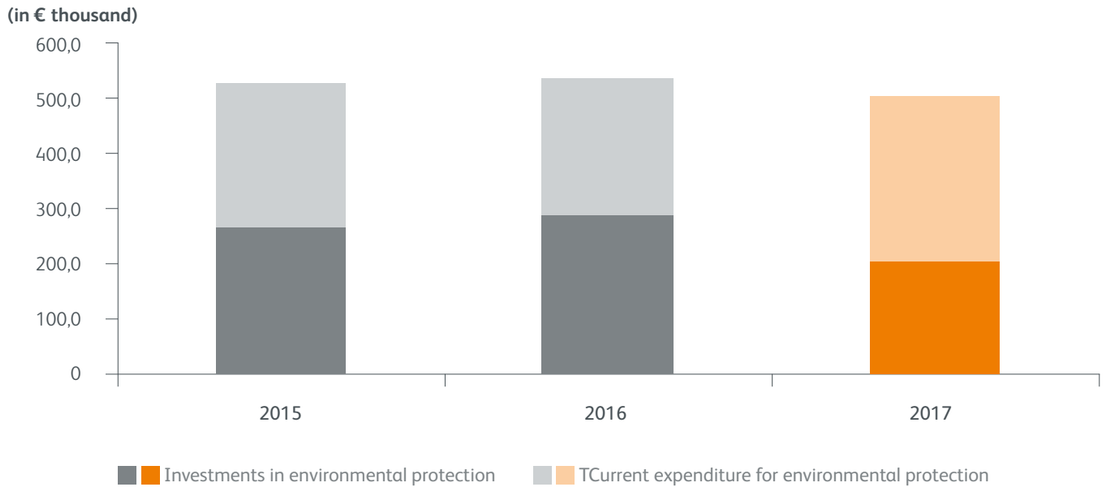
ENVIRONMENT: DUE DILIGENCE IN THE MANAGEMENT OF ENVIRONMENTAL AND SPATIAL IMPACTS

Company activities relating to environment protection derive from the guidelines laid down in the Environmental Management Policy. Electric power transmission plants and equipment are located **in a prudent manner, seeking to minimise their impact on the environment and people. State-of-the-art technology is used in all areas of work and natural resources, materials and energy are handled with due responsibility.** That is reflected in Company investments in the development of the electricity transmission network.

In 2017, most investment funds were spent on **updating and installing devices for waste water drainage, energy efficiency improvement of buildings and provision of outdoor lighting.** Most expenses related to utilities, supply of water from the public water distribution system and electromagnetic radiation measurements.

The result of responsible Company activities is also the fact that **no spillage of hazardous substances occurred** in 2017 and that **no fine was received in relation with environment protection.**

Chart 35: Expenses and investments



Environmental aspect of power plant construction: Power plant construction is carried out on the basis of applicable regulations relating to nature conservation, protection of the environment and natural resources, water management. During construction works, the Company **strives to use existing roads and paths as much as possible, while site surfaces are maximally limited, thus reducing the negative impact on existing vegetation and forest.**

Within the scope of transmission line construction, the Company implements all measures prescribed, including reuse of excavated earth, use of indigenous bush and tree varieties in the rehabilitation of forest edges, the planting of substitute forest islands at individual locations and installation of visual markings (marking conductors and earth wire). In future, the Company also plans to set up individual substitute habitats, such as an extensive hay meadows on fields, preservation of a floodplain forest for the preservation of protected forest bird species, their habitat and similar.

Preservation of biodiversity in power plant maintenance: Before starting maintenance works on transmission line alignments in the Natura 2000 area or in areas of natural values, the Company obtains a permit for works in nature from the locally competent administrative unit laying down conditions for the execution of works and the period in which the works are permitted. Before carrying out works in a forest or forested area, the Company obtains the consent of the Slovenian Forest Service. Transmission line alignments erected on forested land are maintained by cutting undergrowth that does not exceed the thickness of 10cm at breast height. Undergrowth is also cut down in all water courses and land reclamation channels. Maintenance works are performed so as not to endanger the natural biotic environment.

