

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: Netherlands

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

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1 General overview of industry in the Netherlands

The manufacturing industry in the Netherlands consists of about 60,000 enterprises, of which most (96%) are small businesses with up to 50 employees. About 400 of the businesses in the Dutch manufacturing sector are large enterprises with more than 250 employees. Most of these large companies are active in the food and beverage sector, the pulp and paper industry, the chemical industry, and metals and machine production. The number of industrial enterprises per province varies widely. Most enterprises can be found in the provinces of North Brabant (18.7% of the total), South Holland (17.6%), and North Holland (15.3%), with the lowest number in Flevoland (2.2%). Municipalities with the highest number of manufacturing industry companies include Amsterdam (2,560 companies), Rotterdam (2,140), and The Hague (1,100).

In total, the Dutch manufacturing industry (NACE code C) employs about 755,000 persons. The subsectors with the highest number of employees include the sector of metal products, machinery and equipment (216,100), the food and beverage sector (127,100) and the chemical and pharmaceutical industry (57,000). The total output of the Dutch manufacturing industry is 333.6 billion € (2015), with the key sectors being those of metal products, machinery and equipment (96.2 billion €), the food and beverage sector (71.2 billion €), the chemical and pharmaceutical industry (53.3 billion €) and the petroleum sector 34.3 billion €).

The Dutch industry sector used a total of 1,285 PJ of energy in 2015, down about 7.4% compared to 2011. About half (48.6%) of the energy used was from oil and oil products, followed by 28.5% from natural gas and 8.4% from electricity. By far the most energy is used by the chemical and pharmaceutical industry (61.5% of total industrial energy use), followed by the petroleum industry (15.6%).

2 Food and Beverage

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.

2.1 Sectoral organisation

The entire sector is in the Netherlands represented by the *Federatie Nederlandse Levensmiddelen Industrie (FNLI, Federation Dutch Food Products Industry)*. About 450 companies are direct members of this federation. In addition, 19 subsector organisations are members of the federation:

- Algemene Kokswaren en Snackproducentenvereniging (AKSV) – convenience food (NACE C10.85);
- *BeNeLuxSmelt* – processed cheese (NACE C10.51)¹;
- Nederlandse vereniging Frisdranken, Waters, Sappen (FWS) – soft drinks, water, juice (NACE C11.07);
- Koninklijke Nederlandse Vereniging voor Koffie en Thee (KNVKT) – coffee, tea (NACE C10.83);
- Vereniging van Geur- en Smaakstoffenfabrikanten (NEA) – fragrances, flavours (NACE C10.84);
- Vereniging van Nederlandse Fabrikanten van Bakkerijgrondstoffen (NEBAFA) – flour (NACE C10.61, C10.62);
- Nederlandse Brouwers – beer (NACE C11.05);
- Nederlandse Vereniging van Sausfabrikanten (NVS) – sauces (NACE C10.84);
- Nederlandse Vereniging van Consumptie-ijsfabrikanten (NVC) – ice cream (NACE C10.52);
- Nederlandse Vereniging van Fabrikanten van Culinaire Producten (Culinaria NL) – culinary products (NACE C10.85);
- Nederlandse Vereniging van Producenten van Ontbijtgranen en Deegwaren – cereals and dough products (NACE C10.61);
- Nederlandse Vereniging voor de Bakkerij (NVB) – bakery products (NACE C10.71, C10.72);
- Nederlandse Zuivelorganisatie (NZO) – dairy (NACE C10.51);

¹ BeNeLuxSmelt is the sectoral trade organisation for manufacturers of processed cheese in not only the Netherlands, but also Belgium and Luxembourg.

- Organisation des Fabricants de produits Cellulosiques Alimentaires (OFCA) – cellulose derivatives (NACE C10.89)²;
- Vereniging voor de Aardappelverwerkende Industrie (VAVI) – potato products (NACE C10.31);
- *Vereniging voor de Bakkerij- en Zoetwarenindustrie (VBZ)* – bakery products, sweets and chocolate (NACE C10.71, C10.72, C10.82);
- Vereniging van de Nederlandse Groente- en Fruitverwerkende Industrie (VIGEF) – fruit and vegetable products (NACE C10.31, C10.32, C10.39);
- *Visfederatie* – fish products (NACE C10.20);
- Vereniging van Nederlandse Fabrikanten van Kinder- en Dieetvoedingsmiddelen (VNFKD) – children’s food and dietary products (NACE C10.86);
- Vereniging van Rijstpelers in Nederland (VRN) – rice (NACE C10.61).

In addition to these subsector organisations that are members of *FNLI*, there are various other subsector trade organisations, including *VERNOF* (edible oils and fats – NACE C10.41, C10.42), *VNB* (bacon – NACE C10.13), *VNV* (charcuterie – NACE C10.13) and *NEPLUVI* (poultry products – NACE C10.12, C10.13).

2.2 Economic indicators

In 2015, there were 5,695 companies in the Dutch food and beverage industry, of which about 75% companies small SMEs (less than 9 employees) and 93% have less than 50 employees. A substantial part of these small companies (53%) are active in the bread and dough products subsector. Together these companies employ about 135,000 persons directly. This is about 17% of the entire Dutch industrial sector. Indirectly, the food and beverage industry also results in 331,000 indirect jobs, among others in commercial services, agriculture and the transport sector.

The total output of the sector was 64.9 billion € (62.8 billion € excluding tobacco), with a value added of 13.3 billion €. Compared to the total output of all industrial sectors combined (288.6 billion €), the food and beverage (including tobacco) sector makes up 22.5% of the Dutch industrial sector.

