Natural environment

Natural environment issues – Enea Wytwarzanie

Systemic Power Plants Segment

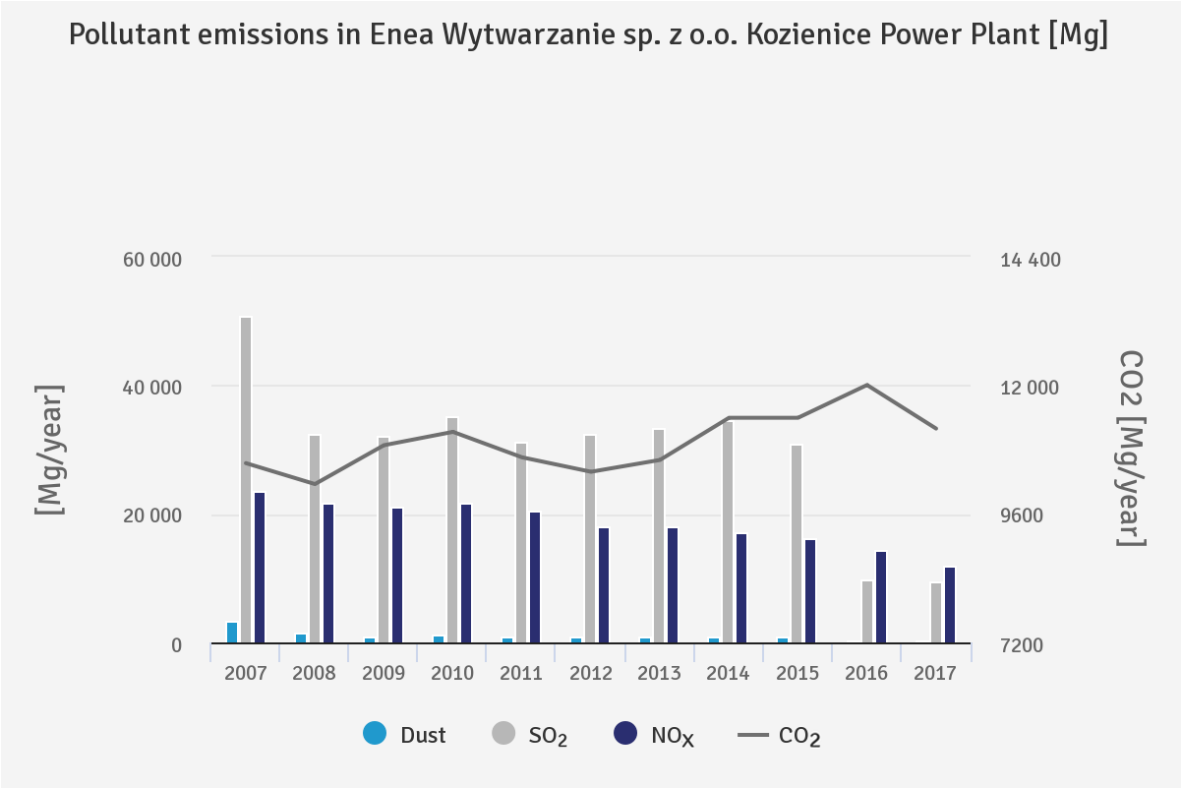
Pursuant to IED Directive, stricter standards of pollution emissions have been in effect since 1 January 2016. The postponement of their effective date was ensured through the derogation mechanism stipulated in the Directive in the form of the Transitional National Plan (TNP) which is binding from 1 January 2016 to 30 June 2020.

During the participation in TNP, it is necessary to keep annual mass limits for pollutions reported for derogation by the plant operators (pursuant to the Regulation: Journal of Laws 2015 item 1138, as amended); also, the emission standards effective as at 31 December 2015 apply. In the light of the rules of TNP operation, it is possible to settle the allocated limits together with other members of the Group: within Enea SA Group, Kozienice Power Plant has shared settlements with Białystok Heat and Power Plant in terms of SO2 and dust limits. Participation in TNP enables the Company to optimise expenses related to air emissions.

As from 1 January 2018, stricter standards of NO_x emissions (pursuant to IED Directive) will apply due to the fact that the Treaty of Accession derogation period has ended on 31 December 2017. In order to reduce the nitrogen oxides emissions to the air, the nitrogen oxide selective catalytic reduction (SCR) plant has been gradually constructed since 2013 at Kozienice Power Plant. As at the end of 2017, SCR plant was installed in 200 MW power units, save for the power unit No. 3 where it is not planned to install the SCR plant for economic reasons. In the years 2018 and 2019, it is planned to install the SCR plant in 500 MW power units No. 10 and No. 9, respectively.

