# cersanit





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# **Ceramic tiles**



#### **Owner of the EPD:**

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#### **EPD Program Operator:**

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#### **Basic information**

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A5, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

The year of preparing the EPD: 2023 Product standard: EN 14411 Service Life: 50 years PCR: ITB-PCR A v1.6. (PCR based on EN 15804+A2) Declared unit: 1 kg of ceramic tile product Reasons for performing LCA: B2B Representativeness: Polish, European

#### MANUFACTURER

Cersanit S.A. – a Polish joint-stock company producing ceramic tiles, sanitary ceramics and other products for comprehensive bathroom equipment, such as furniture, bathtubs, cabins, shower trays, concealed systems, taps, toilet seats, based in Kielce. Cersanit was established on January 15, 1992 as a result of the transformation of the state-owned enterprise Zakłady Wyrobów Sanitarnych "Krasnystaw" in Krasnystaw. The Cersanit group includes European brands: Cersanit, Opoczno, Meissen Keramik, Pilkington's and Mei. The company has 8 factories in Poland, Romania, Germany and Ukraine. Cersanit S.A. is one of the leading manufacturing companies in Europe The Group's principal business involves the manufacturing and distribution of products used to finish and equip bathrooms (sanitary ceramic products, ceramic tiles, shower cubicles, acrylic bathtubs and shower trays, bathroom furniture and bathroom accessories). The main direction of foreign sales expansion is EU Member State markets (e.g. Lithuania, Latvia, Estonia, the Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Germany, France, Great Britain, Ireland, Sweden and Denmark), Eastern European markets (e.g. Ukraine, Moldova), southern European markets (e.g. Serbia, Croatia). Cersanit Group's goals: development of a strong, pan-European economic organization enabling it to maintain its leading role in the comprehensive bathroom fittings market, which, as a consequence, will ensure long-term growth of the company's value and satisfaction of its shareholders. Ceramic products covered by this EPD declaration are produced in the manufacturing plants located

in Krasnystaw (Poland).



Fig. 1. Cersanit manufacturing plant located in Wałbrzych (Poland).

#### PRODUCTS DESCRIPTION AND APPLICATION

The basic standard for groups of ceramic tiles covered by this EPD is the PN-EN 14411 titled "Ceramic tiles, definitions, classification, properties and marking". EPD covers ceramic tiles for various types of use: walls and floors internal and /or external, cluding stairs, in buildings and industrial facilities and for internal walls in buildings and industrial facilities. Ceramic tiles are manufactured using the following materials: clay, dolomite, kaolin, grit, feldspar, sand, colorants and other additives. The manufacturing process is carried out according to the requirements of standard PN-EN 14411. Cersanit manufactures ceramic tiles and decorations with water absorption:  $E_b \leq 0.5\%$ , Gruppe Bl<sub>a</sub>,  $E_b > 10\%$ , Grupa BIII. Ceramic tiles manufactured are intended for internal and external use as floor, wall, facade and stair coverings in residential, commercial, institutional and industrial buildings. The functional properties of the ceramic tiles are presented in Table 1 and types of product covered by EPD are presented in Table 2.

Table	1.	Technical	performance of	f ceramic tiles	manufactured b	v Cersanit S.A.
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Wall and floor tiles Essential parameters	Value					
Fire response	A1 / A1 <sub>FL</sub>					
Size	7cm - 240 cm					
Thickness	6 mm- 20 mm					
Surface	Glazed and unglazed					
Release of hazardous substances - glazed tiles:	-					
Slip	< R13					
PEI –abrasion resistance	2-5					
Resistance to dirt	3-5					
Chemical resistance	A-B					
Weight of 1 m <sup>2</sup>	14.7 kg – 45.7					