The companies in the sector imported for 17.8 billion € from abroad, while the total value of exports was 35.5 billion €. Looking specifically at the agrifood sector, the most important products for the Dutch export are fruit and vegetables (24%), meat and meat products (13%), dairy and eggs (12%), processed food products (10%) and coffee, tea, cacao and spices (10%) (see Figure 1). The four key countries for exports (together 53.9% of total exports value) are Germany, the UK, France and Belgium.

² OFCA is the sectoral trade organisation for manufacturers of food grade cellulose derivatives at a global level, based in the Netherlands.

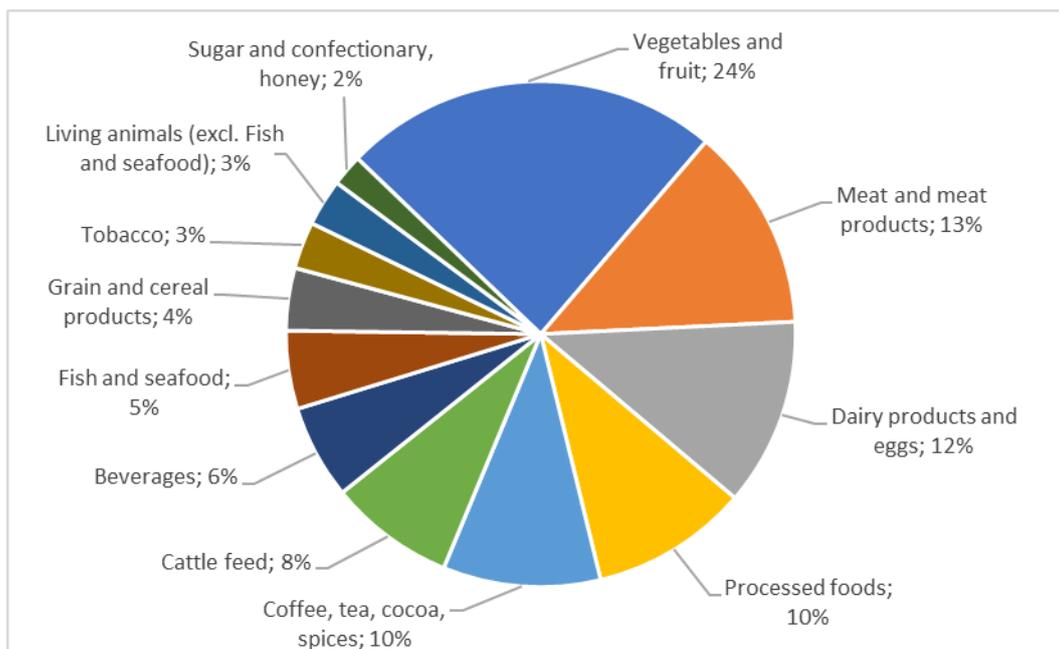


Figure 1: Percentages of export values per subsector in 2015.

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

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of food products	C10	5,210	120,700	63.5	N/A	N/A
Processing and preserving of meat and production of meat products	C10.1	570	15,000	10.3	N/A	N/A
Processing and preserving of fish, crustaceans and molluscs	C10.2	135	3,900	0.9	N/A	N/A
Processing and preserving of fruit and vegetables	C10.3	165	9,700	4.9	N/A	N/A
Manufacture of vegetable and animal oils and fats	C10.4	35	2,600	6.7	N/A	N/A

Manufacture of dairy products	C10.5	300	15,100	12.3	N/A	N/A
Manufacture of grain mill products. starches and starch products	C10.6	110	3,400	2.4	N/A	N/A
Manufacture of bakery and farinaceous products	C10.7	2905	41,100	4.7	N/A	N/A
Manufacture of other food products	C10.8	810	23,000	13.5	N/A	N/A
Manufacture of prepared animal feeds	C10.9	185	6,900	7.7	N/A	N/A
Manufacture of beverages	C11	400	6,700	4.9	N/A	N/A
Distilling. rectifying and blending of spirits	C11.01	50	N/A	N/A	N/A	N/A
Manufacture of wine from grape	C11.02	50	N/A	N/A	N/A	N/A
Manufacture of cider and other fruit wines	C11.03	15	N/A	N/A	N/A	N/A
Manufacture of other non-distilled fermented beverages	C11.04	5	N/A	N/A	N/A	N/A
Manufacture of beer	C11.05	235	N/A	N/A	N/A	N/A
Manufacture of malt	C11.06	5	N/A	N/A	N/A	N/A
Manufacture of soft drinks; production of mineral waters and other bottled waters	C11.07	40	2,000	1.4	N/A	N/A

2.3 Energy consumption

For 2015, the total energy use of the food manufacturing industry (NACE C10) is estimated at 84.8 PJ and for the beverage manufacturing industry (NACE C11) at 4.3 PJ. The key subsectors regarding energy use are the dairy industry (NACE C10.5) with 21.2 PJ, the grain mill projects industry (NACE C10.6) with 10.9 PJ and the fruit and vegetables processing industry (NACE C10.3) with 9.6 PJ.

Based on 2014 data, the total energy use of the food and beverage industry (including tobacco production) accounts for about 6.5% of the energy use by Dutch industries.

3 Pulp & paper

The pulp and paper sector is defined by NACE C17.1 (Manufacture of pulp, paper and paperboard), which consists of the subsectors 17.11 (Manufacture of pulp) and 17.12 (Manufacture of paper and paperboard). The sector of NACE code 17.2 is related, as it refers to the Manufacture of articles of paper and paperboard.

