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Utility easement issues and transmission infrastructure in Poland

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Abstract

The level of social development depends on the development of the technical infrastructure in a given region or country. Each community strives for its own progress and constructs increasingly larger numbers of enterprises and houses and is open to new technologies, not only for industrial development, but also at the average household level. Enterprises and local communities put forward growing demands for various types of energy (electricity, heating or mechanical) and needs concerning water supply and sewage disposal, as well as the need for constant communication and monitoring. Enjoyment of these types of "benefits" is ensured by various types of transmission and distribution networks, such as: power lines, telecommunications lines, gas pipelines, oil pipelines, heat pipelines, waterworks, sewerage systems and others. An increase in demand for services related to the supply of utilities requires maintenance and modernization of the existing networks and construction of new lines, which are important not only from the local, regional and national point of view, but also from the international (neighbourhood cooperation) or European perspective (supply for EU countries). A general demand for utilities involves the interference of linear infrastructure with the ownership of other entities which voluntarily or under compulsion burden their own properties for the placement of required transmission or distribution systems. Due to the linear character of transmission and distribution networks, properties owned by third parties are encumbered in a random manner. Such burdens many result in a decrease in the value of the properties encumbered as a result of limitations in the use of the property. In a market economy, owners of technical infrastructure should have a legal title to use encumbered, third-parties properties. In Poland, such a legal title is ensured, among others, by the utility easement right, which is classified as a limited property right and regulated in the Civil Code Act. This study analyses the length of the main transmission networks in Poland, investment plans, and discusses the general principles for determining the value of utility easement and differences between the strip of limited use of the property and the strip necessary to use the linear infrastructure (technical belt of the network).

Keywords*:* technical infrastructure; transmission; damage; utility easement.

Nomenclature

W_I	market value of the property or its part (plot) not encumbered with technical infrastructure devices (PLN)
W_I^*	market value of the property or its part (plot) after taking into account the existing technical infrastructure devices (PLN)
W_{II}	market value of the property or its part (plot) encumbered with existing technical infrastructure devices, after establishing utility easement, settled as a one-off payment (PLN)
W_1	market value of a comparable unit of agricultural property not encumbered with technical infrastructure (PLN/m^2)
W_1*	market value of a comparable unit of property encumbered with the existing technical infrastructure devices (PLN/m^2)
W_R	unit value of the property of possible intended use after encumbering the plot with technical infrastructure devices (PLN/m^2)
W_{SP}	value of utility easement related to technical infrastructure (PLN)
S_{ZF}	value of damage related to the change in intended use of the property (PLN)
S_{OGR}	value of damage resulting from limitation in land use, including a ban on tree planting on a specific land strip (PLN)
S_{ZFogr}	unit value of damage in relation to the area of limitations – P_{ZF} (PLN/m^2)
S_{PW}	value of damage related to permanent exclusion of the land from use (PLN)

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O_{WL}	value of damage corresponding to a reduction in the value of the property as a result of locating infrastructure devices within the space boundaries of the property (planning damage) and limitations in land use, $O_{WL} = S_{ZF} + S_{OGR}$ (PLN)
O	total value of infrastructure damage corresponding to a reduction in the value of property for limitations resulting from the placement of technical infrastructure (PLN)
P_{dz}	area of the encumbered property (plot)
P_{ZF}	area of limitations related to the ban on construction
P_{PE}	area of the technical strip on which limitations in the use of land exist, including a ban on tree planting
Pw	area excluded from use under surface infrastructure devices
P_{SP}	area of the land for which utility easement should be established
S	ratio describing the reduction in the value of the property resulting from technical infrastructure undesirable for the owner or the perpetual usufruct of the property
Sd	ratio describing the reduction in the value of the property, determined on the basis of the analysis of the local market and, in the absence of market data, assumed from the range between 0.15 and 0.20, inclusively, pursuant to tentative interpretation note TNI V.8 [17]
λ	ratio describing the reduction in the value of the property determined by the property appraiser, depending on the scale of limitations in development of a potentially encumbered plot
k	percentage share of the infrastructure owner in use of the property (index of the co-use of the property)
L_1	number of surface elements included into the first group, within the boundaries of the property (plot)
L_2	number of surface elements included into the second group (other group of surface obstacles) within the boundaries of the property (plot)
$W_{SŁ1}$	unit market value of damage determined for the first group of surface elements
$W_{SŁ2}$	unit market value of damage determined for the second group of surface elements

1. Basic information concerning main transmission networks in Poland

The main transmission networks include power and telecommunications networks, gas, oil and fuel pipelines. As regards cable networks, telecommunications networks are the dominant group, and among pipelines – gas pipes. Table 1 presents the main operators of transmission lines and the length of their networks. The total length of the network provided in the table (168,000 km) is not the final value, since the list does not include copper telecommunications networks and networks owned by other minor operators.

