

EU-MERCI

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

HORIZON 2020 Project Nr. 693845

Analysis of the industrial sectors in different Countries: Slovenia

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

Table of Contents

1	<i>General overview of industry in Slovenia</i>	4
2	<i>Food and Beverage sector</i>	6
2.1	Sectoral organization	6
2.2	Economic indicators	6
2.3	Energy consumption	9
3	<i>Pulp & Paper sector</i>	11
3.1	Sectoral organisation	11
3.2	Economic Indicators	11
3.3	Energy Consumption	12
4	<i>Petroleum refineries sector</i>	14
5	<i>Chemical sector</i>	15
5.1	Sectoral organisation	15
5.2	Economic Indicators	15
5.3	Energy consumption	16
6	<i>Non-metallic minerals sector</i>	18
6.1	Glass	18
6.1.1	Sectoral organisation	18
6.1.2	Economic Indicators.....	18
6.1.3	Energy consumption	19
6.2	Ceramics & Cement	20
6.2.1	Sectoral organisation	20
6.2.2	Economic Indicators.....	21
6.2.3	Energy Consumption.....	21
7	<i>Iron & Steel sector</i>	23
7.1	Sectoral organisation	23
7.2	Economic Indicators	23
7.3	Energy Consumption	24
8	<i>Other Metals sector</i>	26
8.1	Sectoral organisation	26
8.2	Economic Indicators	26

8.3	Energy Consumption	27
9	<i>Machinery sector</i>	29
9.1	Sectoral organisation.....	29
9.2	Economic Indicators	29
9.3	Energy Consumption	33
10	<i>Energy Statistics</i>	34
10.1	Energy consumption.....	34
10.2	Energy prices.....	37
10.3	Carbon dioxide conversion factors	37
10.4	Conversion factors to primary energy	37

1 General overview of industry in Slovenia

The main economic data for Slovenian industry are reported in the Figure below. It has to be considered that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the applied conversion index for data comparison is 255.

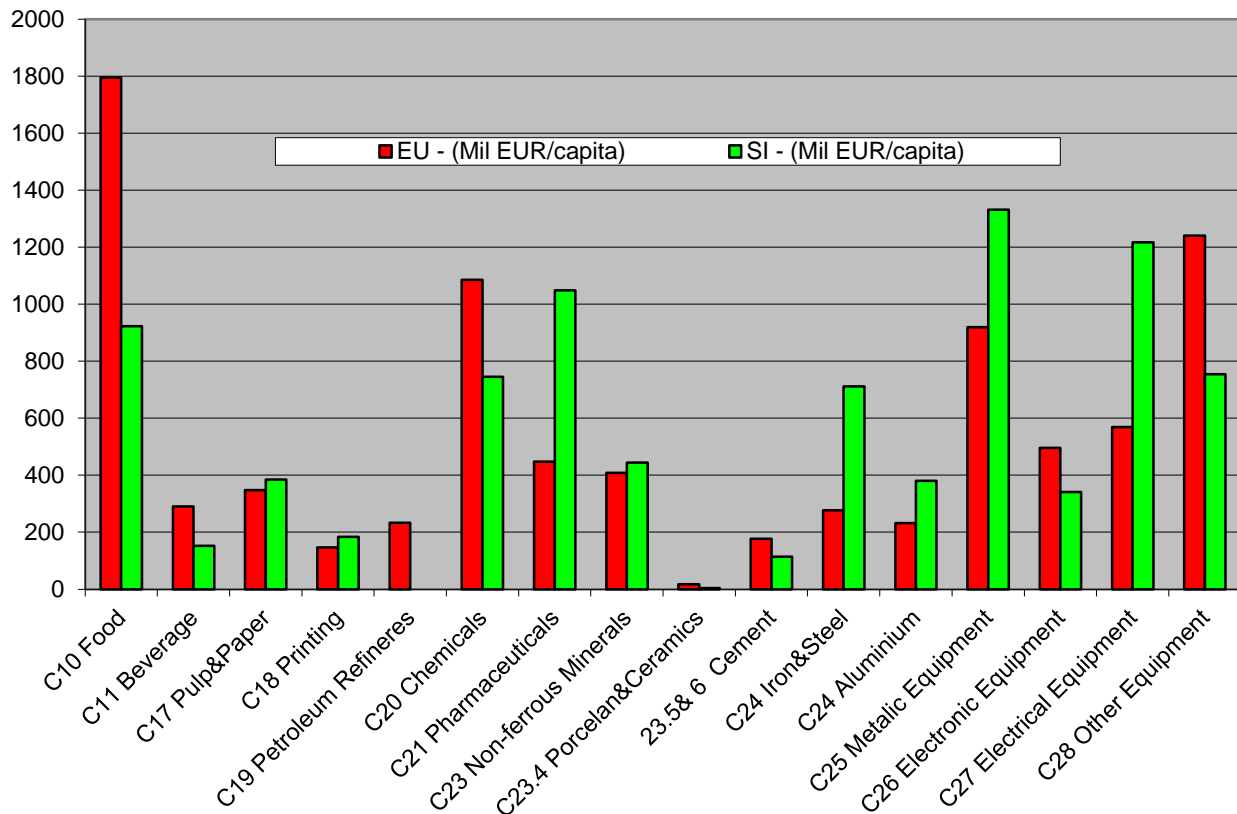


Figure 1: Turnover in million €/capita in EU-28 and Slovenia.

The GDP in 2015 in Slovenia was 38,570 billion € or 18,693 € per person. The industry companies contributed 33 billion € or 86%, of what the sector of manufacturing 25.5 billion € and sector of energy supply 6.1 billion €. Agriculture with 1,264 billion € covers 3.4% of GDP.

Industry is the cornerstone of the Slovenian economy:

- Exporting more than 80% of products, mainly to EU markets;
- accounting 66% of private research and innovation;
- providing high skilled jobs.

The course of index of industry production in the period from 2007 was similar to EU-28. The average yearly growth of the index of industry production was in 2015 regarding 2008 in EU-28 lower for 4.3% and in Slovenia was 5.3%.

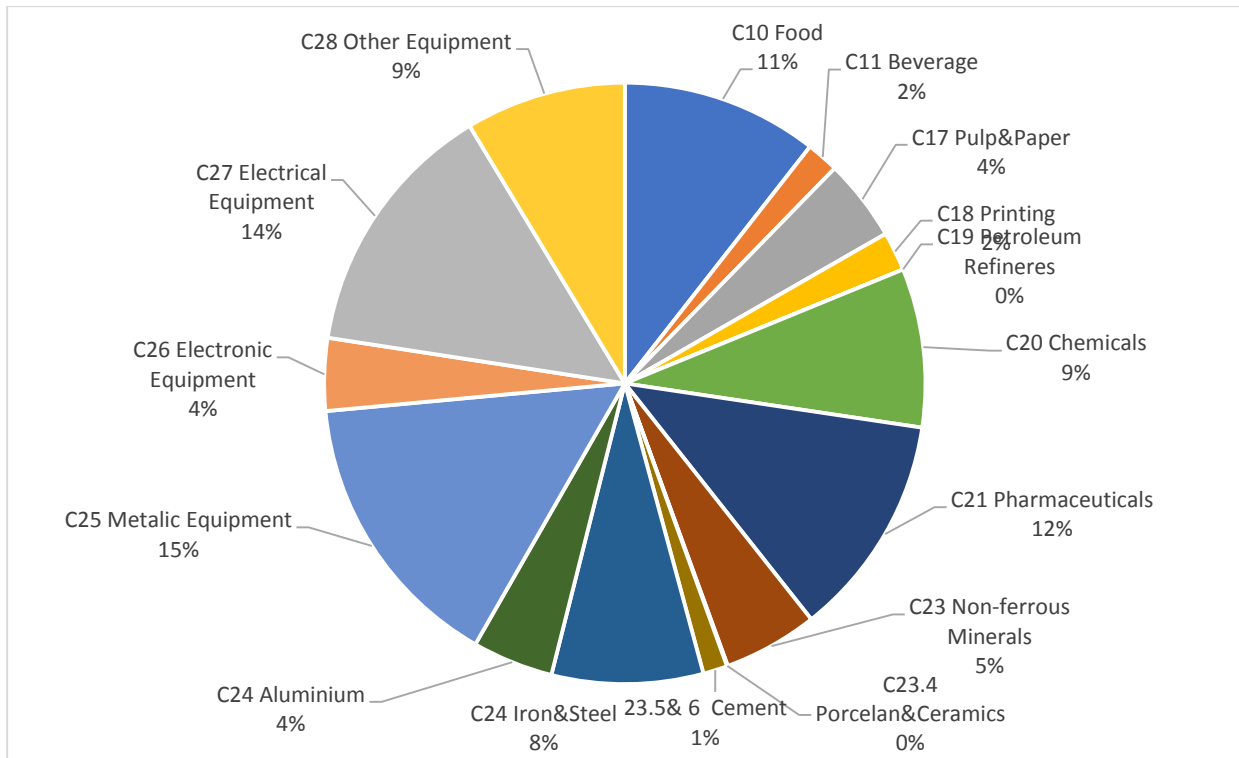


Figure 2: Contribution of the turnover by industry sectors in Slovenia.