3.1 Sectoral organisation

The pulp and paper sector is represented by the sectoral organisation *Koninklijke Vereniging van Nederlandse Papier- en Kartonfabrieken (VNP*, Royal Association of Dutch Paper and Paperboard Factories).

3.2 Economic indicators

There are about 50 companies active in the Dutch pulp and paper industry (NACE C17.1). These companies employ about 4,000 persons in 2014, decreased to 3,896 in 2015. The total output of the sector in 2014 was 1.72 billion € and in 2015 1.74 billion €. This is about 2.3% of the total output of the pulp and paper sector in the European Union.

About 80% of the paper production of the Netherlands is exported (measured in weight), with the key export countries being Germany (29% of exported paper), Belgium (11%), the UK (10%) and France (9%). The total production has decreased, from about 3.5 million tonnes in 2005 to about 2.65 million tonnes in 2015 (see also Figure 2).

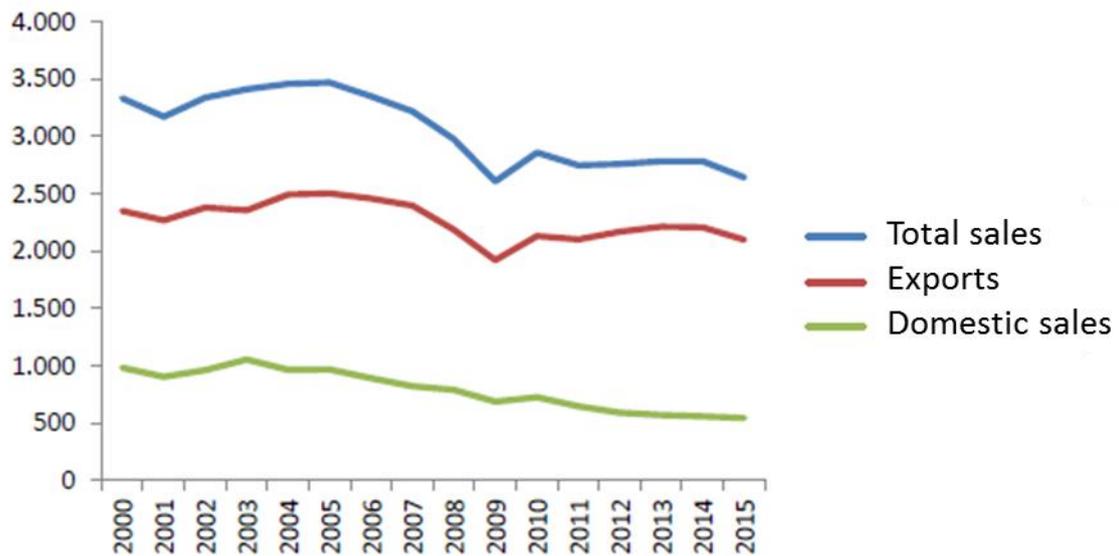


Figure 2. Total production of the paper industry in the Netherlands in thousands of tonnes (blue), with exports (red) and domestic sales (green).

In addition, there are 295 companies in the related sector of Manufacture of articles of paper and paperboard (NACE C17.2) and these employ about 15,400 persons. The total output of this sector in 2014 was about 5.65 billion €.

Table 2: Key economic parameters for Dutch Pulp and Paper sector

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of pulp, paper and paperboard	17.1	50	4,000	1,720	N/A	N/A
Manufacture of pulp	1711	5	N/A	N/A	N/A	N/A
Manufacture of paper and paperboard	1712	45	N/A	N/A	N/A	N/A
Manufacture of articles of paper and paperboard	17.2	295	15,400	5,645	N/A	N/A

3.3 Energy consumption

The energy use of the entire pulp and paper industry (NACE codes 17.1 and 17.2 combined) in 2014 was 25.7 PJ. Most of this energy was provided from natural gas (17 PJ) and electricity (4.2 PJ). About 1.4 PJ was provided from renewable energy.

4 Petroleum refineries sector

The sector of coke and petrol products is defined by NACE C19 (Manufacture of coke and refined petroleum products). There are two subsectors, NACE C19.1 (Manufacture of coke oven products) and NACE C19.2 (Manufacture of refined petroleum products).

4.1 Sectoral organisation

The subsector of refined petroleum products is represented by the *Vereniging Nederlandse Petroleum Industrie (VNPI, Association Dutch Petroleum Industries)*, that also represents the upstream activities of extraction of crude petroleum (NACE B6.1). There is no sectoral organisation of the subsector of coke oven products, as there is only one company still active in this subsector.

4.2 Economic indicators

There are 30 companies active in the coke and petrol products industry in the Netherlands, of which 25 are SMEs and 5 have more than 250 employees. The companies together employ about 5,800 persons. Only one company is active in the coke oven products sector, which is Tata Steel Netherlands. Economic and employment statistics for this company are not included in this sector, but in those of the steel production sector. The annual output of the petroleum products industry in 2014 was more than 50 billion €, or an average output of more than 8.5 million € per employee in the sector.

Table 3: Key economic parameters for Dutch Petroleum refineries sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of coke and refined petroleum products	19	30	5,800	50,024	N/A	N/A
Manufacture of coke oven products	19.1	1	N/A	N/A	N/A	N/A
Manufacture of refined petroleum products	19.2	30	5,800	50,024	N/A	N/A

4.3 Energy consumption

The energy use of the petroleum products industry in 2014 was about 191 PJ, or more than 14% of the total energy use by Dutch industries. Of this energy use, 177 PJ is used by the petroleum products subsector (NACE C19.2) and 14 PJ by the coke oven products subsector (NACE C19.1).