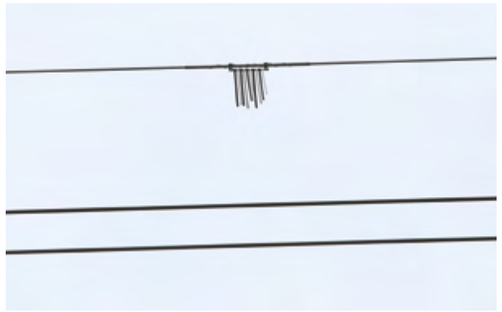
There are 14.4 % of high-voltage transmission lines at 400kV, 220kV and 110kV voltage levels running through Natura 2000 areas.

Diagram 5: Transmission lines in Natura 2000

Areas marked under SPA – Birds Directive
Areas marked under SAC – Habitats Directive

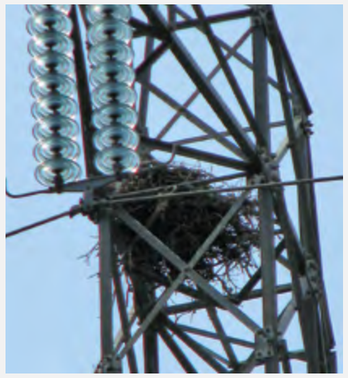
The map shows that the **largest share of high-voltage transmission lines run through Natura 2000 SPA areas, which are important for birds,** over the territory of southwest and west Slovenia and in the area of the Drava river in east Slovenia.

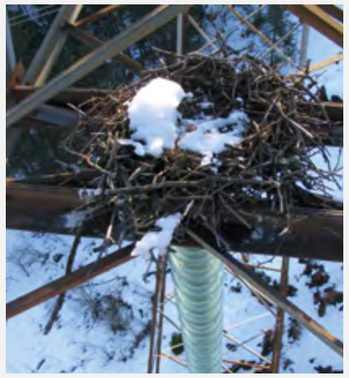
In order to **reduce the probability of crashes into high-voltage transmission line conductors,** the Company set up bird alarms in recent years at individual sections of the 2 x 400kV Beričevo-Krško and 2 x 110kV Beričevo-Trbovlje transmission lines.

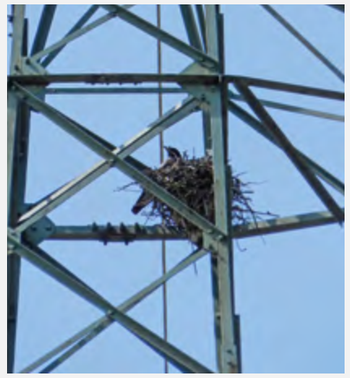


Bird alarms

High-voltage transmission line towers also represent new living spaces for birds. When maintaining high-voltage transmission lines, any finds of live nests are recorded and the nests are left on transmission line towers. The largest number of nests was found on the 2 x 110kV Kleče-Medvode-Labore-Okroglo II transmission line, which may be attributed to the fact that the alignment runs along the Sava river, which is a favourable habitat for birds.

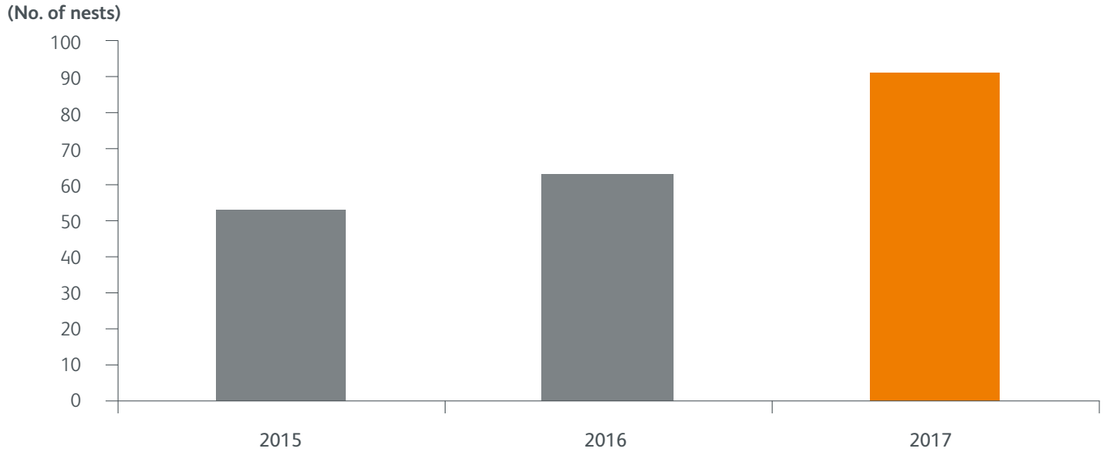






Bird nesting on transmission lines

Chart 36: Bird nesting on high-voltage transmission line towers in central Slovenia