2 Food and Beverage sector

The production of food and beverages is one of the most important activities of the Slovene economy. In 2015, 704 companies were registered in the food processing industry, providing employment for 12,658 employees. The incomes generated amounted to 2.01 billion €, while the value added on employee amounted to 36,742 €. The food processing industry is the third major employer in processing activities, after the metalworking industry and the production of electric devices.

2.1 Sectoral organization

The entire food & beverage sector is represented by the Chamber of agro-food industry, within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The chamber is organised in ten sub-sectors managed by specialised representatives from the industry. The main tasks of the chamber are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

The four largest industries in Slovene food processing are: flour milling and baking, meat processing, milk processing and beverages production. Their total share in the key indicators of industrial structure amounts to about three quarters. These companies provided employment for 30% of all employees in the food processing industry, generated 15% of sales revenues and contributed one fifth of value added. In 2009, meat processing was the leading industry in Slovene food technology by sales revenues (30%); it contributed 22% of value added and employed 28% of employees. One tenth of all companies in the food industry are registered for milk processing: these companies provide employment for more than 8% of all employees in the food industry and generate one tenth of value added and about one fifth of sales revenues. The beverage industry, which combines producers of non-alcoholic beverages, beer and wine, contributes more than one fifth of value added, 16% of sales revenues, employs 12% of employees and contributes one tenth of registered companies.

2.2 Economic indicators

It has to be considered that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the conversion index for data comparison is 255. The turnover per capita in the Food sector C10, in the EU-28 was 1,769 mil €/capita and in Slovenia 923 mil €/capita. In the Beverage sector C11, in the EU-28 was 291 mil €/capita and in Slovenia 152 mil €/capita. In both sectors the per capita value in Slovenia was only on half regarding EU-28. This shows relatively smaller activities of industry in these sectors in Slovenia.

Table 1: Food processing industry economic overview – Slovenia.

FOOD PROCESSING INDUSTRY	2015
Number of companies	704
Number of employees	12,658
Assets [billion €]	2.2
Turnover [billion €]	2.1
Export income [billion €]	0.5
Export orientation [%]	24.3
Productivity [€]	162,890
Value Added on Employee [€]	36,742
Profit/Loss on Employee [€]	5,549

The main parameters for statistical analysis of the sector in Slovenia are reported in the below table.

Table 2: Key economic parameters for the Slovenian Food and Beverage sector.

Description	NACE (Group)	Number of enterprises [n]	No of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of food products	C10	625	11,331	1,845	388	1,799
Processing and preserving of meat and production of meat products	C10.1	93	3,732	N/A	N/A	643
Processing and preserving of fish, crustaceans and molluscs	C10.2	8	150	21	4	19
Processing and preserving of fruit and vegetables	C10.3	31	575	100	27	98
Manufacture of vegetable and animal oils and fats	C10.4	7	109	29	4	29

Manufacture of dairy products	C10.5	28	1,176	294	57	292
Manufacture of grain mill products. starches and starch products	C10.6	9	498	69	13	67
Manufacture of bakery and farinaceous products	C10.7	353	3,643	288	94	281
Manufacture of other food products	C10.8	84	1,054	276	64	262
Manufacture of prepared animal feeds	C10.9	12	396	109	17	107
Manufacture of beverages	C11	79	1,326	304	77	264
Distilling. rectifying and blending of spirits	C11.01	0	0	0	0	0
Manufacture of wine from grape	C11.02	6	189	N/A	N/A	N/A
Manufacture of cider and other fruit wines	C11.03	0	0	0	0	0
Manufacture of other non-distilled fermented beverages	C11.04	N/A	N/A	N/A	N/A	N/A
Manufacture of beer	C11.05	3	691	N/A	N/A	N/A
Manufacture of malt	C11.06	0	0	0	0	0
Manufacture of soft drinks; production of mineral waters	C11.07	5	335	N/A	N/A	N/A

and other bottled waters						
--------------------------	--	--	--	--	--	--

The key markets where Slovenian Food is exported or from where Slovenia imports Food products are represented in the Figure below:

Key markets in international trade (2015):

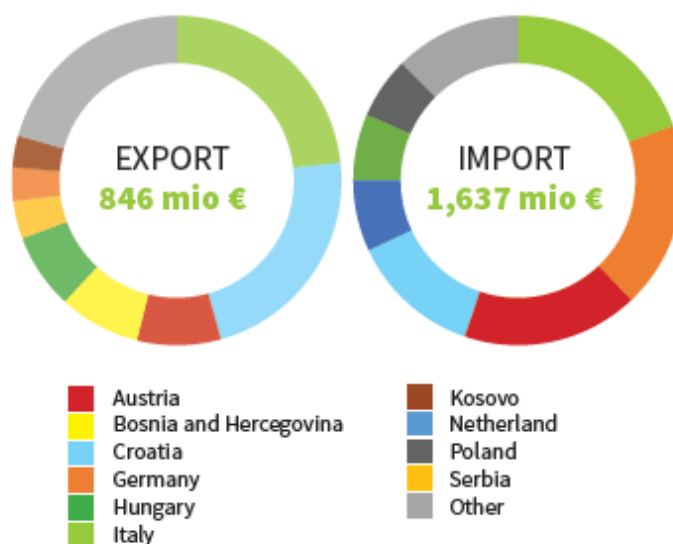


Figure 3: Key markets in international trade for Slovenian Food Industry.

2.3 Energy consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the sector of Chemical industry (NACE C10 and C11) was 73 ktoe, what represented 6,8% of the complete Slovenian production industry. The main energy carriers in this sector were electricity with the share of 38%, natural gas with 28%, petrol with 12%, district heating with 5%, LPG with 4% and wood with 3%.

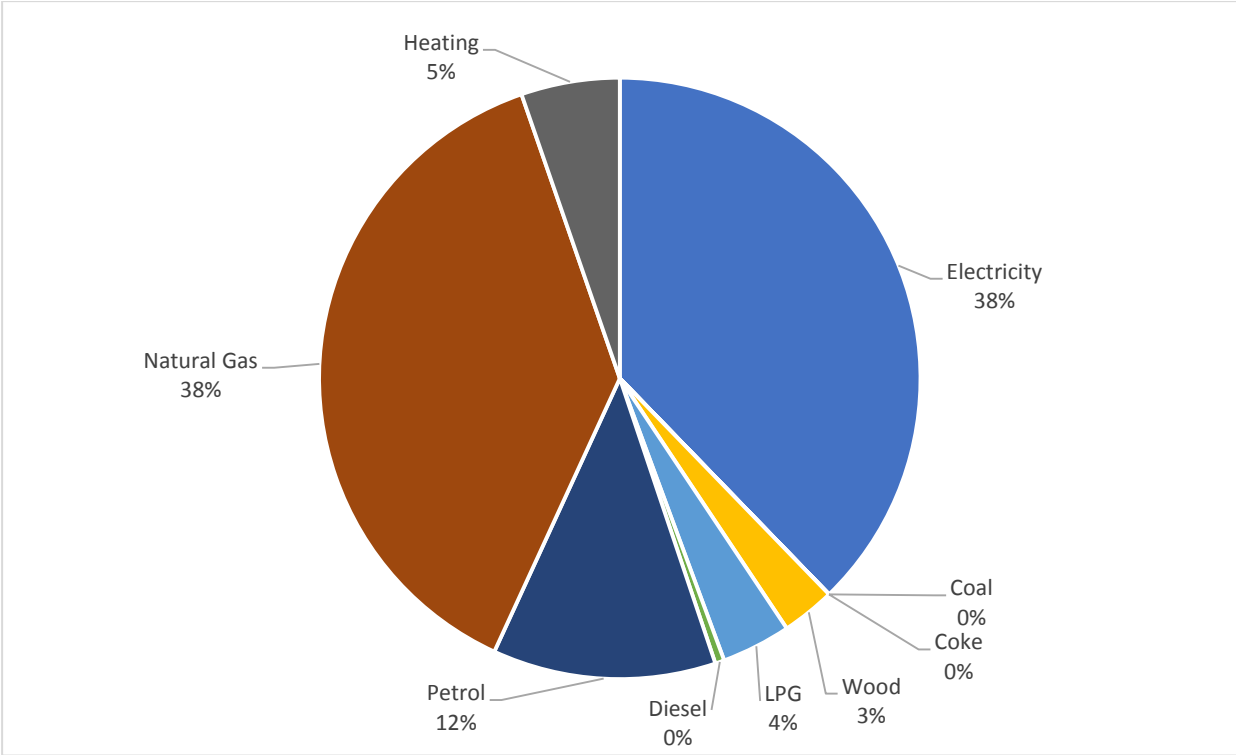


Figure 4: Use of fuels and energy in the sector of Food and Beverage industry in Slovenia.