Desulphurisation of all flue gases with the use of the FGD I-IV plant offers the warranty of keeping the mass limit on pollution emissions as per TNP and meeting the emission standards set out in IED Directive. The proper operation of the installed ESP plants and their successive replacement for high-end highly efficient plants together with the second stage of dedusting which is guaranteed by the operated FGD plants ensures the achievement of the applicable dust emissions standards. The replacement of ESP plant in the power unit No. 9 is planned for 2019.

On 20 December 2017, the Power Unit No. 11 (1 075 MW) was commissioned. The initial measurements performed during its acceptance procedure have demonstrated that the unit reaches all acceptable pollution emission values specified in the integrated permit.



Investment operations implemented in order to meet the requirements of Directive 2010/75/EU on industrial emissions (IED) – Kozienice Power Plant

Unit	Generating capacity (MW)	Denitrification installation (compliant with IED < 200 mg/Nm3)						Denitrification installation (compliant with IED < 200 mg/Nm3)		Dedusting equipment (electrostatic precipitators) (compliant with IED < 20 mg/Nm3) mg/Nm^3)	
		2014	2015	2016 derogation period	2017 derogation period	2018	2019	2014	2015	2016	2017
B1	228			✔							
B2	228		✔								
B3	225										
B4	228				✔						
B5	228			✔							
B6	228	✔									
B7	228		✔								
B8	228				✔						
B9	560					✔		✔			✔

50% of attainable capacity covered with FGD operation

100% of attainable capacity covered with FGD operation

Unit	Generating capacity (MW)	Denitrification installation (compliant with IED < 200 mg/Nm3)						Denitrification installation (compliant with IED < 200 mg/Nm3)		Dedusting equipment (electrostatic precipitators) (compliant with IED < 20 mg/Nm3) mg/Nm^3)	
		2014	2015	2016 2017 derogation period		2018	2019	2014	2015	2016	2017
B10	560						✔	✔			

Within the requirements specified by the IED Directive, as well as BAT conclusions planned for implementation from 18 August 2021 (kBAT) – Enea Wytwarzanie has been consistently for many years realising the specified schedule of adaptation investment activities.

In 2017 the following activities were conducted at Kozienice Power Plant:

- activities related to the adjustment of Enea Wytwarzanie sp. z o.o. to the requirements of the BAT conclusions,
- further catalytic flue gas denitrification installations (SCR) were built on two 200 MW units No. 4 and 8 (with achievable concentrations below 100 mg / Nm3) to significantly reduce nitrogen oxides.

The flue gas denitrification installation on the 500 MW unit No. 10 is at its final stage of implementation. In 2018, the SCR installation is planned for the remaining 500 MW unit No. 9.

The SCR installations gradually developed until 2019 provide the Company with the possibility to comply with the requirements of the IED Directive as well as future requirements arising from the BAT conclusions.

Water consumption in energy generation process

99,7%

of collected water is reverse intake. Kozienice Power Plant does not use underground water for production purposes.

Natural environment issues – Enea Elektrownia Połaniec

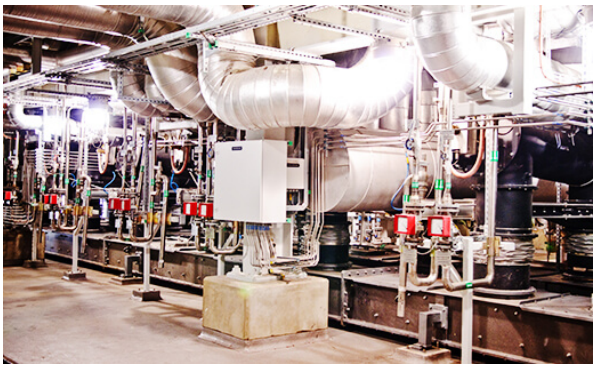
Enea Elektrownia Połaniec S.A. takes advantage of the natural derogation stipulated in IED Directive with respect to power unit No. 1. Throughout the derogation period, i.e., from 1 January 2016 to 31 December 2023, the operation of the power unit No. 1 is limited to 17 500 hours. A total number of 4 736 hours was

used from the available limit of 17 500 hours, of which 2 189 hours were used in 2016 and 2 547 hours in 2017. As at 31 December 2017, the number of hours still to be used is 12,764. A decision on reporting the power unit No. 1 for natural derogation was made because it was impossible to perform desulphurisation of all operating power units No. 1-7 at the same time.