Consumption of materials in power plant construction: The use of materials within the scope of transmission network construction complies with legal regulations and guidelines. The material installation procedure is closely monitored and the data obtained is considered within the scope of each project. The overview of material consumption includes the construction of the ELES Beričevo Technology Centre, which commenced in 2017, and the construction of the 2 x 110kV Maribor-Cirkovce transmission line, which was completed in 2017. Of the 4,344 insulators installed in the 2 x 110kV Maribor-Cirkovce transmission line, 72 % of insulators were disassembled from the old transmission line.

Table 28: Consumption of materials

Consumption of material	Unit	Amount
ELES Technology Centre, Beričevo		
Concrete	m3	4,663.00
Iron	t	661.00
2x110kV Maribor-Cirkovce transmission line		
Concrete	m3	1,993.94
Steel frames	t	240.90
Aluminium + steel + alloys	t	72.22
Conductor	m	58,720.00
Optical ground wire cable (OPGW)	m	18,515.00
Insulator sets	pcs	324.00
Insulators	pcs	1,200.00
Insulators from existing transmission line	pcs	31,440.00

Energy consumption: Guidelines relating to **efficient energy use and focus on continuous reduction of operating costs at plants** continued to be the basis for activities in energy consumption in 2017. The energy efficiency improvement of buildings at the Podlog transmission system substation, which commenced in 2017 and will be completed in 2019. The planned energy efficiency improvements in future years will help reduce the energy used for the buildings. In energy consumption for vehicles, it is planned to replace vehicles with new and low energy vehicles, thus helping to **reduce energy consumption per vehicle.** Furthermore, ELES has prepared a plan to erect charging stations. The total annual estimate on the volume of energy consumed includes energy consumption for buildings and energy consumption for vehicles and work machinery. A larger share of energy is used for building.

Chart 37: Energy consumption

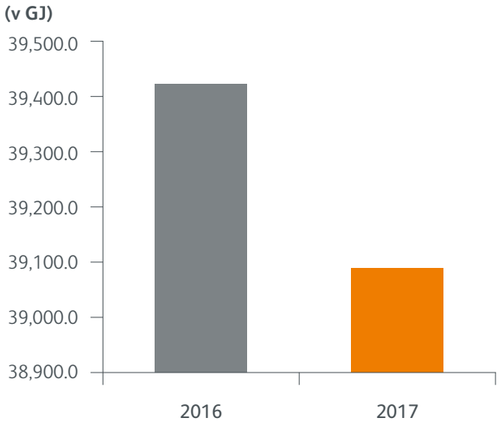
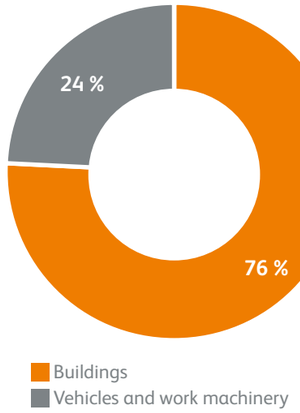


Chart 38: Energy consumption with respect to purpose



Investments in the replacement of outdoor lighting in previous years contributed to electricity savings. In 2016 and 2017, 1,462GJ of energy was saved annually for the use of outdoor lighting.