3 Pulp & Paper sector

Pulp and paper sector is constituted by two NACE groups:

- NACE C17: Manufacture of paper and paper products
- NACE C18: Printing and reproduction of recorded media

3.1 Sectoral organisation

The sector is represented by the Association of paper and paper converting industry within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The main tasks of the association are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

The paper industry in Slovenia has about 110 companies, about 4,200 employers. It has a turnover of 706 million euros and adds 182 million euros to the EU GDP. The industry is strong in export markets, with a priority orientation to international competitiveness. The association of Slovenian paper industry is member of CEPI, the Confederation of European Paper Industries.

3.2 Economic Indicators

We have to consider, that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the sector C17, in EU-28 was 348 mil €/capita, in Slovenia 385 mil €/capita and so 11% higher. In the sector C18, the turnover was in EU-28 146 mil €/capita, in Slovenia 184 mil €/capita and 25% higher.

The main parameter for statistical analysis of the sector in Slovenia are reported in the below table:

Table 3: Key economic parameters for the Slovenian Pulp and Paper sector.

Description	NACE (Div)	NACE (Group)	Number of enterprises [n]	No. of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of paper and paper products	C17	-	112	3,986	770	170	760
Manufacture of pulp, paper and paperboard	-	C17.1	11	1,417	440	79	436

Manufacture of articles of paper and paperboard	-	C17.2	101	2,569	330	91	324
Printing and reproduction of recorded media	C18	-	610	2,924	367	115	357
Printing and service activities related to printing	-	C18.1	602	2,907	366	114	356
Reproduction of recorded media	-	C18.2	8	17	1	0,4	1

3.3 Energy Consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the Pulp, paper and printing industry (NACE C17 and C18) was 205 ktoe, what represented 19.1% of the Slovenian production industry. The main energy carriers in this sector were natural gas with the share of 47%, electricity with 32%, coal with 17% and wood with 3%.

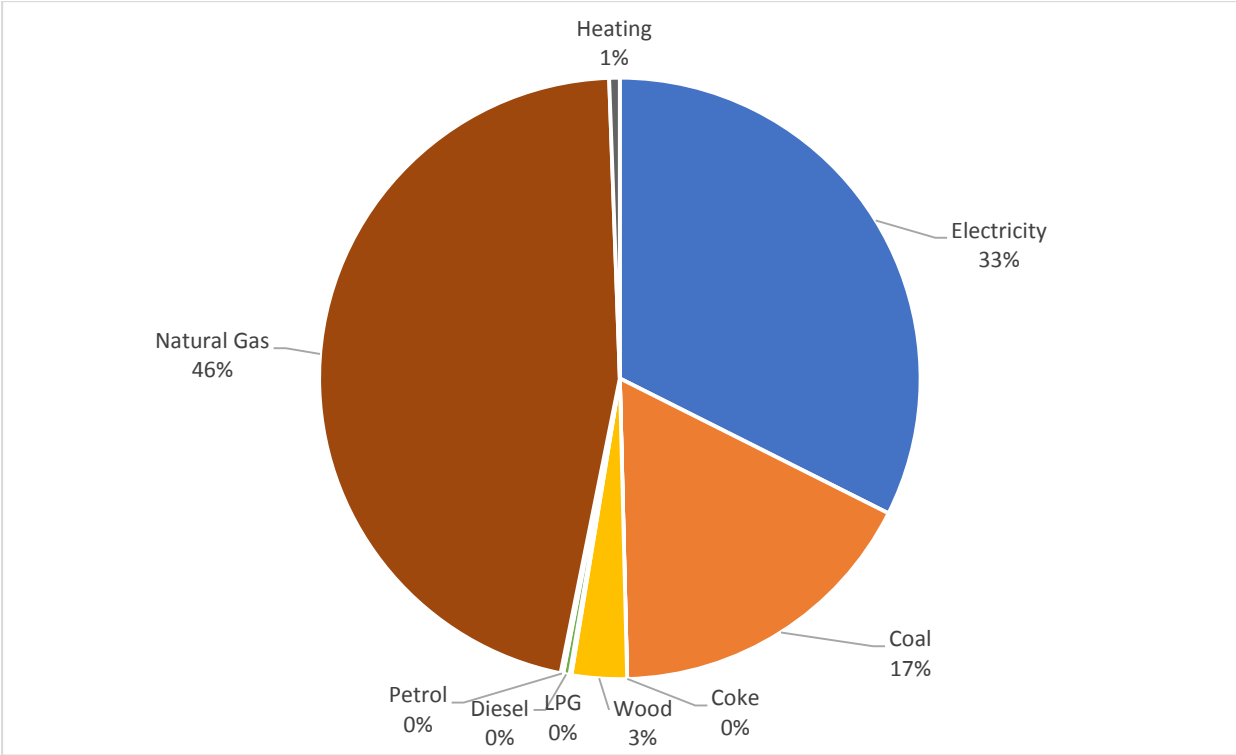


Figure 5: Use of fuels and energy in the sector of Pulp, paper and printing industry in Slovenia.

4 Petroleum refineries sector

The petroleum refineries sector contributed to 0.8% of the EU's GDP in 2011. There is no production in Slovenia in the two main relevant groups in C19 sector: manufacture of coke oven products (NACE C19.1) and refined petroleum products (NACE C19.2).

5 Chemical sector

5.1 Sectoral organisation

The sector is represented by the Association of chemical industry within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The chamber is organised in ten sub-sectors and working groups, managed by specialised representatives from the industry. The main tasks of the association are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

5.2 Economic Indicators

We have to consider that the population in EU-28 in 2015 was 509 million and in Slovenia 2 millions, so the conversion index for data comparison is 255. The turnover per capita in the sector of Chemical production and products C20, in the EU-28 was 1.086 mil €/capita and in Slovenia 746 mil €/capita. The per capita value in Slovenia was for 31% lower regarding EU-28, what means that this sector is relatively smaller in Slovenia. In the sector of Chemical production and products C21, in the EU-28 it was 448 mil €/capita and in Slovenia 1,048 mil €/capita. The per capita value in Slovenia was so for 134% higher regarding EU-28. It means that the pharmaceutical sector in Slovenia is relatively much bigger. The main statistics parameter to be considered for the sector analysis are reported in the below table.

Table 4. Key economic parameters for the Slovenian Chemical sector.

Description	NACE (Group)	Number of enterprises [n]	No, of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of chemicals and chemical products	C20	164	6,347	1,491	375	1,477
Manufacture of basic chemicals. fertilisers and nitrogen compounds. plastics and synthetic rubber in primary forms	C20.1	47	1,868	388	109	382
Manufacture of pesticides and	C20.2	7	192	17	5	16

D4.2 - Picture of efficiency projects implemented by the Industry sector-by-sector and process-by-process

other agrochemical products						
Manufacture of paints, varnishes and similar coatings, printing ink and mastics	C20.3	20	1,350	338	84	336
Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	C20.4	44	937	267	72	267
Manufacture of other chemical products	C20.5	45	1,127	266	70	262
Manufacture of man-made fibres	C20.6	1	779	214	36	214
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21	27	7,947	2,096	790	1,953
Manufacture of basic pharmaceutical products	C21.1	6	11	2	1	2
Manufacture of pharmaceutical preparations	C21.2	21	7,936	2,093	788	1,951

5.3 Energy consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the sector of Chemical industry (NACE C20 and C21) was 165 ktoe, what represented 15.3% of the complete Slovenian production industry. The main energy carriers in this sector were electricity with the share of 33%, natural gas with 23%, district heating with 23%, wood with 20% and petrol with 3%.

