable	TOTAL		
Industria	729	395	228	45	1.397	137	1		1.121	356	1.101		2.717	6.897		6.897				2	0	1.288	46	10		1.346	6.540	18.897
Extractivas (no energéticas)						2			156	3			161	119		119				0				2		2	124	406
Alimentación, bebidas y tabaco	6	27			33	29			209	58			296	809		809				1	0	195	7	2		205	942	2.285
Textil, cuero y calzado						3			25	3			31	140		140				0		3				3	149	324
Pasta, papel e impresión						15			53	18			87	568		568				0		495	26			520	506	1.681
Química (incluyendo petroquímica)	122	8		45	176	7			41	88			136	1.677		1.677				0		5	8			13	817	2.819
Minerales no metálicos	7				7	32			141	11	1.100		1.284	1.267		1.267				0		204	3			207	507	3.273
Siderurgia y fundición	594	329	228		1.151	14			23	34			71	701		701						0				0	1.084	3.008
Metalurgia no férrea		31			31	5			13	29			47	172		172				0		0				0	821	1.072
Transformados metálicos						7			59	57	1		123	396		396				0		0				1	415	934
Equipo de transporte						7			33				39	105		105				0		0				0	314	459
Construcción						15			315	46			376	340		340				0	0	14		6		21	178	915
Madera, corcho y muebles						1			15	6			22	21		21						311				311	97	452
Otras industrias							1		38	3			42	581		581				0		59	3			62	585	1.270
Transporte						47	4.431	5.637	21.429	106			31.651	312		312				0				961		961	522	33.445
Carretera						47	4.426		20.939				25.412	287		287								958		958	105	26.763
Ferrocarril									88				88														238	327
Marítimo interior									340	106			446															446
Aéreo: aviación interior							4	1.778					1.783															1.783
Aéreo: aviación internacional								3.859					3.859															3.859
Oleoductos																												
Otros transporte no especificados							1		62				63	25		25				0				3		3	178	269
Usos diversos	111	6			117	1.272	38	46	4.551	48			5.955	6.009	0	6.010		2	2	275	19	2.638	13	9	30	2.983	12.893	27.961
Agricultura						46	15		1.552	6			1.619	69		69				1	4	68	1	1		76	501	2.265
Pesca							11		214				225							0				4		4		229
Comercio, Servicios y Admin. Públicas						181	11		842	17			1.052	2.639	0	2.640		2	2	52	4	80	11	3	2	153	6.192	10.039
Residencial	89				89	1.045			1.941	15			3.001	3.017		3.017				221	11	2.489		1	28	2.749	6.025	14.881
Otros usos diversos no especificados	22	6			29			46	3	10			59	283		283							1			1	175	547
TOTAL	840	401	228	45	1.515	1.457	4.470	5.684	27.101	510	1.101		40.323	13.218	0	13.218		2	2	277	19	3.925	59	980	30	5.290	19.955	80.303

Fuente: MINETUR/IDAE

Figure 25: Final Energy consumption in Spain.

Sector: Alimentación, bebidas y tabaco, evolución por fuente de energía.