#### Table 2. Product's types covered by EPD

Product	Description
Wall tiles, Thickness – 8,5 mm, Weight of m² – 14,75kg	Ceramic tile - made of natural raw materials, - about water absorption E> 10% - not frost -resistant intended for laying walls in the interior
Glazed Porcelain tile Thickness $- 8 \text{ mm}$ Weight of $m^2 - 19,1 \text{kg}$	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside
Glazed/unglazed Porcelain tile Thickness – 20 mm Weight of $m^2 - 45,7kg$	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside
glazed Porcelain tile Thickness – 8 mm Weight of m2 – 18,2kg	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside
Unglazed Porcelain tile Thickness – 6,5 mm Weight of m <sup>2</sup> – 14,8kg	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside
Decorations Glazed Porcelain tile, Thickness – 8 mm Weight of m2 – 19kg Wall tiles, Thickness – 8,5 mm Weight of m2 – 14,75 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - with water absorption E> 10%; not frost -resistant intended for laying walls in the interior - with water absorption E≤0.5%; frost -resistant intended for laying walls and floors in the interior and outside
Wall tiles Thickness – 7- 8 mm Weight of m <sup>2</sup> - 13,5 kg/m2	Ceramic tile - made of natural raw materials, - about water absorption E> 10% - not frost -resistant intended for laving walls in the interior
Wall tiles thickness– 9 mm Weight of m <sup>2</sup> - 16,1 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - about water absorption E> 10% - not frost -resistant intended for laying walls in the interior
thickness– 10 mm Weight of m <sup>2</sup> – 20,4 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - about water absorption E> 10% - not frost -resistant intended for laying walls in the interior
Wall tiles thickness– 12 mm Weight of m <sup>2</sup> - 22,6 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - about water absorption E> 10% - not frost -resistant intended for laying walls in the interior
Glazed Porcelain tile thickness– 8 mm Weight of m2 - 17,65 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside
Unglazed Porcelain tile thickness– 7 mm Weight of m <sup>2</sup> - 14,7 kg/m <sup>2</sup>	Ceramic tile - made of natural raw materials, - with water absorption E≤0.5% - frost -resistant intended for laying walls and floors in the interior and outside

Note: More technical information on products available on the website of Cersanit.

# LIFE CYCLE ASSESSMENT (LCA) – general rules applied

# **Declared unit**

Declared unit is 1 kg of ceramic tile product (averaged).

Note: The conversion from 1 kg to 1  $m^2$  should be done by multiplying by the specific impact (table 4) by a product surface weight (Table 2, for example 14.7 kg/m<sup>2</sup>).

## Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the ceramic tiles is a line process conducted in two factories of Cersanit located in Wałbrzych and Opoczno (Poland). Allocation was done on product mass basis. To determine the recipe for the production of tiles, the average specification from two plants was used (based on producer declaration and data from production/formulation process). All impacts associated with the extraction and processing of raw materials used for the production of ceramic tiles are allocated in module A1 of the LCA. Impacts from the global line production were inventoried and 100% were allocated to the ceramic tiles production. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration.

#### **System limits**

Type of the EPD is: cradle to gate - with options. The following life cycle stages were considered. Production stage including: A1 – Raw material extraction and processing, A2 – Transport to the manufacturer and A3 – Manufacturing, A4- Transport to Site, A5- Installation, End-of-life stage: C1-Deconstruction, C2 – Transport to waste processing, C3 – Waste processing, C4 – Disposal (landfill). This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues. EPD includes D module- declaration of all benefits and loads beyond product system. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA. 99.8% materials submitted for the formulations and production data were taken into consideration. In the assessment, all available data from production have been considered, i.e. all raw materials/elements used as per formulation process, utilized thermal energy for heating, and electric power consumption. Thus, material and energy flows contributing less than 1 % of mass or energy have been considered. It can be assumed that the total sum of neglected processes does not exceed 0.5 % of energy use and mass per modules.

#### Modules A1 and A2: Raw materials supply and transport

The modules A1 and A2 represent the extraction and processing of raw materials and components and transport to the production sites. Clay, dolomite, kaolin, grit, feldspar, sand, pigments, additives, auxiliary materials and packaging materials are sourced from domestic and foreign suppliers. Means of transport include railway, ships and trucks (inventoried). Polish and European standards for average combustion were used for calculations. Data on mode of transport and distances, as reported by suppliers were used for those materials and parts contributing more than 0.1 % of total product mass.

#### Module A3: Production

The production of ceramic tiles is carried out in two Polish factories Wałbrzych and Opoczno. A scheme of the ceramic tiles production process by Cersanit S.A. is presented in Fig. 2. Gas and electricity are used in the production process.

#### Module A4: Transport to a construction site

The ceramic tiles produced are delivered to Polish as well as foreign customers. In the adapted scenario an average distance of 250 km from the factory gate to a recipient is assumed. Means of transport include 16-32t lorry (EURO 5) with fuel consumption of 35 l per 100 km.

#### Module A5: Installation process

In the adapted scenario the installation process requires adhesive mortar, water and other ancillary materials recommended by the Cersanit S.A.. Only consumable materials have been included in the calculation.

#### Modules C1, C2, C3, C4 and D: End-of-life (EoL)

In the adapted scenario, dismantling of ceramic tiles (C1) is performed as part of building renovation or demolition processes, where environmental impacts from declared products can be considered as minor (<1%). There are no specific deconstruction methods, applied in Poland, in regards with the ceramic tiles so the electric tools impact was assumed. During the demolition process the major amount of the products contribute to the construction and demolition wastes which can be processed on site or in a waste processing plant. It is assumed that 100% of ceramic tiles are recovered at the EoL cycle. Recovered material is transported to either to landfill or construction site distant by 70 km, on 16-32t lorry (EURO 5) with fuel consumption of 35 l per 100 km. In the adapted scenario 50% of the ceramic tiles is recycled and further used as aggregate for road foundation or ballast (credits presented in module D) while remaining 50% is forwarded to landfill in the form of mixed construction and demolition wastes. Environmental burdens declared in module C4 are associated with waste-specific emissions to air, soil and groundwater. Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Electricity at end-of-life (module C) has been modelled. Electricity at end-of-life (module D) has been modelled using an average EU-27 electricity mix as the location where the product reaches end-of-life is unknown.