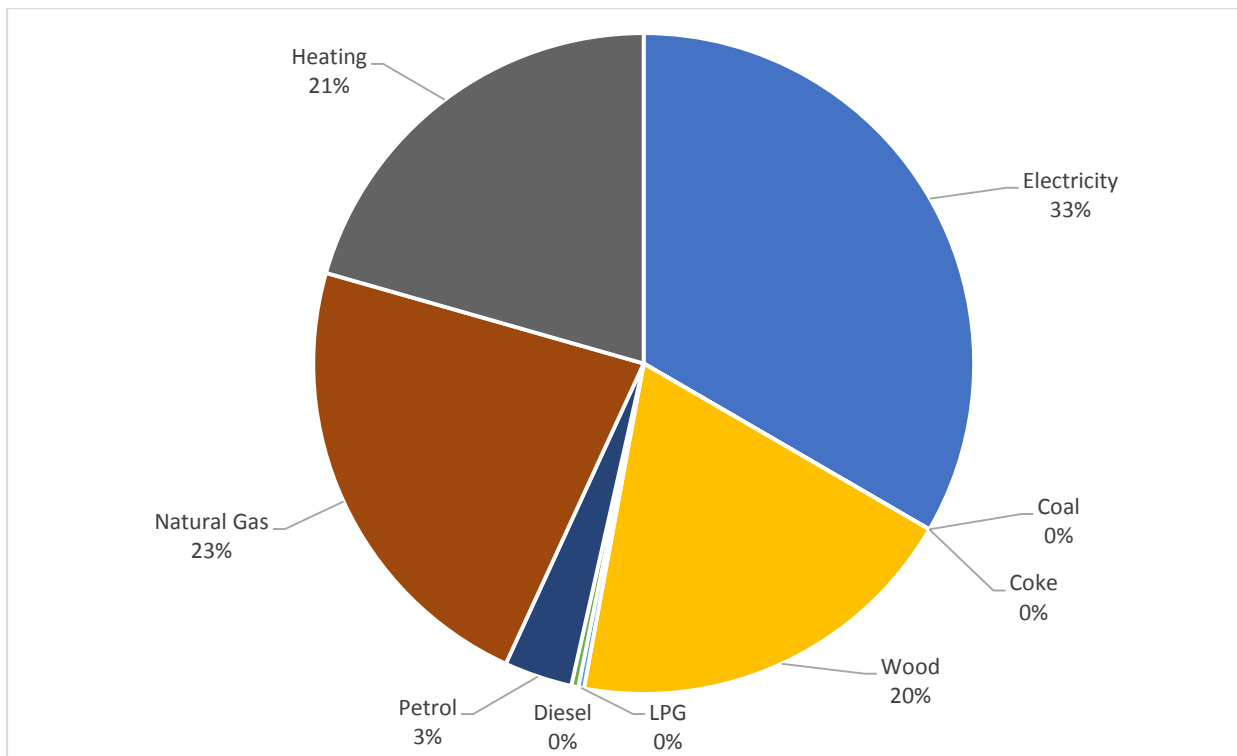


Figure 6: Use of fuels and energy in the sector of Chemical industry in Slovenia.

6 Non-metallic minerals sector

6.1 Glass

Non-metallic mineral products comprise of the production of cement, ceramics, glass and lime. These manufacturing sectors are characterised by the transformation of naturally occurring minerals such as limestone, silica and clays through an energy-intensive process. The end products range from bricks and tiles to glass and tableware.

Non-metallic mineral (C23) sector is composed by the subsectors of:

- Manufacture of glass and glass products (C23.1);
- Manufacture of ceramics and ceramic products (C23.2, C23.3, C23.4, C23.7, C23.9);
- Manufacture of cement (C23.5 and C23.6);
- Manufacture of lime (C23.5 and C23.6).

6.1.1 Sectoral organisation

In Slovenia there are two main manufacturing plants for glasses, container glass, glass for lights and special decorative products. The companies are Steklarna Hrastnik and Steklarna Rogaška with long tradition and export orientation and provides majority of the employments in the sector. In Slovenia there is no production of flat glass and glass fibres.

6.1.2 Economic Indicators

The population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the entire sector of Non-metallic minerals C23, in the EU-28 was 408 mil €/capita and in Slovenia 444 mil €/capita. The per capita value in Slovenia is in the range of EU-28, only slightly higher for about 9%.

The statistic parameters for the sector of Non-metallic minerals production in Slovenia are:

Table 5: Key economic parameters for the Slovenian Non-metallic minerals sector.

Description	NACE (Group/Class)	Number of enterprises [n]	No. of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of other non- metallic products	C23	252	6.097	888	N/A	851

Manufacture of glass and glass products	C23.1	33	1.879	161	70	152
Manufacture of refractory products	C23.2	11	97	41	9	40
Manufacture of clay building materials	C23.3	9	283	32	9	31
Manufacture of other porcelain and ceramic products	C23.4	16	94	8	6	6
Manufacture of cement, lime and plaster	C23.5	5	289	81	21	77
Manufacture of articles of concrete, cement and plaster	C23.6	79	1.101	147	40	137
Cutting, shaping and finishing of stone	C23.7	68	471	35	15	34
Manufacture of abrasive products and non-metallic mineral products n.e.c.	C23.9	31	1.883	382	102	374

6.1.3 Energy consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the Non-metallic minerals production industry (NACE C23) was 184 ktoe, what represented 17,1% of the complete Slovenian production industry. The main energy carriers in this sector were natural gas with the share of 48%, electricity with 25%, coke with 23%. Petrol, diesel, LPG and wood represented each the share of 1%.

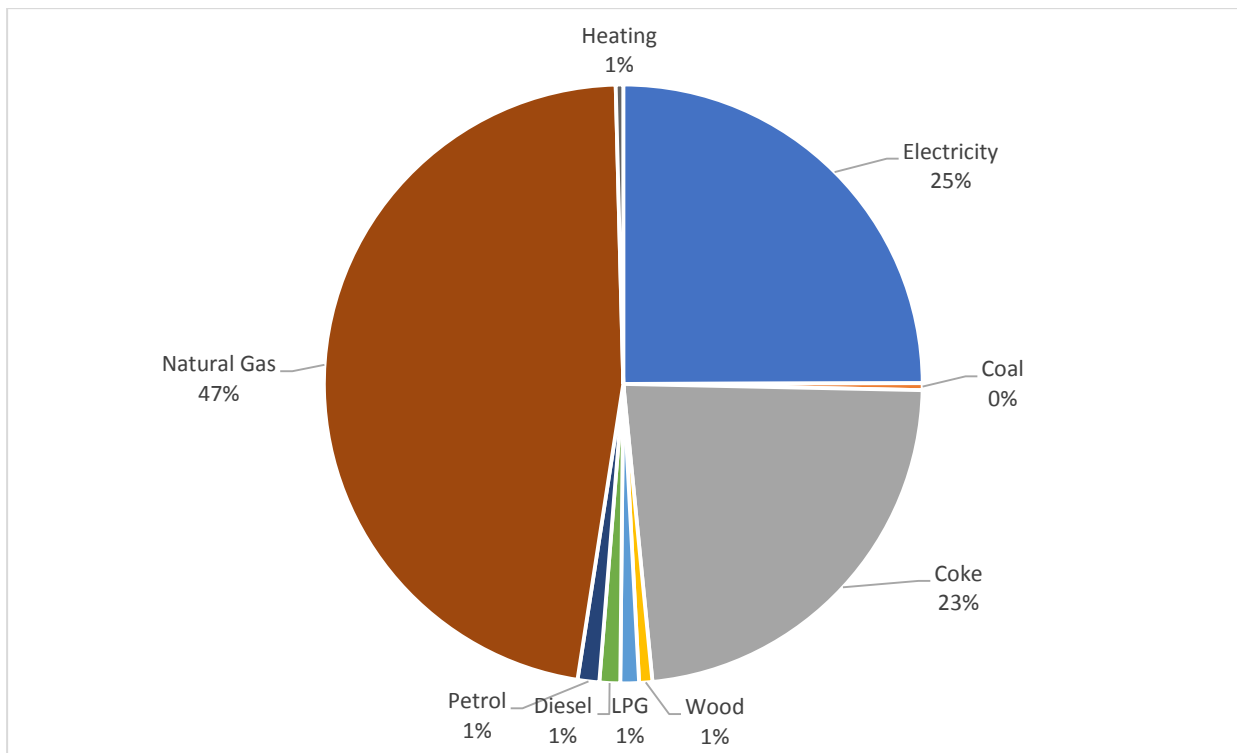


Figure 7: Use of fuels and energy in the sector of Mineral Production industry in Slovenia.