(ktep)	CONSUMO DE ENERGÍA FINAL																										
	CARBONES					PRODUCTOS PETROLÍFEROS								GASES			RESIDUOS			ENERGÍAS RENOVABLES							ENERGÍA ELÉCTRICA	TOTAL
	Hulla, Antracita y Aglomerados	Coque de coquería	Gas de coquería y horno alto	Alquitranes de Carbón	TOTAL	GLP	Gasolina	Queroseno	Gasóleo	Fuelóil	Coque de petróleo	Otros productos petrolíferos	Productos petrolíferos	Gas Natural	Otros Gases	TOTAL	Residuos industriales no renovables	RSU no renovable	Residuos	Solar térmica	Geotermia	Biomasa	Biogás	Biocarburantes	RSU renovable	TOTAL		
1990	-	24	-	-	24	21	-	-	149	-	-	-	170	253	0	253	-	-	-	-	-	-	-	-	-	-	496	943
1991	-	20	-	-	20	27	-	-	156	701	-	-	885	316	0	316	-	-	-	-	-	-	-	-	-	-	508	1.729
1992	-	20	-	-	20	24	-	-	154	702	-	-	880	325	0	326	-	-	-	-	-	-	-	-	-	-	518	1.744
1993	-	20	-	-	20	22	-	-	159	697	-	-	878	337	0	337	-	-	-	-	-	-	-	-	-	-	505	1.741
1994	-	24	-	-	24	24	-	-	154	841	-	-	1.019	323	0	323	-	-	-	-	-	-	-	-	-	-	515	1.880
1995	-	24	-	-	24	31	-	-	180	812	-	-	1.022	471	-	471	-	-	-	-	-	-	-	-	-	-	527	2.044
1996	-	20	-	-	20	27	-	-	226	541	-	-	794	513	-	513	-	-	-	-	-	-	-	-	-	-	524	1.852
1997	-	14	-	-	14	33	-	-	216	525	-	-	774	593	-	593	-	-	-	-	-	-	-	-	-	-	588	1.970
1998	-	14	-	-	14	35	-	-	236	401	-	-	673	658	-	658	-	-	-	-	-	-	-	-	-	-	611	1.954
1999	-	5	-	-	5	35	-	-	241	306	-	-	582	749	-	749	-	-	-	0	-	284	-	-	-	284	658	2.278
2000	-	3	-	-	3	35	-	-	283	278	-	-	597	930	-	930	-	-	-	0	-	249	10	-	-	259	772	2.561
2001	-	4	-	-	4	35	-	-	303	272	-	-	610	1.144	-	1.144	-	-	-	0	-	249	10	-	-	259	743	2.761
2002	-	3	-	-	3	35	-	-	297	295	-	-	627	1.401	-	1.401	-	-	-	0	-	279	10	-	-	289	790	3.110
2003	-	17	-	-	17	34	-	-	330	295	-	-	659	1.298	-	1.298	-	-	-	0	-	261	10	-	-	271	864	3.109
2004	-	27	-	-	27	35	-	-	377	178	-	-	590	1.271	-	1.271	-	-	-	0	-	261	11	-	-	272	915	3.076
2005	-	20	-	-	20	35	-	-	411	106	-	-	552	1.047	-	1.047	-	-	-	0	-	264	8	-	-	273	990	2.882
2006	-	16	-	-	16	32	-	-	189	220	-	-	440	590	-	590	-	-	-	0	-	284	20	-	-	304	869	2.220
2007	-	32	-	-	32	31	-	-	245	199	-	-	475	556	-	556	-	-	-	0	-	284	21	-	-	305	906	2.275
2008	-	37	-	-	37	30	-	-	229	202	-	-	460	480	-	480	-	-	-	1	-	315	10	-	-	326	896	2.199
2009	-	24	-	-	24	25	-	-	213	150	-	-	388	621	-	621	-	-	-	1	-	226	7	-	-	234	874	2.140
2010	-	24	-	-	24	24	-	-	241	135	-	-	400	627	-	627	-	-	-	1	0	228	28	-	-	257	901	2.209
2011	2	19	-	-	21	22	-	-	164	125	-	-	311	411	-	411	-	-	-	1	0	239	15	-	-	255	826	1.824
2012	6	13	-	-	19	20	-	-	148	73	-	-	240	745	-	745	-	-	-	1	0	236	14	-	-	250	815	2.069
2013	3	15	-	-	18	19	-	-	189	99	-	-	307	789	-	789	-	-	-	1	0	226	39	2	-	267	802	2.183
2014	3	16	-	-	19	33	-	-	178	93	-	-	303	765	-	765	-	-	-	1	0	223	28	2	-	254	938	2.278
2015	6	27	-	-	33	29	-	-	209	58	-	-	296	809	-	809	-	-	-	1	0	195	7	2	-	205	942	2.285

Fuente: MINETUR/IDAE

Figure 26: Food and Beverage industry energy consumption in Spain.