Fig. 2. The scheme of the ceramic tiles production process by Cersanit S.A.

#### **Data quality**

The data selected for LCA originate from ITB-LCI questionnaires (2 manufacturing plants) completed by producer and verified via data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good. The background data for the processes come from the following resources database Eco invent v.3.9 (minerals, additives, energy carriers, waste treatment, and packaging). The background data for energy is national based on KOBiZE/GUS reports (Polish electricity mix and combustion factors for fuels). Specific (LCI) data quality analysis was a part of the input data verification. Where no background data was available, data gaps were complemented by literature research.

#### **Data collection period**

The data for manufacture of the declared products refer to period between 01.01.2021 – 31.12.2021 (1 year). The life cycle assessments were prepared for Poland.

#### Assumptions and estimates

Environmental impacts associated with ceramic tile production were aggregated using weighted averages (for both plants).

#### **Calculation rules**

LCA was done in accordance with ITB PCR A 1.6. document.

#### Databases

The data for the processes comes from the following databases: Ecoinvent v.3.9, specific EPDs, ITB-Database.

#### Additional information

Polish electricity mix used (production) is 0.698 kg CO<sub>2</sub>/kWh (KOBiZE 2021). European electricity mix used is 0.430kg CO<sub>2</sub>/kWh for the end of life (Ecoinvent v3.9, RER).

#### LIFE CYCLE ASSESSMENT (LCA) - Results

#### **Declared unit**

The declaration refers to declared unit (DU) – 1 kg of the ceramic tiles produced by Cersanit S.A.

Table 3. System boundaries for the environmental characteristic of ceramic tiles

	Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)															
Pro	oduct st	age	Consti proc	ruction cess			ι	Jse stage	Э			End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction- installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery- recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO2	1.52E-01	1.29E-01	2.97E-01	5.78E-01	4.17E-02	4.65E-02	6.98E-03	1.10E-02	4.65E-02	5.43E-03	-1.26E-02
Greenhouse gas potential - fossil	eq. kg CO2	1.91E-01	1.29E-01	2.97E-01	6.17E-01	4.16E-02	4.57E-02	6.85E-03	1.10E-02	4.63E-02	5.37E-03	-1.25E-02
Greenhouse gas potential - biogenic	eq. kg CO2	-4.01E-02	4.36E-04	1.82E-04	-3.95E-02	1.42E-04	1.33E-03	2.00E-04	3.76E-05	4.07E-04	5.34E-05	-8.45E-05
Global warming potential - land use and land use change	eq. kg CO2	9.50E-04	5.09E-05	4.60E-05	1.05E-03	1.63E-05	1.60E-05	2.40E-06	4.32E-06	9.94E-06	5.43E-06	-5.22E-06
Stratospheric ozone depletion potential	eq. kg CFC 11	7.67E-09	2.97E-08	1.51E-08	5.25E-08	9.62E-09	9.33E-10	1.40E-10	2.55E-09	3.98E-01	1.64E-09	-4.35E-10
Soil and water acidification potential	eq. mol H+	1.10E-03	4.00E-01	3.22E-04	4.02E-01	1.69E-04	5.07E-04	7.60E-05	4.47E-05	4.23E-04	4.54E-05	-3.87E-05
Eutrophication potential - freshwater	eq. kg P	1.23E-04	8.60E-06	1.57E-05	1.47E-04	2.79E-06	8.67E-05	1.30E-05	7.40E-07	2.62E-05	1.54E-06	-1.51E-06
Eutrophication potential - seawater	eq. kg N	2.27E-04	1.66E-04	5.35E-05	4.46E-04	5.09E-05	7.33E-05	1.10E-05	1.35E-05	9.45E-04	1.57E-05	-1.37E-05
Eutrophication potential - terrestrial	eq. mol N	2.05E-03	1.81E-03	5.60E-04	4.42E-03	5.55E-04	6.20E-04	9.30E-05	1.47E-04	1.93E-03	1.70E-04	-1.52E-04
Potential for photochemical ozone synthesis	eq. kg NMVOC	7.04E-04	5.49E-04	2.28E-04	1.48E-03	1.70E-04	1.73E-04	2.60E-05	4.50E-05	4.32E-04	4.93E-05	-5.41E-05
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	7.81E-06	4.53E-07	1.44E-06	9.70E-06	1.47E-07	2.23E-07	3.34E-08	3.90E-08	7.42E-08	1.81E-08	-3.14E-08
Abiotic depletion potential - fossil fuels	MJ	4.03E+00	1.91E+00	2.20E+00	8.13E+00	6.17E-01	7.73E-01	1.16E-01	1.63E-01	2.63E-01	1.24E-01	-2.01E-01
Water deprivation potential	eq. m <sup>3</sup>	1.10E-01	8.79E-03	2.60E-02	1.45E-01	2.85E-03	1.60E-02	2.40E-03	7.55E-04	5.52E-03	7.15E-04	-2.15E-03