For the coke oven products subsector, virtually all required energy (13.6 PJ) is provided from coal and coal products, with the remaining being provided from electricity. For the petroleum products subsector, most energy is provided from oil (105 PJ), natural gas (60 PJ) and renewable energy (8 PJ).

5 Chemical

The chemical sector is defined by NACE Code 20 (Manufacture of chemicals and chemical products).

5.1 Sectoral organisation

The chemical industry in the Netherlands is represented by the *Vereniging van de Nederlandse Chemische Industrie* (VNCI, Association of the Dutch Chemical Industry).

5.2 Economic indicators

In 2015, there were about 800 companies in the Dutch chemical industry sector, of which about 760 are small or medium-sized enterprises (SMEs). About 56,000 persons are employed in the chemical sector, of whom about 44,000 in the manufacturing of chemicals and chemical products (NACE Code 20) and 12,000 in the pharmaceutical industry (NACE Code 21).

The total output of the sector in 2015 was 42 billion € (excluding the 5 billion € of the pharmaceutical industry). This is a significant reduction compared to 2014, when the total output was still 48 billion €.

About 80% of the products manufactured by the Dutch chemical industry are exported, with 80% of this export being to countries in Europe, mainly Germany (20%) and Belgium (12%) (see Figure 3). The exports by the chemical sector represent about 18% of the total Dutch exports.

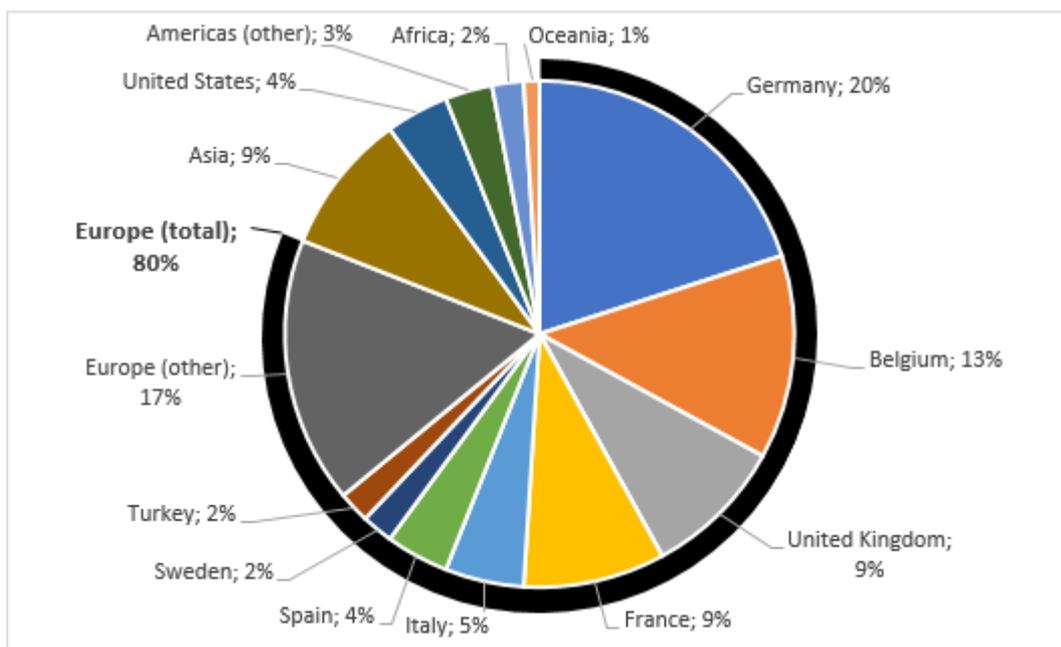


Figure 3: Exports of the Dutch chemical industry by destination MS.

Table 4: Key economic parameters for Dutch Chemical sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of chemicals and chemical products	C20	800	50,700	48.1	N/A	N/A
Manufacture of basic chemicals. fertilisers and nitrogen compounds. plastics and synthetic rubber in primary forms	C20.1	320	28,700	38.6	N/A	N/A
Manufacture of pesticides and other agrochemical products	C20.2	15	N/A	N/A	N/A	N/A
Manufacture of paints. varnishes and similar coatings. printing ink and mastics	C20.3	85	6,400	1.9	N/A	N/A
Manufacture of soap and detergents. cleaning and polishing preparations. perfumes and toilet preparations	C20.4	220	N/A	N/A	N/A	N/A
Manufacture of other chemical products	C20.5	130	8,600	4.9	N/A	N/A
Manufacture of man-made fibres	C20.6	30	2,100	0.8	N/A	N/A

5.3 Energy consumption

The final energy consumption by the Dutch chemical industry in 2015 was 813.5 PJ, where 98% was used by the basic chemicals subsector (NACE C20.1). Divided among energy sources, most final energy for the chemical sector was provided from oil and oil products (536.3 PJ) and natural gas (177.1 PJ). Based on 2014 data, the chemical sector (including pharmaceuticals) accounts for about 65% of the total energy consumption of Dutch industries.

6 Non-metallic minerals sector

6.1 Glass sector

The glass manufacturing sector is defined by NACE Code 23.1 (Manufacture of glass and glass products) and includes the manufacturing of flat glass, hollow glass, glass fibres and other glass products and shaping and processing of flat glass and other glass products, including technical glassware.