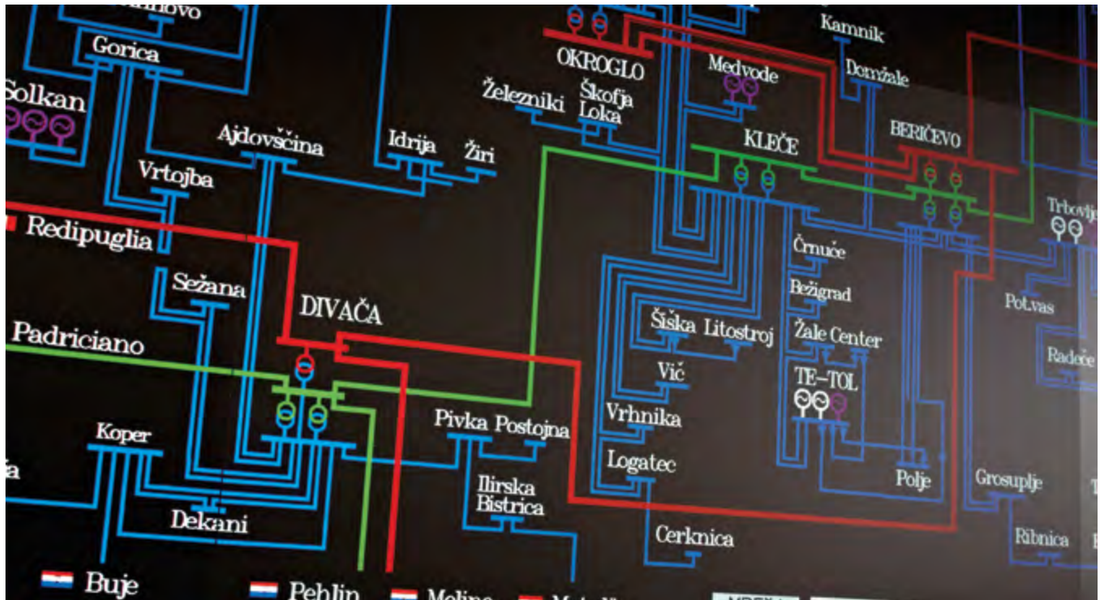
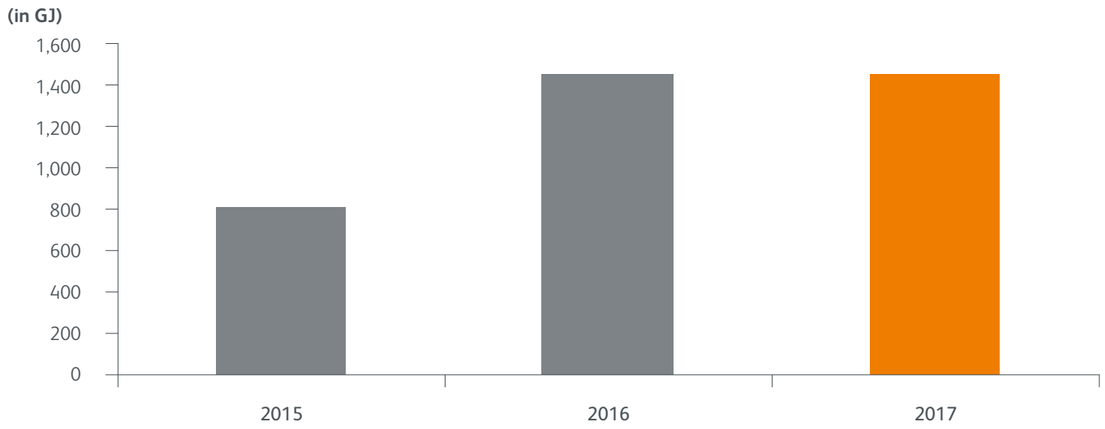
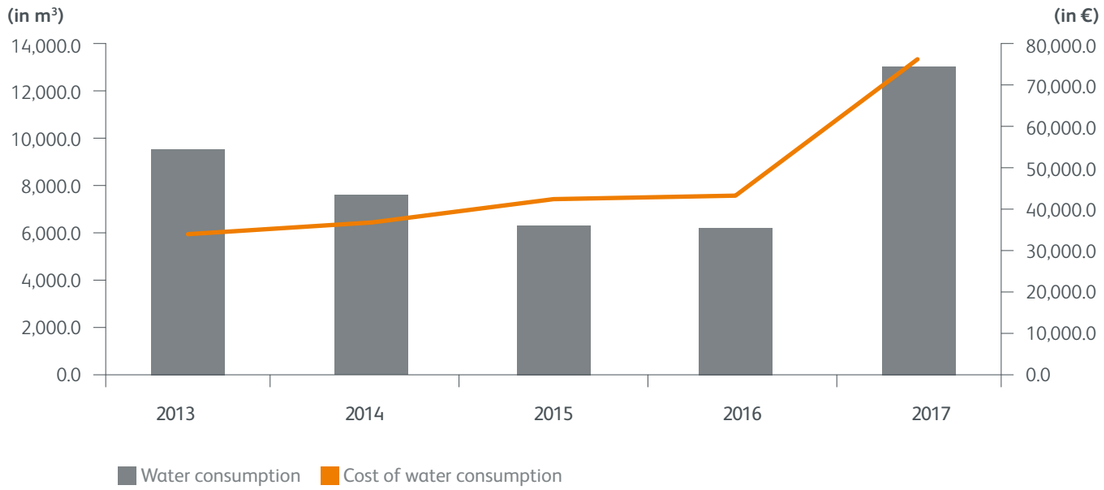