Under Phoenix project whose objective was the upgrade of the Power Plant production capacity and adjusting power units No. 2-7 to the IED Directive requirements, the following improvement of power unit efficiency was achieved:

Power Unit No. 2 – 242 MW, ISO net efficiency: 38% (before upgrade: 226 MW, efficiency: ca. 36%)
Power Unit No. 3 – 242 MW, ISO net efficiency: 38% (before upgrade: 223 MW, efficiency: ca. 36%)
Power Unit No. 4 – 242 MW, ISO net efficiency: 38% (before upgrade: 225 MW, efficiency: ca. 36%)
Power Unit No. 6 – 242 MW, ISO net efficiency: 38% (before upgrade: 221 MW, efficiency: ca. 36%)
Power Unit No. 7 – 239 MW, ISO net efficiency: 38% (before upgrade: 221 MW, efficiency: ca. 36%)

The improvement in power efficiency translated to a reduction in bituminous coal consumption by approx. 14g/KWh (approx. 3%) and a decrease in CO_2 emissions. Under the project, the flue-gas desulphurisation (FGD) plant was modernised, whereas the power units No. 2, 3, 6, and 7 were equipped with the nitrogen oxide selective catalytic reduction (SCR) plant. At present, the process of SCR installation in power unit No. 4 is underway. Also, the implementation tendering procedures for Phoenix project in power unit No. 5 has already started.



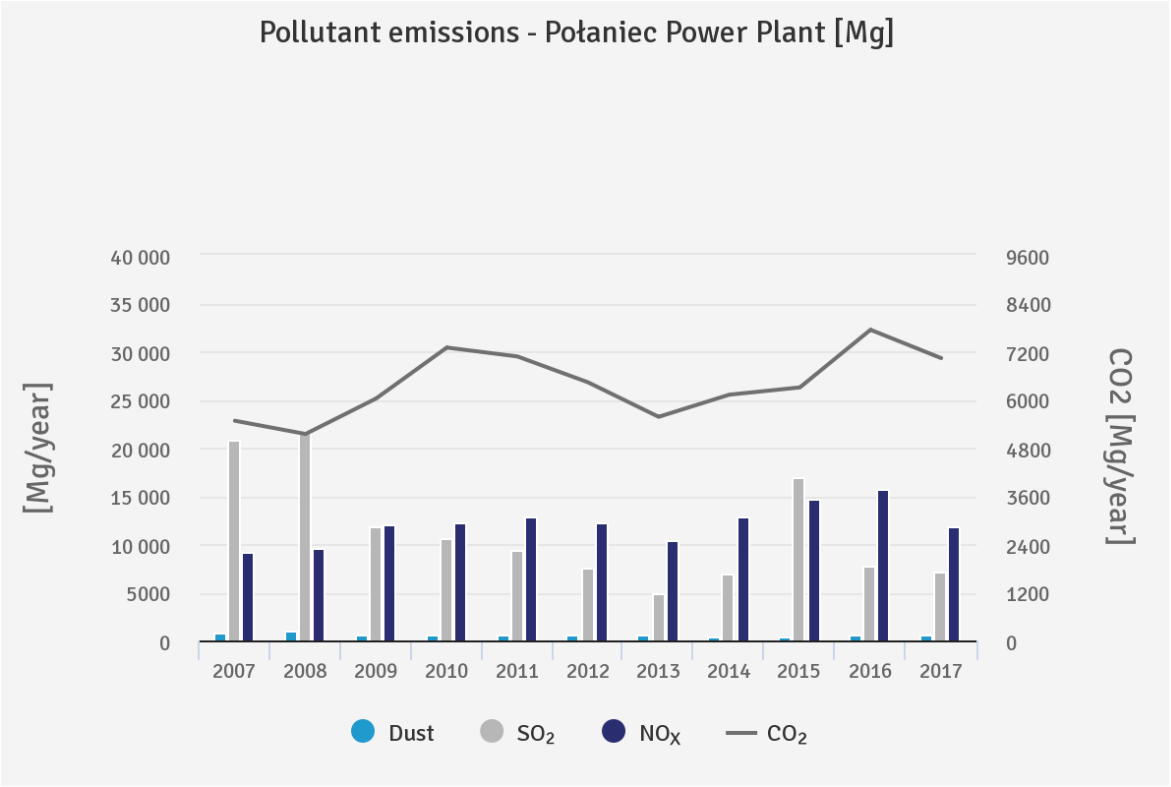
Pollutant concentration in Połaniec Power Plant in 2017