6.1.1 Sectoral organisation

The glass industry in the Netherlands is represented by the *Vereniging van Nederlandse Glasfabrikanten* (VNG, Association of Dutch Glass Manufacturers). Only a few large internationally-operating glass manufacturers are members of this association.

6.1.2 Economic indicators

As of 2015, there were about 690 companies in the Dutch glass industry sector, of which nearly all (about 675 companies) are small or medium-sized enterprises (SMEs). These companies employ about 5,700 persons. The total output of the sector in 2014 was 1.05 billion €.

Table 5: Key economic parameters for Dutch Glass sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of glass and glass products	C23.1	690	5,700	1,050	N/A	N/A
Manufacture of flat glass	23.11	10	N/A	N/A	N/A	N/A
Shaping and processing of flat glass	23.12	400	N/A	N/A	N/A	N/A
Manufacture of hollow glass	23.13	50	N/A	N/A	N/A	N/A
Manufacture of glass fibres	23.14	30	N/A	N/A	N/A	N/A
Manufacture and processing of other glass, including technical glassware	23.19	200	N/A	N/A	N/A	N/A

6.1.3 Energy consumption

Final energy consumption by the Dutch glass industry in 2015 was 9.1 PJ. Divided among energy sources, most of the energy for the glass sector was provided from natural gas (7.2 PJ) and electricity (1.8 PJ).

6.2 Ceramic & Cement sector

The ceramic and cement sector is represented by most of the subgroups of NACE code 23 (Manufacture of other non-metallic mineral products), except for subgroup 23.1 of the glass industry. In this section, there is a focus on the subsectors 23.2 (Manufacture of refractory products), 23.3 (Manufacture of clay building material), 23.4 (Manufacture of other porcelain and ceramic products), 23.5 (Manufacture of cement, lime and plaster), 23.6 (Manufacture of articles of concrete, cement and plaster), 23.7 (Cutting, shaping and finishing of stone) and 23.9 (Manufacture of abrasive products and non-metallic mineral products n.e.c.).

6.2.1 Sectoral organisation

There are various sector organisations in the ceramic and cement industry, each focusing on a specific group of products. Some of these sectoral organisations include *Vereniging Koninklijke Nederlandse Bouwkeramiek (KNB, Association Royal Dutch Building Ceramics)*, *Nederlandse Cellenbeton Vereniging (NCV, Dutch Aerated Concrete Association)*, *Vereniging Nederlands Kalkzandsteenplatform (VNK, Association Dutch Calcium Silicate Platform)* and *Bonf van Fabrikanten van Betonproducten in Nederland (BFBN, Federation of Manufacturers of Concrete Products in the Netherlands)*.

6.2.2 Economic indicators

There are about 1225 companies active in the Dutch ceramics and cement industry. Most of these (about 1210 companies) are small or medium-sized enterprises (SMEs). Together, these companies employ approximately 20,000 persons. The total output of the sector in 2014 was about 4.7 billion €.

Table 6: Key economic parameters for Dutch Ceramic and Cement sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Ceramic and cement sector	23.2-23.9	1,225	20,000	4,669	N/A	N/A
Manufacture of refractory products	23.2	20	N/A	N/A	N/A	N/A
Manufacture of clay building	23.3	45	N/A	N/A	N/A	N/A

material						
Manufacture of other porcelain and ceramic products	23.4	240	N/A	N/A	N/A	N/A
Manufacture of cement, lime and plaster	23.5	5	N/A	N/A	N/A	N/A
Manufacture of articles of concrete, cement and plaster	23.6	445	11,400	2,585	N/A	N/A
Cutting, shaping and finishing of stone	23.7	400	2,100	242	N/A	N/A
Manufacture of abrasive products and non-metallic mineral products n.e.c.	23.9	65	N/A	N/A	N/A	N/A

6.2.3 Energy consumption

The total energy consumption of the sector in 2014 amounted to 14.8 PJ. Specifically, 6.7 PJ was used by the subsector of clay building material (NACE C23.3) and 3.2 PJ by the subsector of articles of concrete, cement and plaster (NACE C23.6). Divided among energy carriers, most of the energy was provided from natural gas (9.8 PJ), followed by electricity (2.4 PJ).

7 Iron & Steel sector

The iron and steel sector is represented by the NACE codes 24.1 (Manufacture of basic iron and steel and of ferro-alloys n.e.c.), 24.2 (Manufacture of tubes, pipes, hollow profiles and related fittings, of steel) and 24.3 (Manufacture of other products of first processing of steel), as well as 2451 (Casting of iron) and 2452 (Casting of steel).

7.1 Sectoral organisation

The basic metal industry (including iron and steel) in the Netherlands is represented by the *Vereniging Nederlandse Metallurgische Industrie (VNMI, Association Dutch Metallurgical Industry)*. About 80% of the Dutch metallurgical industry (companies with more than 20 employees) is member of VNMI.

7.2 Economic indicators

Combined, there are about 195 companies in the Dutch iron and steel industry. Of those, about 55 are active in the subsector of basic iron and steel manufacturing (NACE C24.1), 90 in manufacturing of steel tubes, pipes, etc. (NACE C24.2), 20 in the manufacturing of other steel products (NACE C24.3) and 30 in iron and steel casting (NACE C24.51 and 24.52).

There are no detailed data on the employment and economic output of the various subsectors. The total basic metals industry (i.e. not only including iron and steel but also basic non-ferrous metals) employs about 19,400 persons. The total output of the entire basic metals industry in 2014 was about 7.6 billion €. The total export value of the sector was in 2010 5.6 billion €.