Table 1. Summary of main transmission networks in Poland

No.	Transmission system operator	Type of transferred media	Length line [km]	Type of line facility
1	Polskie Sieci Elektroenergetyczne S.A.	Electricity transfer: alternative current (AC)	13,445	Overhead power lines [50]
		Electricity transfer: direct current (DC)	254	Undersea line: Poland – Sweden [50]
2	Independent telecommunications operators	Data transfer	141,239	Fibre network
Total cable network (overhead and underground)			**154,938**	
3	Operator gazociągów przesyłowych Gaz-System S.A. (Gas Transmission Operator)	Gas transport	10,033	Gas pipelines [42]
	System Gazociągów Tranzytowych SGT EuRoPol GAZ s.a. (Transit Gas Pipeline System)		685	Transit gas pipeline [39]
4	Przedsiębiorstwo Eksploatacji Rurociągów Naftowych "Przyjaźń" S. A. ("Druzhba" Oil Pipeline Operation Company)	Oil transport	1,766	Oil pipelines
		Fuel transport	612	Fuel pipelines
Total pipeline network (underground)			**13,096**	
Total			168,034	

It should be emphasized that a part of the infrastructure was constructed several decades ago and requires repairs or modernization. There is also a high demand for the construction of new networks. For this reason, regulation of the legal status concerning devices located within the boundaries of third-party properties is a very important factor in the current Polish market economy. To demonstrate the scale of the problem, selected transmission infrastructure networks are briefly characterized below and distribution networks are described in a further point, without taking account service lines for connections to the properties.

1.1. Power grids

Polskie Sieci Elektroenergetyczne S.A., a joint-stock company, providing electricity transmission services and ensuring the security of operation of the national power system, is the transmission operator for extreme voltage power lines. The company operates through its five regional companies: PSE – Centrum S.A., PSE – Północ S.A., PSE – Południe S.A., PSE – Wschód S.A. and PSE – Zachód S.A. The operator owns a transmission network, consisting of: one line of 750 kV, 114 km long, 77 lines of 400 kV, with a total length of 5,383 km, 167 lines of 220 kV and the total length of 7,948 km, 101 extreme voltage stations (NN) and one 254 km direct current (DC) submerged line between Poland and Sweden [50].

Since PSE is planning to expand the transmission network, a development plan was prepared to satisfy the present and future demands for electricity for 2010 – 2025 [13]. Currently, the priority is given to the construction of the Poland-Lithuania power bridge, which is an important element of the trans-European power network. For this reason, the investment is supported by the European Union (Decision 1364/2006/EC). The project is related to the development of the transmission network in north-eastern Poland. Under the investment plans in Poland, the company intents to construct 4,687 km of new 400 kV current circuits and 267 km of 220 kV current circuits, and to modernize 806 km of 400 kV and 1,188 km of 220 kV current circuits.

1.2. Telecommunications networks

In recent years, the optical fibre network in Poland has been dynamically growing. Copper lines are gradually being replaced by modern optical fibre lines. Two main groups of telecommunications operators can be distinguished in the market: public and business operators. The group of public operators consist of the following companies: Orange Polska S.A., Exatel SA, Netia S.A. and TK Telekom Sp z o.o. having at their disposal the total length of optical fibre lines of about 100,000 km. The second group includes: GTS Poland, ATM S.A. and HAWE Telekom Sp. z o.o., which provide business and operator services, addressed to specific recipients and Poznańskie Centrum Superkomputerowo-Sieciowe, which manages the PIONIER academic network. The length of the network belonging to the other groups of operators is about 40,000 km (Table 2).