#### Table 4. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Cersanit S.A. - environmental impacts (DU: 1 kg)

Table 5. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Cersanit S.A. - environmental information describing waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste neutralized	kg	9.71E-03	2.14E-03	1.45E-03	1.33E-02	6.92E-04	8.00E-06	1.20E-06	1.83E-04	2.40E-06	3.26E-06	1.54E-04
Non-hazardous waste neutralised	kg	8.93E-01	3.78E-02	5.25E-02	9.83E-01	1.23E-02	4.16E-04	6.24E-05	3.25E-03	5.93E-03	5.01E-01	6.75E-03
Radioactive waste	kg	1.97E-04	1.41E-07	7.66E-07	1.98E-04	4.60E-08	5.80E-07	8.70E-08	1.22E-08	3.39E-07	7.59E-07	1.54E-04
Components for re-use	kg	0.00E+00										
Materials for recycling	kg	1.26E-04	7.62E-06	8.60E-03	8.74E-03	1.91E-06	8.00E-07	1.20E-07	5.06E-07	4.46E-07	5.78E-09	2.35E-06
Materials for energy recovery	kg	1.77E-06	4.77E-08	3.07E-08	1.85E-06	1.54E-08	7.00E-09	1.05E-09	4.09E-09	4.67E-09	6.85E-11	6.59E-09

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA										
Consumption of renewable primary energy resources used as raw materials	MJ	INA										
Total consumption of renewable primary energy resources	MJ	1.23E+00	2.72E-02	8.98E-01	2.16E+00	8.85E-03	5.73E-02	8.60E-03	2.34E-03	1.78E-02	2.16E-03	-1.26E-02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA										
Consumption of non-renewable primary energy resources used as raw materials	MJ	INA										
Total consumption of non-renewable primary energy resources	MJ	4.03E+00	1.91E+00	2.41E+00	8.34E+00	6.17E-01	7.76E-01	1.16E-01	1.63E-01	2.64E-01	1.34E-01	-2.01E-01
Consumption of secondary materials	kg	3.46E-03	6.41E-04	3.42E-04	4.44E-03	2.07E-04	7.07E-05	1.06E-05	5.48E-05	3.52E-05	6.07E-07	-8.35E-05
Consumption of renewable secondary fuels	MJ	1.39E-02	7.00E-06	1.49E-05	1.39E-02	2.28E-06	3.94E-07	5.91E-08	6.03E-07	3.08E-07	1.59E-08	-5.44E-07
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-04	9.39E-05	0.00E+00	1.88E-04	0.00E+00	0.00E+00
Net consumption of freshwater resources	m <sup>3</sup>	3.52E-03	2.39E-04	1.07E-03	4.83E-03	7.76E-05	2.10E-04	3.15E-05	2.05E-05	9.03E-05	2.21E-05	-8.50E-04

Table 6. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Cersanit S.A. - environmental aspects related to resource use (DU: 1 kg)

#### Table 7. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Cersanit S.A. – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

#### Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2:2020-03 and ITB PCR A						
Independent verification corresponding to ISO 14025 (subclause 8.1.3.)						
x external internal						
External verification: Halina Prejzner, PhD. eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., eng.						

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the for the information provided and contained I EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: Note: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (17065/17029 certified). ITB-EPD program is recognized and registered member of The European Platform – Association of EPD program operators and ITB-EPD declarations are registered and stored in the international <u>ECO-PORTAL</u>.

#### **Normative references**

- ITB PCR A, V1.6 General Product Category Rules for Construction Products (2023)
- ISO 14025:2006, Environmental labels and declarations Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management Life cycle assessment Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets Service life planning Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets Service life planning Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works Environmental product declarations -Core rules for the product category of construction products
- PN-EN 15942:2012 Sustainability of construction works Environmental product declarations – Communication format business-to-business
- EN 14411:2012 Płytki ceramiczne Definicje, klasyfikacja, właściwości, ocena zgodności i znakowanie
- KOBiZE Wskaźniki emisyjności CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2021