Table 7: Key economic parameters for Dutch Iron and Steel sector.

Description	NACE (group)	Number of enterprises 2015 (CBS, 2016a)	No. of persons employed 2014 (CBS, 2016b)	Turnover 2014 [mil €] (CBS, 2016b)	Value added [mil €]	Production value [mil €]
Entire basic metals sector	24	380	19,400	7,598	About 2,000 (NYFER, 2012)	N/A
Iron and steel sector	NACE codes below combined	195	N/A	N/A	N/A	N/A
Manufacture of basic iron and steel and of ferro-alloys n.e.c.	24.1	55	N/A	N/A	N/A	N/A
Manufacture of tubes, pipes,	24.2	90	N/A	N/A	N/A	N/A

hollow profiles and related fittings, of steel						
Manufacture of other products of first processing of steel	24.3	20	N/A	N/A	N/A	N/A
Casting of iron	24.51	25	N/A	N/A	N/A	N/A
Casting of steel	24.52	5	N/A	N/A	N/A	N/A

7.3 Energy consumption

Based on 2014 data, the entire basic metals sector accounts for about 109 PJ of energy use, which is about 8% of the total energy consumption of Dutch industries. Most energy used in the sector was provided from coal and coal products (78.7 PJ), natural gas (13.6 PJ) and electricity (14.8 PJ).

8 Other metals sector

The other metals sector refers to the manufacture of basic metals (NACE Code 24), excluding iron and steel. The sector thus includes the Manufacture of basic precious and other non-ferrous metals (NACE code 24.4) that includes for example copper, lead, zinc, tin and aluminium production, as well as the casting of light metals (NACE code 24.53) and casting of other non-ferrous metals (NACE code 24.54).

8.1 Sectoral organisation

The basic metal industry (including 'other metals') in the Netherlands is represented by the *Vereniging Nederlandse Metallurgische Industrie (VNMI, Association Dutch Metallurgical Industry)*. About 80% of the Dutch metallurgical industry (companies with more than 20 employees) is member of VNMI.

8.2 Economic indicators

There are 185 companies active in the other metals sector, of which 65 are in the subsector of aluminium production (NACE C24.42) and 70 in casting of light and other metals (NACE C25.43 and C25.44). Virtually all companies in the sector are small and medium-sized enterprises (SMEs), with only 5 aluminium-producing countries having more than 250 employees.

There is no detailed information on the number of employees in the sector and the total turnover. Specifically for the sector of Manufacture of basic precious and other non-ferrous metals (NACE code 24.4), the number of employees is 5,300 and the annual turnover in 2014 was just above 2 billion €.

Table 8: Key economic parameters for Dutch Other metals sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Entire basic metals sector	24	380	19,400	7,598	About 2,000	N/A
Other metals sector	NACE codes below combined	185	N/A	N/A	N/A	N/A
Manufacture of basic precious and other non-ferrous metals	24.4	115	5,300	2,027	N/A	N/A
Precious metals production	24.41	20	N/A	N/A	N/A	N/A
Aluminium production	24.42	65	N/A	N/A	N/A	N/A

Lead, zinc and tin production	24.43	15	N/A	N/A	N/A	N/A
Copper production	24.44	5	N/A	N/A	N/A	N/A
Other non-ferrous metal production	24.45	10	N/A	N/A	N/A	N/A
Processing of nuclear fuel	24.46		N/A	N/A	N/A	N/A
Casting of light metals	24.53	40	N/A	N/A	N/A	N/A
Casting of other non-ferrous metals	24.54	30	N/A	N/A	N/A	N/A

8.3 Energy consumption

There is no detailed information available of the energy consumption within the sector. Based on 2014 data, the entire basic metals sector (also including iron and steel manufacturing) accounts for about 109 PJ of energy use, which is about 8% of the total energy consumption of Dutch industries. Most of the energy used in the sector was provided from coal and coal products (78.7 PJ), natural gas (13.6 PJ) and electricity (14.8 PJ).

9 Machinery sector

The sector of metal products, machinery and equipment is a varied sector consisting of the Manufacture of fabricated metal products, except machinery and equipment (NACE code 25), Manufacture of computer, electronic and optical products (NACE code 26), Manufacture of electrical equipment (NACE code 27) and Manufacture of machinery and equipment not elsewhere classified (NACE code 28). There are dozens of subsectors under these four main categories.

9.1 Sectoral organisation

There are several sectoral organisations in the metal products, machinery and equipment sector, the key one being *FME-CWM*, which is an umbrella organisation for the technological industry with 130 member organisations representing subsectors. Some of the member organisations include *FPT-VIMAG* (manufacturers of machines, tools and services for the metal industry), *FMIB* (manufacturers of machines for the buildings industry) and *IJG* (manufacturers of iron equipment).

9.2 Economic indicators

There are about 16,000 companies active in the entire sector of metal products, machinery and equipment, of which most (about 10,500) are in the subsector of the manufacture of fabricated metal products (NACE code 25). Almost all companies are small and medium-sized enterprises (SMEs), with out of the more than 16,000 companies only about 65 companies with more than 250 employees. About half of these large companies are in the sector of manufacture of machinery and equipment n.e.c. (NACE code 28).

These companies together employ more than 250,000 persons. Subsectors that employ large numbers of people include the manufacture of structural metal products (NACE C25.1; 42,500 persons), the treatment and coating of metals (NACE C25.6; 30,600 persons) and the manufacture of machinery (NACE C28; 96,800 persons).