6.2 Ceramics & Cement

Ceramics products can be divided into 4 categories:

- Construction and housing: it comprises bricks and roof tiles, wall and floor tiles, clay drainage pipes, sanitary ware and expanded clay;
- Consumer goods: it comprises tableware, ornamental ware and household appliances;
- Industrial applications such as abrasives, refractories and porcelain enamel;
- High tech and innovation goods in the fields of Electronics, Healthcare, Security, Transport and Renewable Energies.

6.2.1 Sectoral organisation

The sector is represented by the Association of Metal and non-metal materials industry within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The main tasks of the association are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

In Slovenia there are only two manufacturing plants for ceramics products. The two companies are Martex Volčja Draga and Gorenje keramika Šmartno ob Paki. The companies have long tradition and provides the majority of employments in the sector.

In Slovenia there also two manufacturing plants for cement production. The two companies are Salanit Anhovo and Lafrange cement in Trbovlje. The companies have long tradition and provides the majority of employments in the sector.

6.2.2 Economic Indicators

We have to consider, that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the entire sector of Cement manufacture and products C23.5 and C23.6, in the EU-28 was 176 mil €/capita and in Slovenia 114 mil €/capita. The per capita value in Slovenia was for 36% lower regarding EU-28 what means, that this sector is smaller in Slovenia.

The main parameter for statistical analysis of the sector in Slovenia are reported in the below table:

Key economic parameters for the Slovenian Food and Beverage sector.

Description	NACE (Group/Class)	Number of enterprises [n]	No, of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of cement. lime and plaster	C23.5	5	289	81		
Manufacture of articles of concrete. cement and plaster	C23.6	79	1,101	147	40	137

6.2.3 Energy Consumption

Ceramics industry is energy intensive, with around 30% of the production costs related to energy.

The production process is highly energy-intensive, with energy costs representing up to 40% of total product cost.

The main aspects to take into consideration about cement industry are:

- The costs of road transportation are very high, making it worthless to haul cement for more than 200-300km; however, with the modern vessels, it is possible to carry cement with cargo-ships over longer distances for a lower unit price;
- The regional demand of cement is more or less proportional to the density of population and the disposable income;

- The production of cement is carried out in large plants, whose capacity is not easily modifiable after building;
- The regional demand is very volatile, making it necessary to be able to transport it to the neighbouring regions via road hauling or by ship.

7 Iron & Steel sector

7.1 Sectoral organisation

The sector is represented by the Association of Metal and non-metal materials industry, within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The main tasks of the association are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members. Within the association there is organised a special strategic board for metallurgy.

The main two Slovenian companies in the Iron & steel sector are Sij Slovenian Steel Group and Štore Steel are members of the European Union EUROFER association. The Slovenian steel companies are producers of special steel products and mainly oriented to export. The Sij group of companies has 3.400 employers and a yearly sale of products in the range of 570 million €. The company Štore Steel has 520 employers and yearly sale of products in the range of 101 million €. The main products are inox plates, special heavy plates, sticks steel for implements, alloy steel for implements, semi products, industrial knives, cylinders, welding materials, machinery production etc.

7.2 Economic Indicators

The population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the entire sector of Metal production C24 in the EU-28 was 276 mil €/capita and in Slovenia 711 mil €/capita. The per capita value in Slovenia was for 157% higher regarding EU-28 what means that we have in Slovenia a relatively big Iron & steel sector.

The main parameters for statistical analysis of the sector in Slovenia are reported in the below table:

Table 6: Key economic parameters for the Slovenian Food and Beverage sector.

Description	NACE (Group)	NACE (Class)	No, of enterprises [n]	No, of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of metals	C24		55	5,470	1,422	285	1,391
Manufacture of basic iron and steel and of ferro- alloys	C24.1		4	2,614	662	143	645
Manufacture	-	C24.10	4	2,614	662	143	645

of basic iron and steel and of ferro-alloys							
Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	C24.2		0	0	0	0	0
Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	-	C24.20	0	0	0	0	0
Manufacture of other products of first processing of steel	C24.3		9	332	45	11	44
Cold drawing of bars	-	C24.31	0	0	0	0	0
Cold rolling of narrow strips	-	C24.32	1	1	N/A	N/A	N/A
Cold forming or folding	-	C24.33	3	41	N/A	N/A	N/A
Cold drawing of wire	-	C24.34	2	270	N/A	N/A	N/A
Casting of metals	C24.5		38	2,524	715	131	702
Casting of iron	-	C24.51	5	976	N/A	N/A	N/A
Casting of steel	-	C24.52	3	398	N/A	N/A	N/A

7.3 Energy Consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the Metal production industry (NACE C24) was 304 ktoe, what represented 28,3% of the complete

Slovenian production industry. The main energy carriers in this sector were electricity with the share of 61%, natural gas with 35%, LPG with 3% and district heating with 1%. We estimate that about 2/3 of this energy consumption was due to Iron and Steel industry.

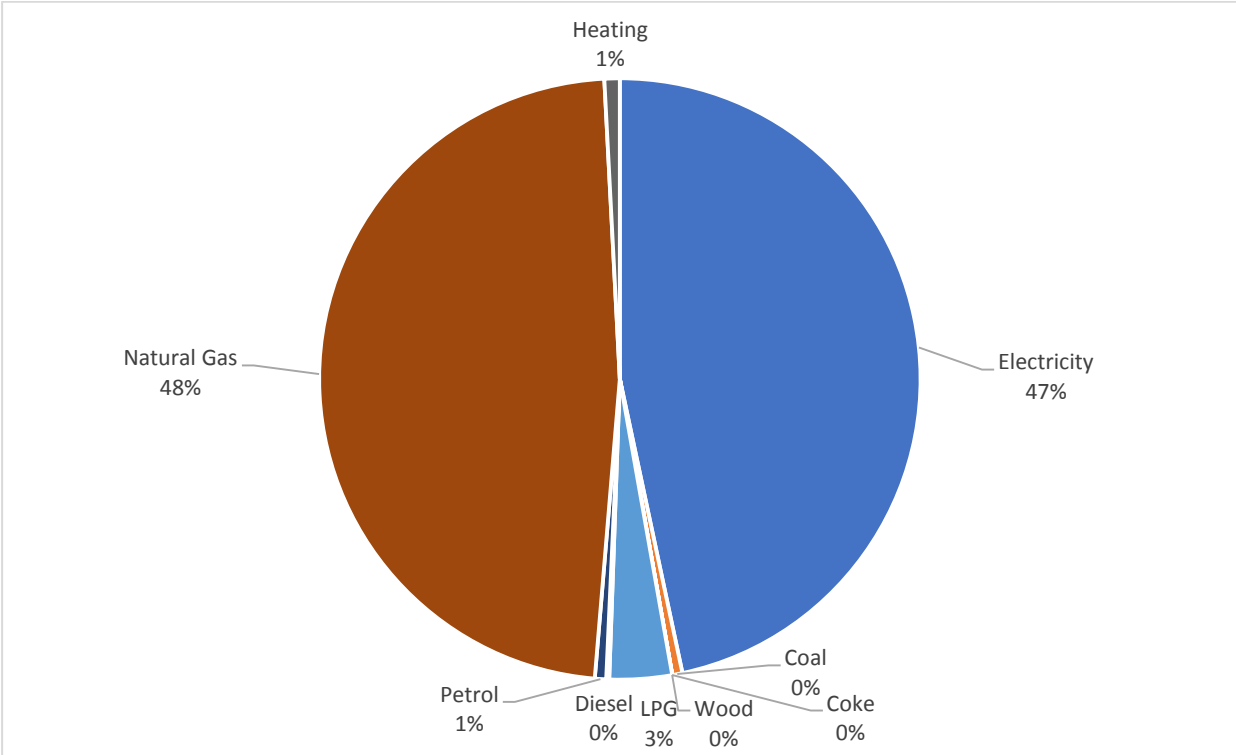


Figure 8: Use of fuels and energy in the sector of Metal Production industry in Slovenia.

8 Other Metals sector

Non-ferrous metals (NFM) sector is composed by the upstream base metal production (aluminium, copper, lead, zinc, tin) and precious metals production and the secondary processing and fabrication activities of light metals and other non-ferrous metals. They are used in many different sectors, especially automotive, aerospace, mechanical engineering, electronics, medical devices and construction. This is due to their thermal, electrical, magnetic and isolating characteristics and their recyclability and low specific weight.