Chart 39: Electricity savings in the use of outdoor lighting from 2013 to 2017



Water consumption: The water used in Company processes is taken from the public water distribution system. **The volume of water used increased substantially in 2017 compared to previous years** due to the construction of the ELES Beričevo Technology Centre, replacement of the T412 transformer at the Maribor transmission system substation, renovation of the switching station and facility at the Hudo substation, construction of GIS at the Pekre transmission system substation and the renovation of a courtyard at the Podlog transmission system substation.

Chart 40: Water consumption



Emissions and SF_6 gas recycling: SF_6 gas, which can be found in sealed parts of certain high-voltage equipment, functions as an insulator, thus ensuring the proper functioning of the equipment. When operational, such equipment does not cause greenhouse effects on the environment. With properly qualified repairmen, the Company **makes sure that there is no leakage of SF_6 in the air during equipment maintenance (e.g. gas capture), while the installation of new equipment is entrusted only to properly qualified providers.** Monitoring and maintenance are used to **prevent the leakage of fluorinated greenhouse gas SF_6 from high-voltage equipment** to the maximum possible extent.

The volume of SF_6 in use amounted to 11,935.9 kilograms in 2017, which amounts to 2,950.8kg more than in 2016. Increased volume is the result of the plants taken over and the new GIS at the Pekre transmission system substation. In 2017, 23.5 kilograms of SF_6 gas was recycled and reused.

Chart 41: Total volume of SF6 in HV equipment

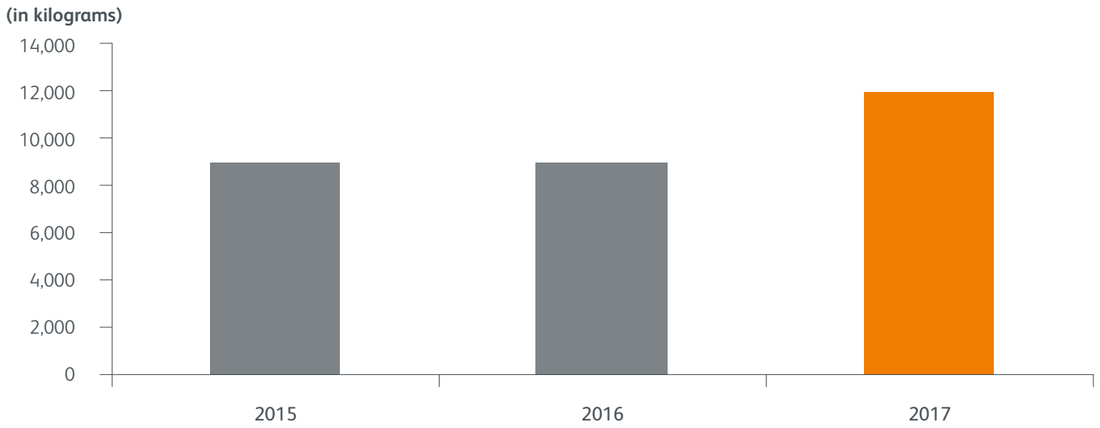
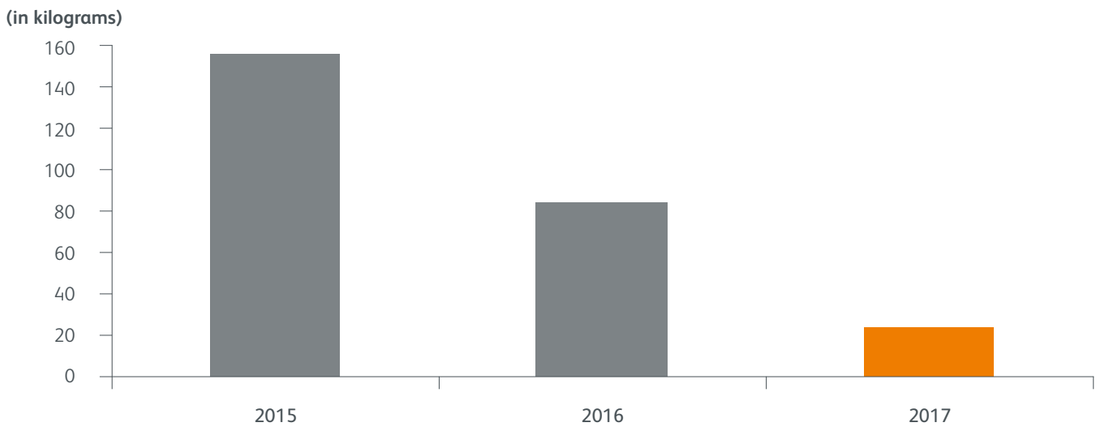