The total output of the sector is more than 85 billion €. Compared to the total output of all industrial sectors combined (288.6 billion €), the metal products, machinery and equipment sector makes up about 37% of the total output.

Table 9: Key economic parameters for Dutch Machinery sector.

Description	NACE (group)	Number of enterprises 2015	No. of persons employed 2014	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Entire metal products, machinery and equipment	25, 26, 27, 28	16,025	257,500	85,075	N/A	N/A

industry						
Manufacture of fabricated metal products, except machinery and equipment	25	10,525	109,000	19,040	N/A	N/A
Manufacture of structural metal products	25.1	2,305	42,500	7,435	N/A	N/A
Manufacture of tanks, reservoirs and containers of metal	25.2	85	N/A	N/A	N/A	N/A
Manufacture of steam generators, except central heating hot water boilers	25.3	5	N/A	N/A	N/A	N/A
Manufacture of weapons and ammunition	25.4	10	N/A	N/A	N/A	N/A
Forging, pressing, stamping and roll-forming of metal; powder metallurgy	25.5	495	9,200	1,907	N/A	N/A
Treatment and coating of metals; machining	25.6	6,390	30,600	3,988	N/A	N/A
Manufacture of cutlery, tools and general hardware	25.7	395	5,400	894	N/A	N/A
Manufacture of other fabricated metal products	25.9	840	14,600	3,232	N/A	N/A
Manufacture of computer, electronic and optical products	26	1,490	29,400	35,540	N/A	N/A
Manufacture of electronic components and boards	26.1	305	N/A	N/A	N/A	N/A
Manufacture of computers and peripheral equipment	26.2	200	N/A	N/A	N/A	N/A
Manufacture of communication equipment	26.3	100	N/A	N/A	N/A	N/A
Manufacture of consumer electronics	26.4	205	1,200	481	N/A	N/A
Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	26.5	450	12,300	2,646	N/A	N/A
Manufacture of irradiation, electromedical and electrotherapeutic equipment	26.6	70	N/A	N/A	N/A	N/A
Manufacture of optical instruments and photographic equipment	26.7	115	N/A	N/A	N/A	N/A

Manufacture of magnetic and optical media	26.8	40	N/A	N/A	N/A	N/A
Manufacture of electrical equipment	27	1,120	22,300	5,923	N/A	N/A
Manufacture of electric motors, generators and transformers and electricity distribution and control apparatus	27.1	300	6,500	1,312	N/A	N/A
Manufacture of batteries and accumulators	27.2	25	N/A	N/A	N/A	N/A
Manufacture of wiring and wiring devices	27.3	75	2,900	926	N/A	N/A
Manufacture of electric lighting equipment	27.4	320	5,600	2,163	N/A	N/A
Manufacture of electric domestic appliances	27.5	95	4,000	805	N/A	N/A
Manufacture of other electrical equipment	27.9	310	N/A	N/A	N/A	N/A
Manufacture of machinery and equipment n.e.c.	28	2,890	96,800	26,572	N/A	N/A
Manufacture of general-purpose machinery	28.1	385	14,300	4,248	N/A	N/A
Manufacture of other general-purpose machinery	28.2	1,175	37,600	7,898	N/A	N/A
Manufacture of agricultural and forestry machinery	28.3	295	8,300	2,230	N/A	N/A
Manufacture of metal forming machinery and machine tools	28.4	155	2,200	388	N/A	N/A
Manufacture of other special-purpose machinery	28.9	885	34,300	11,809	N/A	N/A

9.3 Energy consumption

The total energy use by the metal products, machinery and equipment sector amounts to about 20.7 PJ, of which about half by the metal products industry (NACE C25). Most of the energy to the sector is provided from electricity (10.3 PJ) and natural gas (9.9 PJ). The energy use by the sector is relatively limited compared to other sectors and makes up only about 1.5% of the total energy use by Dutch industry.

10 Energy statistics

10.1 Energy consumption

The total energy consumption of the manufacturing sector (NACE code C) in the Netherlands amounted in 2014 to about 1,334 PJ.³ Divided among energy carriers, the main sources were oil (682 PJ), natural gas (357 PJ), electricity (105 PJ) and coal (98 PJ). Divided among industrial sectors, the sectors with the highest energy consumption were chemicals (844 PJ), petroleum (191 PJ) and basic metals (109 PJ). See the graphs and table below for a more detailed overview.