8.1 Sectoral organisation

The sector is represented by the Association of Metal and non-metal materials industry within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The main tasks of the association are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

8.2 Economic Indicators

We have to consider, that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the sector of Non-ferrous metals C24.4 and 24.5, in the EU-28 was 232 mil €/capita and in Slovenia 380 mil €/capita. The per capita value in Slovenia was so for 64% higher regarding EU-28. This is very probably the result of relatively big production of aluminium in Slovenia in the company Talum Kidričevo.

The main statistics parameter for Non-ferrous metals industry are reported in the below table:

Table 7: Key economic parameters for the Slovenian Other metals sector.

Description	NACE (Group)	NACE (Class)	Number of enterprises [n]	No, of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufactur e of metals	C24		24	2,091	760	103	744
Manufacture of basic precious and other non- ferrous metals	C24.4	-	5	816	399	37	389

Precious metal production	-	C24.41	0	0	0	0	0
Aluminium production	-	C24.42	1	721	N/A	N/A	N/A
Lead, zinc and tin production	-	C24.43	1	94	N/A	N/A	N/A
Copper production	-	C24.44	0	0	N/A	N/A	N/A
Other non-ferrous metal production	-	C24.45	0	0	N/A	N/A	N/A
Processing of nuclear fuel	-	C24.46	N/A	N/A	N/A	N/A	N/A
Casting of metals	C24.5 1/3	-	19	1,275	361	66	355
Casting of light metals	-	C24.53	16	3,940	N/A	N/A	N/A
Casting of non-ferrous	-	C24.54	10	165	N/A	N/A	N/A

8.3 Energy Consumption

The production of NFM is highly energy-intensive; a reduction of energy consumption is given by the re-use of materials through recycling.

According to the data of Slovenian statistical office (SISTAT) for 2015 and our estimation for aluminium production, the use of fuels and energy in the Non-ferrous metal industry (NACE C24.4 and C.24.5) was 119 ktoe, what represented 11.1% of the complete Slovenian production industry. The main energy carriers in this sector is electricity.

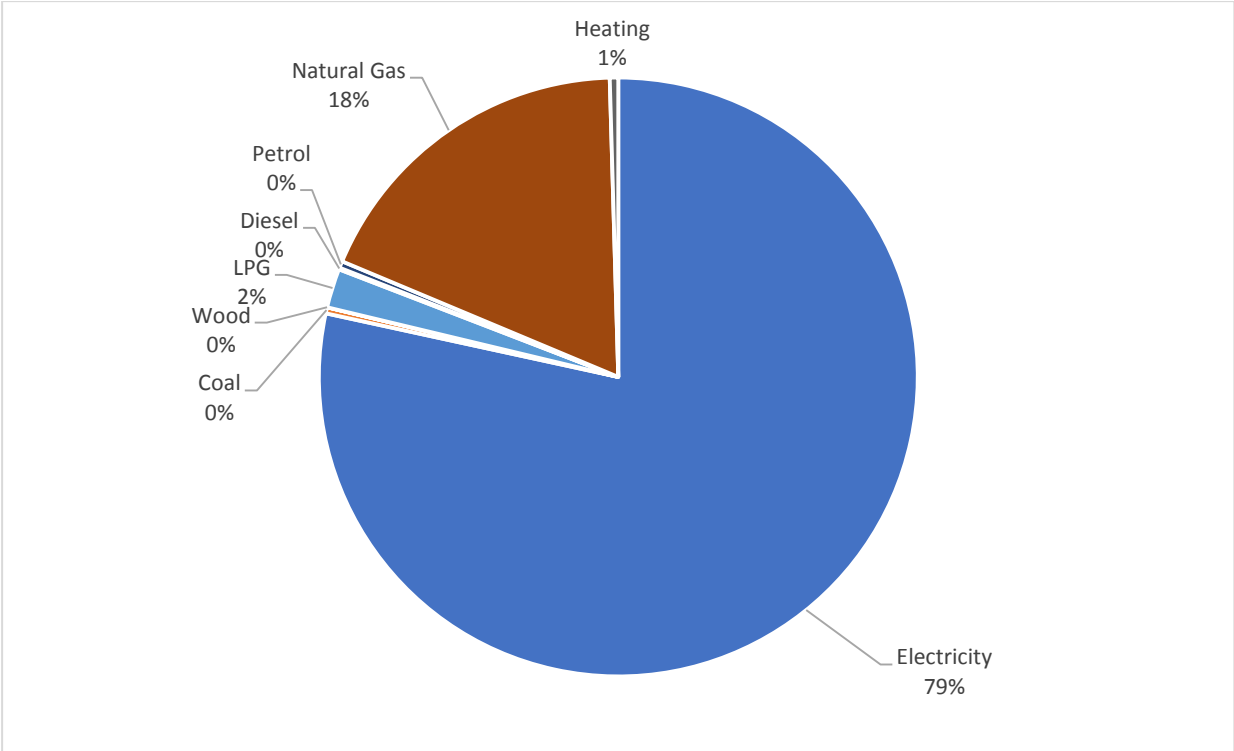


Figure 9: Use of fuels and energy in the Non-ferrous metal sector industry in Slovenia.

9 Machinery sector

The machinery sector is split among 4 NACE divisions:

- C25 (Manufacture of fabricated metal products, except machinery and equipment);
- C26 (Manufacture of computer, electronic and optical products);
- C27 (Manufacture of electrical equipment);
- C28 (Manufacture of machinery and equipment not elsewhere classified).

9.1 Sectoral organisation

The sector is represented by the Association of Metal industry within the Chamber of commerce and industry of Slovenia. The membership is voluntary. The chamber is organised in ten sub-sectors and working groups, managed by specialised representatives from the industry. The main tasks of the chamber are representation of the members in front of the government, international organisations and social partners, general deployment of the sector, knowledge transfer and transfer of energy efficiency practices, training, information and consultancy to the members.

9.2 Economic Indicators

We have to consider, that the population in EU-28 in 2015 was 509 million and in Slovenia 2 million, so the index for data comparison is 255. The turnover per capita in the sector of Manufacture of fabricated metal products, C25 in the EU-28 was 920 mil €/capita, in Slovenia with 1,332 mil €/capita, or 45% higher. In the sector of production of electronic products C26 in the EU-28 was 496 mil €/capita, in Slovenia with 341 mil €/capita, 31% smaller. In the sector of production of electrical equipment C27 in the EU-28 was 569 mil €/capita, in Slovenia with 1,217 mil €/capita, more than double. In the sector of production of other machinery and equipment C28, in the EU-28 was 1.241 mil €/capita, in Slovenia only 754 mil €/capita. The main parameters for statistical analysis of the sector are reported in the below table.

Table 8: Key economic parameters for the Slovenian Machinery sector.

Description	NACE (Group)	Number of enterprises [n]	No, of persons employed [n]	Turnover [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of fabricated metal products. except	C25	1,815	25,667	2,663	881	2,587

machinery and equipment						
Manufacture of structural metal products	C25.1	473	6,198	705	211	684
Manufacture of tanks, reservoirs and containers of metal	C25.2	32	514	40	15	39
Manufacture of steam generators, except central heating hot water boilers	C25.3	7	15	6	-1	1
Manufacture of weapons and ammunition	C25.4	2	3	2	0,5	2
Forging, pressing, stamping and roll-forming of metal; powder metallurgy	C25.5	41	1,077	213	43	211
Treatment and coating of metals; machining	C25.6	657	6,338	488	198	478
Manufacture of cutlery, tools and general hardware	C25.7	206	6,174	578	226	558
Manufacture of other fabricated metal products	C25.9	397	5,376	632	189	616
Manufacture of computer, electronic and optical products	C26	242	6,000	681	225	645
Manufacture of electronic	C26.1	78	2,136	240	71	234

components and boards						
Manufacture of computers and peripheral equipment	C26.2	27	213	43	13	40
Manufacture of communication equipment	C26.3	21	773	127	42	108
Manufacture of consumer electronics	C26.4	40	481	70	17	69
Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	C26.5	62	1,404	150	58	144
Manufacture of irradiation, electromedical and electrotherapeutic equipment	C26.6	4	8	3	0,3	3
Manufacture of optical instruments and photographic equipment	C26.7	10	985	47	23	46
Manufacture of magnetic and optical media	C26.8	0	0	0	0	0
Manufacture of electrical equipment	C27	272	16,771	2,534	665	2,020
Manufacture of electric motors, generators, transformers and electricity distribution	C27.1	87	6,456	870	259	849