Chart 42: SF_6 gas (in kilograms)



Carbon footprint: The calculation of the carbon footprint for 2017 took into account major areas of Company activity, i.e. direct emissions (leakage of SF_6 gas from high-voltage equipment, emissions from vehicles and emission from other equipment) and indirect emissions (energy losses during electricity transmission and electricity consumption for buildings). The carbon footprint of the mentioned activities amounts to 193,756 tonnes of CO_2. **The largest share of the carbon footprint are energy losses in electricity transmission,** i.e. 97.58 % of the estimated carbon footprint for the Company.

Diagram 6: Carbon footprint

ELES carbon footprint 193,756 tonnes CO_2

DIRECT EMISSIONS

	tone ekvivalenta CO_2	%
Leakage of SF_6	0	0
Emissions from vehicles	694.34	0.358
Emissions from work machinery	8.84	0.005
Emissions from air conditioning	22.13	0.011
Emissions from combustion installations	44.44	0.023
Emissions from diesel generators	5.88	0.003

INDIRECT EMISSIONS

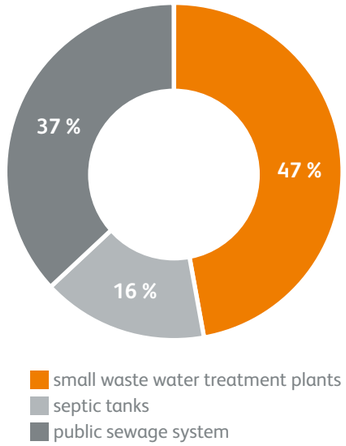
	tone ekvivalenta CO_2	%
Losses in the transmission network	189,067.36	97.580
District heating	241.39	0.125
Electricity consumption for buildings	3,671.46	1.895

Noise: The noise produced by Company equipment is **managed with suitable technical measures (use of proper equipment, noise protection, monitoring).** Operational monitoring for sources of noise was conducted at the 400/110-220/110/35kV transmission system substation at the Divača Transmission Network Infrastructure Centre. Measurements have shown that noise indicator values were below the limit values laid down in the Decree on limit values for environment noise indicators.

Electromagnetic radiation: Within the scope of regular operational monitoring for electromagnetic radiation, the Company conducted the monitoring of electromagnetic radiation in 2017 at 18 power facilities at the Maribor Transmission Network Infrastructure Centre (2 transmission system substations and 5 transmission lines), Podlog Transmission Network Infrastructure Centre (1 transmission system substation and 4 transmission lines), Ljubljana Transmission Network Infrastructure Centre (1 transmission system substation in 2 transmission lines) and Divača Transmission Network Infrastructure Centre (3 transmission lines). **The values and electrical and magnetic fields in the relevant areas were lower than permissible values,** which amount to E = 10kV/m and B = 100μT according to the Decree on electromagnetic radiation in natural and living environment.