Dust lower by

20%

than the acceptable concentration

- SO_2 lower by 16 % than the acceptable concentration
- NO_x lower by 21 % than the acceptable concentration



Investment operations implemented in order to meet the requirements of Directive 2010/75/UE on industrial emissions (IED) – Połaniec Power Plant

Unit	Attainable capacity (MW)	SCR installation (compliant with IED < 200 mg/Nm^3)				FGD installation (compliant with IED < 200 mg/Nm^3)		Dedusting equipment (electrostatic precipitators) (compliant with IED < 20 mg/Nm^3	
		2016	2017	2018	2019	2016	2017	2016	2017
B1	225	Unit covered by natural derogation of 17 500h				Derogation of 17 500h		Derogation of 17 500h	
B2	242		✔			✔		✔	
B3	242		✔			✔		✔	
B4	242			✔		✔		✔	
B5	225				✔	✔		✔	
B6	242		✔			✔		✔	
B7	239	✔				✔		✔	

Unit	Attainable capacity (MW)	SCR installation (compliant with IED < 200 mg/Nm^3)				FGD installation (compliant with IED < 200 mg/Nm^3)		Dedusting equipment (electrostatic precipitators) (compliant with IED < 20 mg/Nm^3	
		2016	2017	2018	2019	2016	2017	2016	2017
B9	205	emissions below IED norms (flue gases do not undergo denitrification)				emissions below IED norms (flue gases do not undergo desulphurisation)		✔	

THE MAIN EFFECTS OF IMPLEMENTED ENVIRONMENTAL ACTIVITIES:

- Improved desulfurization efficiency by installing a formic acid dosing system.
- Equipping units No. 2, 3, 6, 7 with SCR catalysts, resulting in a reduction of nitrogen oxide emissions from about 500 mg/Nm3 to below 200 mg/Nm³. Currently, the SCR catalyst installation process is being carried out at unit No. 4. A tender procedure for the Phoenix project has been launched for unit No. 5.
- Increasing environmental awareness of the employees of the Power Plant, the subsidiary, contractors providing services to the Power Plant and students of nearby schools.

ENVIRONMENTAL EDUCATION ACTIVITIES

In 2017, the following activities were carried out at Enea Elektrownia Połaniec S.A.:

- A meeting with local government authorities of neighbouring municipalities, county and province. li>
- The ninth edition of Ecological Contest, which aims to promote knowledge of environmental protection and legal regulations on environmental issues among employees of the Power Plant and its Bioenergia subsidiary.
- The second edition of the art contest for neighbouring primary schools designated for children. The aim of the competition is to promote knowledge about the Power Plant and undertaken environmental activities. The subject of the contest is „The Power Plant for the environment, the environment for the Power Plant".

Water consumption in energy generation process

99,7%

of collected water is reverse intake
Kozienice Power Plant does not use underground water for production purposes.

Transitional National Plan

The stricter emissions standards introduced by IED Directive may be postponed by taking advantage of the TNP derogation referred to in Article 32 of IED Directive (implementation to the Polish law through Article 146c of the Environment Protection Law Act, Journal of Laws 2001 No. 62 item 627, as amended). Kozienice Power Plant and Białystok Heat and Power Plant confirmed their participation in TNP in terms of emissions of: SO2, dust – Kozienice Power Plant and SO2, dust, and NO_x – Białystok Heat and Power Plant.

Derogation from the emission standards for the sources covered by TNP is effective from 1 January 2016 to 30 June 2020, which means that the standards effective as at 31 December 2015 shall apply in this period (for Kozienice Power Plant: dust - 50 mg/Nm3, SO2 – 1 200 mg/Nm3 for five 200 MW power units, and 400 mg/Nm3 for other power units). Pursuant to the Environment Protection Law Act, the Minister of Environment issued Regulation of 21 July 2015 on the requirements relevant for the implementation of the Transitional National Plan (Journal of Laws 2015 item 1138, as amended) which determines the substance mass limits for the sources covered by TNP for the years 2016-2019 and for H1/2020 that become smaller each year.