and control apparatus						
Manufacture of batteries and accumulators	C27.2	3	561	213	42	206
Manufacture of wiring and wiring devices	C27.3	24	1,214	96	32	91
Manufacture of electric lighting equipment	C27.4	44	394	40	12	39
Manufacture of domestic appliances	C27.5	31	6,671	1,106	252	982
Manufacture of other electrical equipment	C27.9	83	1,474	247	69	244
Manufacture of machinery and equipment (not elsewhere classified)	C28	508	12,249	1,508	468	1,460
Manufacture of general-purpose machinery	C28.1	78	2,786	348	110	335
Manufacture of other general-purpose machinery	C28.2	187	3,743	493	139	483
Manufacture of agricultural and forestry machinery	C28.3	38	1,269	163	48	157
Manufacture of metal forming machinery and machine tools	C28.4	56	1,188	124	43	120
Manufacture of other	C28.9	149	3,271	380	129	365

special-purpose machinery						
---------------------------	--	--	--	--	--	--

9.3 Energy Consumption

According to the data of Slovenian statistical office (SISTAT) for 2015, the use of fuels and energy in the sector of Machinery industry (NACE C25, C26, C27 and C28) was 144 ktoe, what represented 11.3% of the complete Slovenian production industry. The main energy carriers in this sector were electricity with the share of 56%, natural gas with 30%, petrol with 7%, district heating with 3%, LPG with 2%, diesel with 1% and wood with 1%.

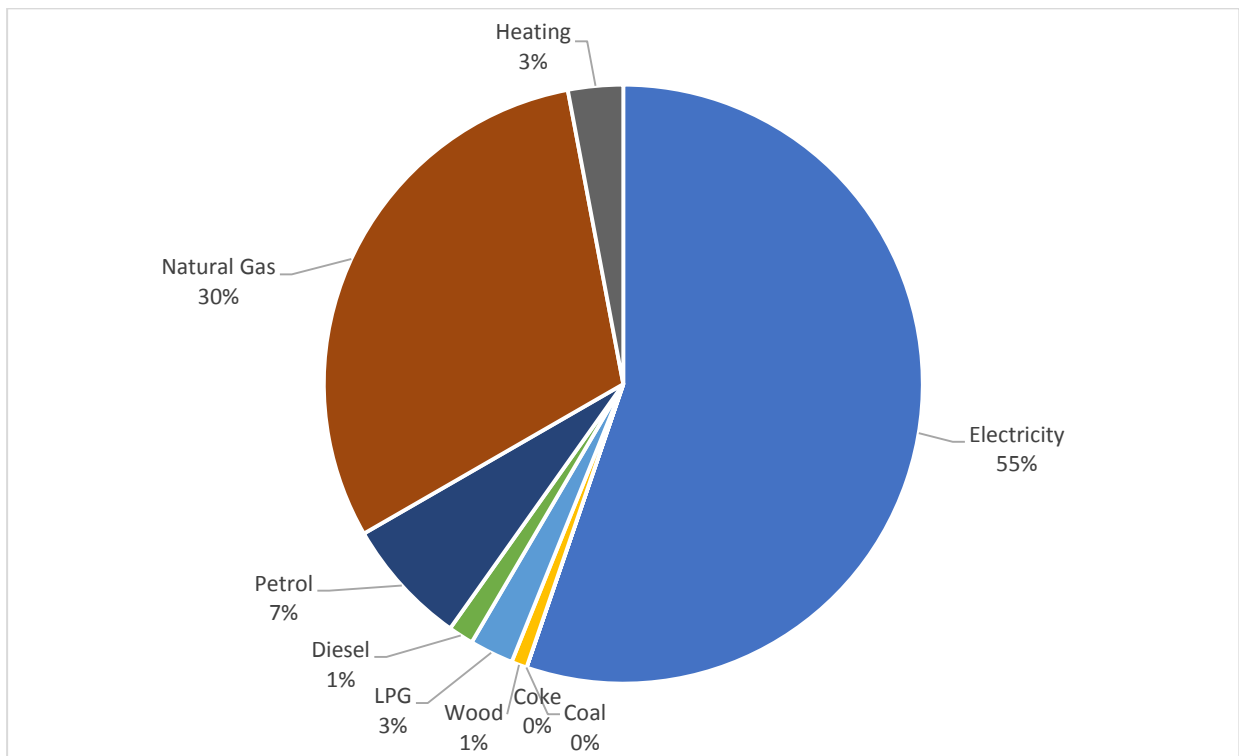


Figure 10: Use of fuels and energy in the Machinery sector industry in Slovenia.

10 Energy Statistics

10.1 Energy consumption

The final energy consumption in Slovenia was 4,752 ktoe, of what manufacturing sector representing 1,074 ktoe or 22.6%. From the comparison with EU-28 Slovenia has substantial higher share of consumption in the Pulp, paper and print industry, Non-metallic mineral, Non-ferrous metal and Machinery industry and lower in the Chemical, pharmaceutical and Food and beverage industry.

Table 9: Sectors final energy consumption in EU-28 and Slovenia.

Sector group	Final energy consumption in 2013 – EU-28 [ktoe]	% share of total	Final energy consumption in 2015 - Slovenia [ktoe]	% share of total
Pulp, paper and print	34,265	12.6%	205	19.1%
Iron and steel	50,815	18.6%	185	17.2%
Non-metallic mineral	34,249	12.6%	184	17.1%
Chemical and pharmaceutical	51,485	18.9%	165	15.3%
Non-ferrous metal	9,381	3.4%	119	11.1%
Petroleum refineries	44,657	16.4%	0	0%
Food and beverage	28,353	10.4%	73	6.8%
Machinery	19,282	7.1%	144	11.3%
Total	272,487		1,074	

The total energy consumption of the industry sector (NACE code C) in Slovenia in 2015 was 53,127 TJ or 1,074 ktoe. Divided among energy carriers, the main sources were electricity (21,687 TJ), natural gas (16,956 TJ), wood (3,341 TJ), district heating (2,052 TJ) and coke (1,294 TJ). Divided among industrial sectors, the sectors with the highest energy consumption were basic metals (12,751 TJ), pulp & paper (8,267 TJ) and building materials (7,696 TJ). See the graphs and table below for a more detailed overview.

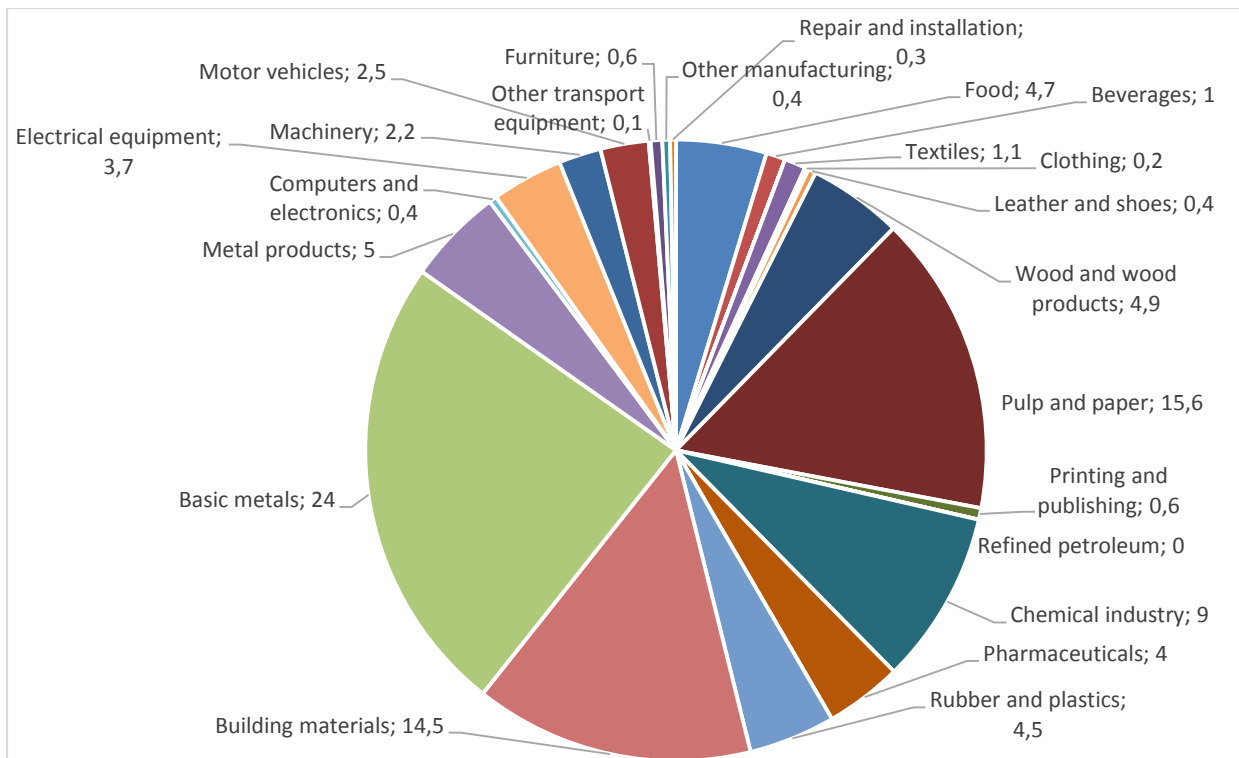


Figure 11: Energy consumption by industry sector in Slovenia.