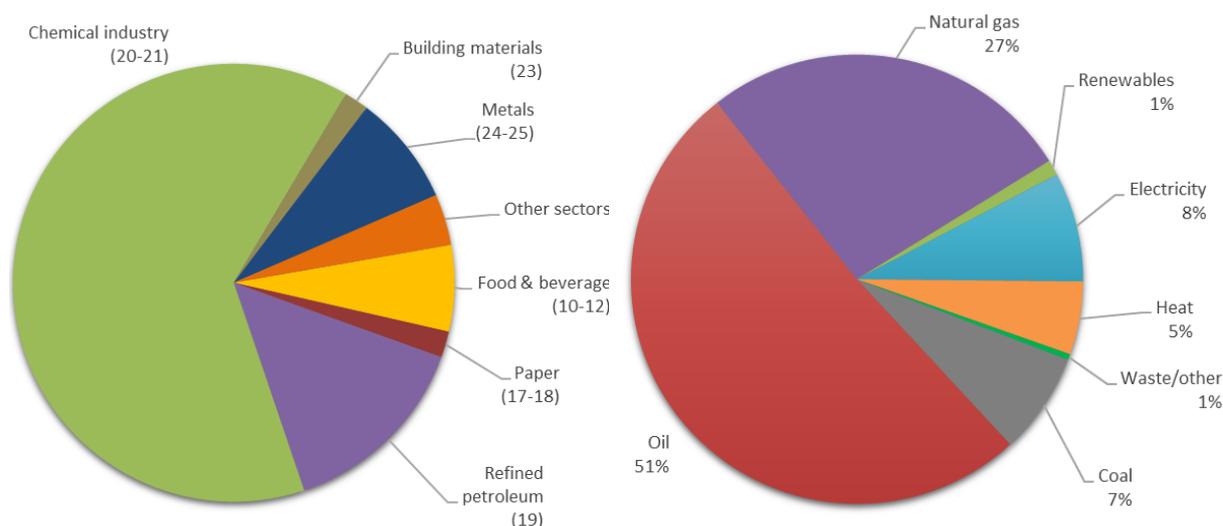


Figure 4: Energy consumption in Dutch industry, by subsector (left) and by energy carrier (right).

Table 10: Energy consumption of manufacturing in the Netherlands.

Description	NACE (group)	Total energy consumption, 2014 [PJ]	Percentage of industrial energy consumption [%]	Key energy carriers
Entire industry sector	C	1,332.8	100	Oil (682 PJ), natural gas (357 PJ), electricity (105 PJ), coal (98 PJ)
Food	10	80.3	6.02	Natural gas (55.7 PJ), electricity (17.7 PJ)
Beverages	11	4.1	0.31	Natural gas (3.1 PJ)
Tobacco	12	0.5	0.04	Natural gas (0.4 PJ)

³ According to the Central Statistics Bureau (CBS, 2016c) the total energy consumption amounted to 1,332.8 PJ. According to the Compendium for Environment (CLO, 2016) the number was 1,334 PJ (the sum of the energy use per sector) or 1,336 PJ (the sum of the energy use per energy carrier).

Textiles	13	3.3	0.25	Natural gas (2.2 PJ), electricity (1 PJ)
Clothing	14	0.1	0.01	N/A
Leather and shoes	15	0.2	0.02	N/A
Wood and wood products	16	3.0	0.23	Biomass (1.2 PJ), natural gas (1.0 PJ)
Pulp and paper	17	25.7	1.93	Natural gas (17.0 PJ), electricity (4.2 PJ)
Printing and publishing	18	2.7	0.20	Electricity (1.8 PJ)
Refined petroleum	19	190.7	14.31	Oil (105.3 PJ), natural gas (59.6 PJ), coal (13.6 PJ)
Chemical industry	20	843.9	63.32	Oil (572.2 PJ), natural gas (166.2 PJ), heat (63.6 PJ), electricity (35.7 PJ)
Pharmaceuticals	21	4.5	0.34	Natural gas (2.7 PJ), electricity (1.6 PJ)
Rubber and plastics	22	9.4	0.71	Electricity (5.8 PJ), natural gas (3.5 PJ)
Building materials	23	23.9	1.79	Natural gas (17.0 PJ), electricity (4.1 PJ)
Basic metals	24	108.9	8.17	Coal (78.7 PJ), electricity (14.8 PJ), natural gas (13.6 PJ)
Metal products	25	10.0	0.75	Electricity (5.0 PJ), natural gas (4.7 PJ)
Computers and electronics	26	1.7	0.13	Electricity (1.1 PJ)
Electrical equipment	27	3.6	0.27	Natural gas (2.4 PJ), electricity (1.2 PJ)
Machinery	28	5.4	0.41	Electricity (3.0 PJ), natural gas (2.4 PJ)
Motor vehicles	29	2.4	0.18	Natural gas (1.1 PJ), electricity (1.1 PJ)
Other transport equipment	30	1.8	0.14	Natural gas (1.0 PJ)
Furniture	31	1.9	0.14	Natural gas (1.0 PJ)
Other manufacturing	32	0.9	0.07	Natural gas (0.4 PJ)
Repair and installation	33	1.4	0.11	Electricity (0.8 PJ)

10.2 Energy prices

For industrial consumers, the natural gas prices in the first semester of 2016 in the Netherlands were 0.0384 €/kWh (excluding VAT but including taxes and levies that are not recoverable). The only EU Member State with a higher natural gas price for industry is Finland. The average natural gas price in

the EU-28 was 0.0315 €/kWh. The high prices in the Netherlands are the result of the taxes, which are with 41% the highest in the EU.

The electricity price for industrial consumers in the Netherlands amounted to 0.0857 €/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 specific information on the consumer prices of petroleum products by the end of 2015. For petrol (Euro-super 95), the price without taxes and duties was 0.44 € in the Netherlands, the same as the EU-28 average. Including taxes and duties, the price was 1.46 €, higher than the 1.30 € average of the EU-28. For automotive diesel, the price without taxes and duties was 0.44 € and including those taxes and duties it amounted to 1.13 €. Both values are exactly at the EU-28 average. For LPG motor fuel, the values for the Netherlands were 0.32 € and 0.62 € respectively, while for the EU-28 they were 0.33 € and 0.54 €.

10.3 Carbon dioxide conversion factors

In the Netherlands, a set of conversion factors has been established for greenhouse gas reporting. For 'grey' electricity (based on a representative mix for Dutch fossil electricity including natural gas, coal and nuclear energy), the conversion factor is 0.464 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 Netherlands Enterprise Agency has published a set of 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.