Waste water: The Company manages waste water in three ways. At locations where it is not possible to connect to the public sewage system and where workers are not always present, **waste water is collected in septic tanks.** If possible, due to technical capacities, s**mall waste water treatment plants are set up** within the scope of reconstructions of transmission system substations. At locations **where it was technically and economically possible to connect to the public sewage system, the connection was executed in past years.** Currently, the largest share of waste water is drained to small waste water treatment plants (47 %), then to the public sewage system (37 %), and the lowest share to septic tanks (16 %).

Chart 43: Waste water



Waste: The Company is well aware that waste is a source of raw materials, which is why it is **consistently separated, whereby applying the waste management hierarchy.** Certain types of waste are collected by public undertakings with suitable permits issued by the Ministry of the Environment and Spatial Planning without a record list issued, while all other types of waste are collected by companies with the relevant permits that were authorised by the Company to issue record lists.

Annual volumes of hazardous waste depend on the reconstructions under way. Large volumes of hazardous waste in 2013 and 2017 are related with the replacement of high-voltage equipment (oil from high-voltage equipment and discarded equipment that contains hazardous substances).

Chart 44: Volumes of hazardous waste

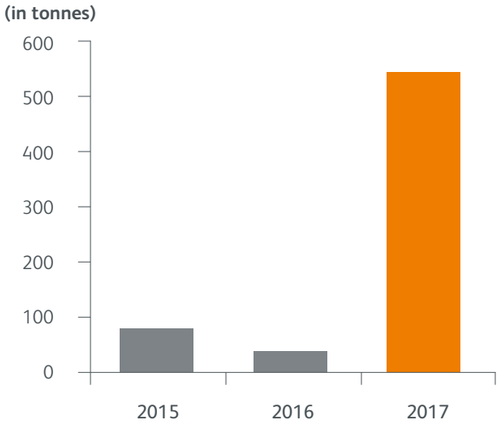
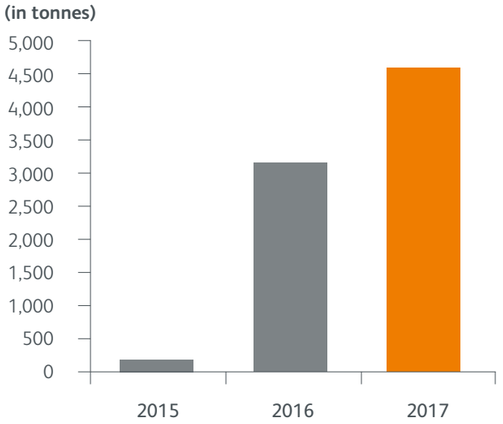


Chart 45: Volume of non-hazardous waste



In 2017, the volumes of hazardous waste increased substantially. The largest share was produced with the disassembly of a power transformer at the Maribor and Divača transmission system substations, which is a waste product from disassembly (paper insulation contaminated by oil, bituminous mixtures, mineral-based non-chlorinated oils and discarded equipment). Furthermore, the largest share of the hazardous waste is water contaminated by oil that is pumped during the cleaning of oil leakage sumps and oil separators for power transformers.

Annual volumes of non-hazardous waste has also fluctuated in recent years, which was also the result of plant reconstructions. The largest share of non-hazardous waste includes construction waste (soil and rocks, bituminous mixtures, concrete, iron and steel).

Increased volumes of non-hazardous waste emerged due to the implementation of projects, i.e. the reconstruction of the switching station at Hudo substation, construction of a new GIS switching station at the Pekre transmission system substation, reconstruction of the 110kV Maribor-Cirkovce transmission line and the replacement of a power transformer at the Divača and Maribor transmission system substations.

Furthermore, annual volumes of municipal waste that serve only as an estimate of municipal waste that in fact occurred. Within the scope of municipal waste, the Company monitors volumes of septic tank sludge, mixed municipal waste, paper, glass, packaging, bio-waste and bulky waste. Reduced volumes of municipal waste in 2017 compared to 2016 are the result of power plant connections to the public sewage system and small waste water treatment plants.

Chart 46: Volume of municipal waste