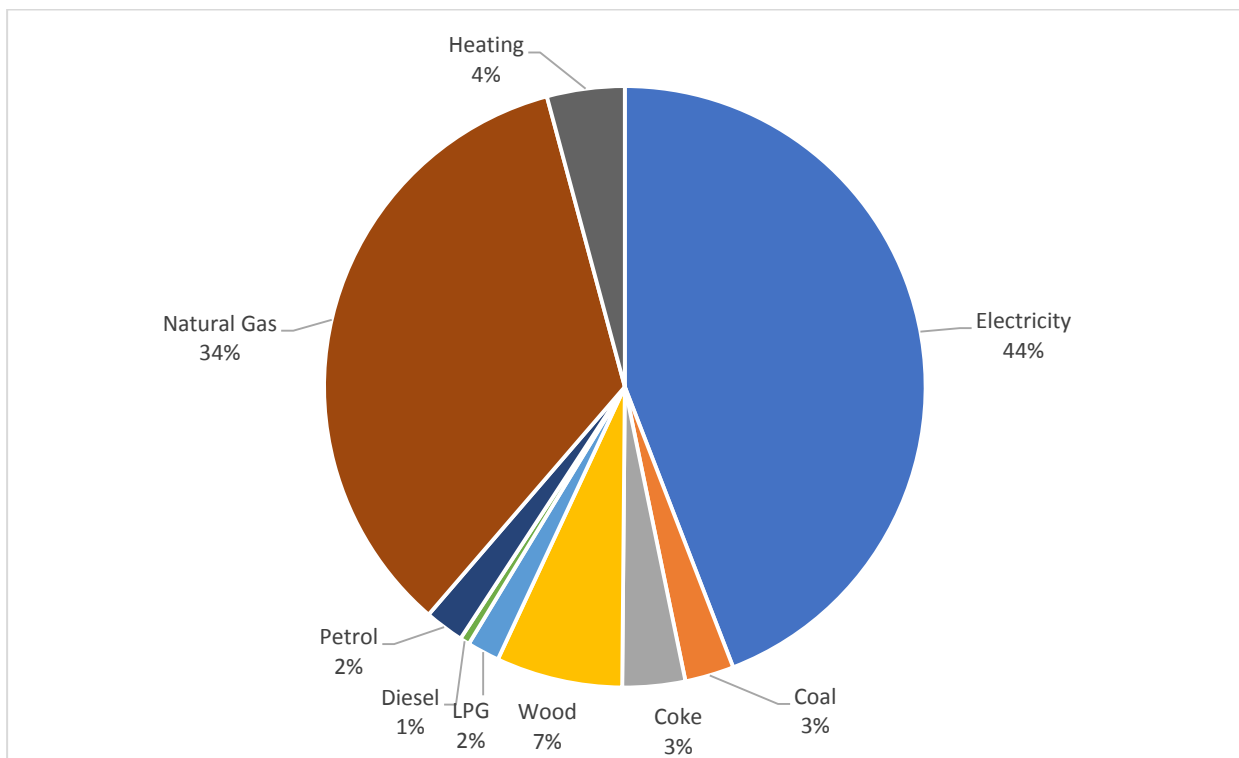


Figure 12: Energy consumption by energy carrier in Slovenia.

Table 10: Sectors total energy consumption in Slovenia in 2015.

Description	NACE (group)	Total energy consumption, 2015 [TJ]	Percentage of industrial energy consumption [%]	Key energy carriers
Entire industry sector	C	53,127	100	Electricity (21,687 TJ), natural gas (16,956 TJ), wood (3,341 TJ), coke (1,658 TJ), coal (1.294 TJ), petrol (1.038 TJ)
Food	10	2,492	4.7	Natural gas (842 TJ), electricity (840 TJ), petrol (267 TJ)
Beverages	11	550	1.0	Natural gas (255 TJ), electricity (202 TJ)
Tobacco	12	0	0	-
Textiles	13	581	1.1	Electricity (249 TJ), natural gas (195 TJ)
Clothing	14	90	0.2	Electricity (35 TJ), natural gas (32 TJ)
Leather and shoes	15	208	0.4	Natural gas (104 TJ), electricity (59 TJ)
Wood and wood products	16	2,578	4.9	Biomass (1,851 TJ), electricity (605 TJ)
Pulp and paper	17	8,267	15.6	Natural gas (3,260 TJ), electricity (2,283), coal (1,212 TJ)
Printing and publishing	18	340	0.6	Electricity (193 TJ)
Refined petroleum	19	0	0	-
Chemical industry	20	4,780	9.0	Electricity (1,544 TJ), natural gas (1,044 TJ)
Pharmaceuticals	21	2,116	4.0	Natural gas (951 TJ), electricity (896 TJ)
Rubber and plastics	22	2,378	4.5	Electricity (1,217 TJ), natural gas (832 TJ)
Building materials	23	7,696	14.5	Natural gas (2,911 TJ), electricity (1,541 TJ), coke (1,427 TJ)
Basic metals	24	12,751	24.0	Electricity (7,528 TJ), natural gas (4,310 TJ)
Metal products	25	2,662	5.0	Electricity (1,367 TJ), natural gas (756 TJ)
Computers and electronics	26	209	0.4	Electricity (139 TJ)

Electrical equipment	27	1,961	3.7	Electricity (1,248 TJ), natural gas (395 TJ)
Machinery	28	1,186	2.2	Electricity (611 TJ), natural gas (358 TJ)
Motor vehicles	29	1,337	2.5	Electricity (779 TJ), natural gas (469 TJ)
Other transport equipment	30	28	0.1	Electricity (19 TJ)
Furniture	31	332	0.6	Electricity (150 TJ), wood (157 TJ)
Other manufacturing	32	205	0.4	Electricity (118 TJ)
Repair and installation	33	149	0.3	Electricity (55 TJ)

10.2 Energy prices

The natural gas prices for industrial consumers, in the first semester of the year 2016 in Slovenia, was 0.0336 €/kWh (excluding VAT but including taxes and levies that are not recoverable). The average natural gas price in the EU-28 was 0.0315 €/kWh.

The electricity price for industrial consumers in the first semester of the year 2016 in Slovenia was 0.0751 €/kWh (excluding VAT but including taxes and levies that are not recoverable). This is much lower than the average of the EU-28, which was 0.1169 €/kWh.

Looking at oil, there is the last statistical information for June 2014 on the consumer prices of petroleum products. For petrol (Euro-super 95), the price without taxes and duties was 0.599 €/l in Slovenia. Including taxes and duties, the price was 1.487 €/l. For automotive diesel, the price without taxes and duties was 0.657 €/l and including those taxes and duties it amounted to 1.365 €/l.

10.3 Carbon dioxide conversion factors

For 'grey' electricity (based on a representative mix for Slovenia fossil electricity including natural gas, coal and nuclear energy), the conversion factor in the period 2005 to 2015 was 0.5 kg of CO₂ per kWh of electricity. For renewable energy (wind, hydro and solar), the conversion factor is 0.0.

10.4 Conversion factors to primary energy

The used conversion factors to primary energy in MJp for electricity and common fuel types. These are as follows:

- 1 kWh of electricity is 9 MJp

- 1 Nm³ of natural gas is 31.65 MJp
- 1 GJ of heat is 1,110 MJp
- 1 tonne of gas or diesel oil is 42,700 MJp
- 1 m³ of biogas from sewage treatment is 23.3 MJp.