Enea Wytwarzanie sp. z o.o. settles the emission limits allocated for the pollutants reported to TNP as follows:

- in terms of sulphur dioxide and dust emissions: Kozienice Power Plant together with Białystok Heat and Power Plant,
- in terms of NO_x emissions: Białystok Heat and Power Plant individually.

The table below presents pollution emission under TNP for 2017 and the degree of utilisation of maximum annual emission limits.

Plant		SO_2		Pył		NO_x	
		[Mg]	% Utilisation	[Mg]	% Utilisation	[Mg]	% Utilisation
Kozienice Power Plant	emissions	8 583.89	68.5	211.26	14.1	-	-
	annual max. limit	12 522.50		1 502.70			
Elektrociepłownia Białystok	emissions	1 525.20	57.2	58.72	27.2	297.04	22.0
	annual max. limit	2 666.56		215.69		1 347.75	
TOTAL	emissions	10 109.09	66.6	269.98	15.7	297.04	22.0
	annual max. limit	15 189.06		1 718.39		1 347.75	

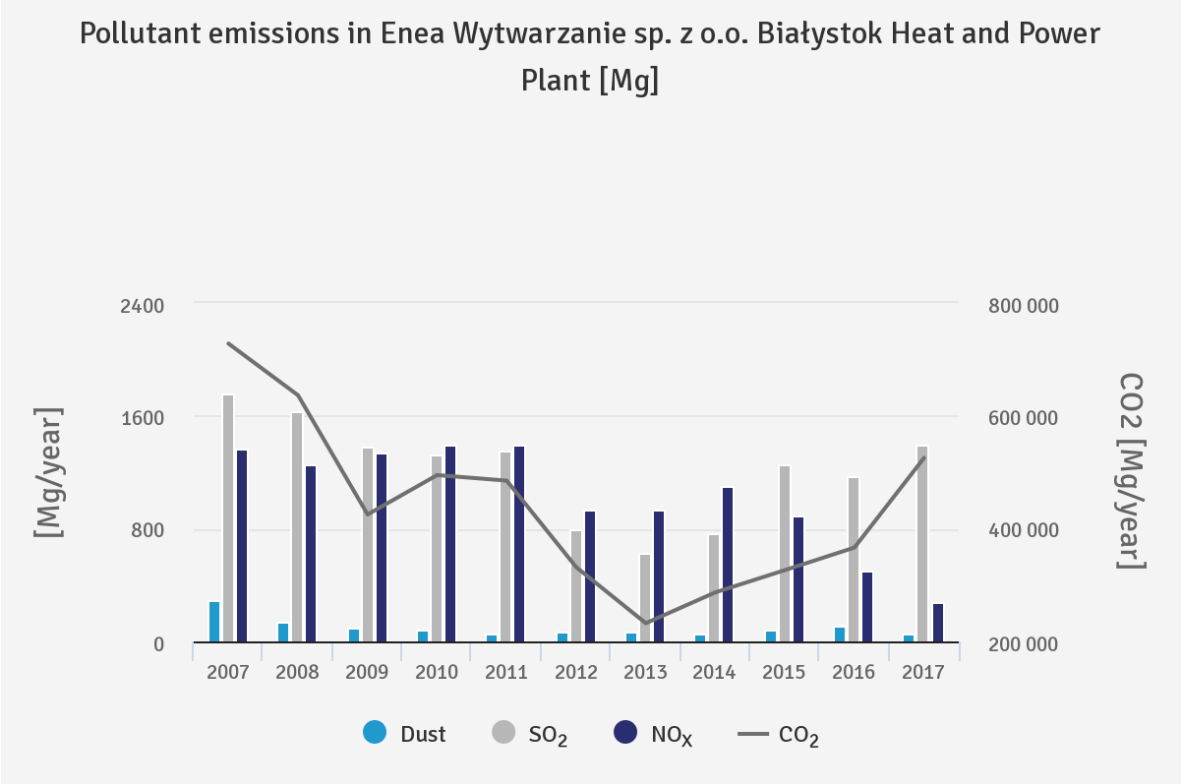
For TNP purposes, emissions (calculated pursuant to the Commission Implementing Decision of 10 February 2012 laying down rules concerning the transitional national plans referred to in the Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (2012/115/EU)) do not form the grounds for charging the fees for commercial use of the environment.

Heat Segment

Enea Wytwarzanie in the Heat Segment (Białystok Heat and Power Plant) has implemented the following investments until now which affect the volume of emissions:

- conversion of coal-fired OP-140 boiler No. 5 to biomass fluidised bed OFB-105
- conversion of coal-fired OP-140 boiler No. 6 to biomass fluidised bed OFB-105
- the SCR installation on OFB-105 boilers No. 5 and 6
- the SCR installation on OP-230 boilers No. 7 and 8
- heat recovery system on K6 boiler
- the FGD installation on OP-230 boilers No. 7 and 8.

For 2019, the upgrade of the electro filter on OP-230 boiler No. 8 is planned.



Investment operations implemented in order to meet the requirements of Directive 2010/75/UE on industrial emissions (IED) – Białystok Heat and Power Plant

Boiler	Current heat output [MW]	SCR installation (as of 2016 compliant with IED < 200 mg/Nm^3)				FGD installation (as of 2016 compliant with < 200 mg/Nm^3)				Dust (compliant with IED < 20 mg/Nm^3)			
		2013	2014	2015	2016	2016	2017	2018	2019	2016	2017	2018	2019
K5	75	✔											
K6	75	✔											
K7	165			✔			✔						
K8	165			✔			✔						✔

Issues regarding Mining Area – LW Bogdanka:

Air protection:

- LW Bogdanka SA does not have any arranged emitter emitting dust and gases to the air
- A non-arranged emitter is the extraction waste neutralisation plant at Bogdanka which may be the source of dusting on dry and windy days
- Fugitive air emissions come from combustion of fuels in combustion engines used in the company and from combustion processes
- rock mass drainage in the area of mine workings
- controlled drainage of Jurassic aquifers
- re-use of water for fire protection and process purposes
- pumping water to the surface
- surface re-use of mine water (Zakład Przeróbki Mechanicznej Węgla, Łęczyńska Energetyka sp. z o.o. – under SUW)
- mine water retention in a surface reservoir and sedimentation tank for the purpose of suspended solids reduction
- water discharge from the reservoir through a system of drainage ditches and Rów Żelazny watercourse to Świnka river in the amount of approx. 14,622 m_3/day
- mine waters are characterised by the total contents of chlorides and sulphates in the amount of 1 009 mg/dm_3
- in 2017, the total increase in mining waste was 5,693.7 thousand tonnes
- approx. 47% of waste was subject to recycling and management. The amount of recycled waste, i.e., waste used for industrial waste land reclamation, road and yard hardening, cement production at “Ożarów” Cement Production Plant, and for other purposes, was 2,682.7 thousand tonnes
- 98% of waste is used to perform reclamation of industrial waste land. Reclamation consists in restoring the original relief of such land through filling sand pits with mining waste, covering them with a layer of soil and its agricultural or forest development
- other extraction waste (3,011.0 thousand tonnes) is stored in the extraction waste neutralisation facility in Bogdanka
- LW Bogdanka SA manages other industrial waste: it releases to the licenced entities any waste which is capable of reuse (timber, used oils, scrap metal, scrap conveyor belts) or intended for neutralisation (used light sources, glue and paint packaging, etc.)
- No reclamation works were performed on industrial waste land areas in 2017
- The upkeep works regarding the organised green areas, waste neutralisation facility, and industrial

waste land reclaimed in the preceding years in the area of Bogdanka, Nadrybie and Stefanów Fields and the railway facilities in Zawadów are being performed on an ongoing basis

- The impact of mining operation conducted in 2017 on the surface was manifested, just as in the previous years, mainly through the expansion of the surface area of the impact exerted so far
- In the area of Bogdanka and Nadrybie Wieś villages, the maximum subsidence remains at the level of 5.00 m in the central part of the subsidence trough
- Just as it the previous years, the damage to buildings in 2017 was caused mainly in rural buildings and was repaired on an ongoing basis; no such reported damage to buildings caused any hazard to users
- In 2017, the aggregate cost of redressing the damage caused by mining operation amounted to approx. PLN 3.1m
- Mining activity involves the payment of operation fee, the fee for using the natural environment, and various other costs related to:
  mining waste management,
  reclamation of industrial waste land,
  environmental monitoring,
  preparing the land surveys and documentation necessary for the proper operation of the facility,
- the operation fees are paid every 6 months to the bank accounts of the municipalities where the operation is carried on (60%) and to the National Environmental Protection and Water Management Fund (NFOŚiGW) (40%). The licence fee is the income of NFOŚiGW in 40% and the income of mining municipalities in 60%
- LW Bogdanka SA meets the standards in the field of environmental protection and was not required to pay any penalties for violating the conditions of using the environment set out in applicable legal regulations in 2017