Table 2. Summary of the length of telecommunications optical fibre transmission networks of the main operators in Poland

Type of transferred media	Operator of the transmission system	Line length without service lines [km]	Name of the infrastructure facility
Data transfer	Orange Polska S.A. Telecommunications operator	82,000	Orange optical fibre network [33, 37]
	Netia SA Telecommunications operator	14,000	Netia Group optical fibre network [34]
	TK Telekom Sp z o.o. Railway telecommunications and public telecommunications operator	6,000	TK Telekom optical fibre network, cable network [33, 54]
	Public operators together	**102,000**	
	Exatel SA Polish telecommunications operator	20,000	AXATEL backbone network [33, 37, 40]
	Poznań Supercomputing and Networking Center Polish academic network	5,739	PIONIER – Polish broadband optical fibre academic network [33, 37, 48]
	GTS Poland Operator of wholesale telecommunications services	5,000	Regional network and metropolitan networks GTS [33, 44]
	ATM S.A. Telecommunications for business	4,500	ATMAN network [33, 38]
	HAWE Telekom Sp. z o.o. Operator providing services only for other operators	4,000	Polish Optical fibre Network HAWE [33, 45]
	Other operators together	**39,239**	
Total		141,239	

Telecommunications companies have a quite large number of connections and are constantly increasing this number. To ensure broad access to the Internet to the possible largest group of society, the construction of broadband network in Poland started under the Act on Supporting the Development of Telecommunications Services and Networks of 7 May 2010 [25] and was based on EU funds (Regional Operational Programmes and Operational Programme Development of Eastern Poland). The developed projects assume that about 27,000 km of optical fibre networks will be constructed under the above-mentioned special purpose act.

In January 2014, the Ministry of Administration and Digitization announced the National Broadband Plan [15], the aim of which is to ensure public broadband access to the Internet. Every year, as part of stock taking activities, the Office of

Electronic Communications (UKE) prepares maps presenting the coverage of the existing telecommunications infrastructure and public telecommunications networks pursuant to the Regulation of the Minister of the Interior and Administration of 28 January 2011 [29]. As results from the requirements for EU projects, all projects must be completed by the end of 2015, at the latest. 10,000 km of optical fibre lines and 1,000 backbone distribution nodes are to be created under the project concerning the Broadband Network of Eastern Poland (which concerns the provinces of Lublin, Podkarpacie, Podlasie, Świętokrzyskie and Warmia and Mazury) [10]. Until present, about 2,000 km of network have been built in Poland [15].

1.3. Gas networks

Transfer gas pipelines make up one of the basic networks of line infrastructure. The operator of the transmission system is a joint-stock company, Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A. [42]. Six field branches deal with gas transmission network and the operation of gas-system facilities: Branch Offices in Gdańsk, Poznań, Rembelszczyzna, Świerklany, Tarnów and Wrocław. As results from the scheme presented, the north-east part of Poland is deprived of a gas transmission network, which translates into a partial investment exclusion of this region. The total length of the transmission gas pipelines is more than 10,000 km (Table 1). These are gas pipes of diameters from DN 50 to DN 1000 and pressure between 1.6 MPa and 8.4 MPa. The company owns 887 gas stations, 14 gas compressor stations and 58 pipeline nodes, and underground gas storage facilities.

Additionally, the Yamal–Europe transit gas pipeline runs through Poland. This gas pipeline runs from the Yamal peninsula in Russia, through Belarus and Poland to Western Europe. The owner of the Polish part of the gas pipe is System Gazociągów Tranzytowych EuRoPol GAZ s.a. (Transit Gas Pipeline System), but operation functions are fulfilled by a joint-stock company, GAZ-SYSTEM S.A. The length of the DN 1400 gas pipeline is about 685 km. Five gas compressor stations, 33 shut-off and relief valve systems and seven cathodic protection stations are located along the network [39].

GAZ-System carries out numerous infrastructural industry investments. In 2011, a Włocławek – Gdynia gas pipeline with a length of 252 km was constructed, a 22 km cross-border (intersystem) connection with the Czech Republic in the area of Cieszyn, and a gas compressor station in Jarosław and Goleniów were completed. Also, a transmission structure in Lasów, at the Polish-German border was expanded. 100 km of gas pipelines were constructed under this project, including the 65.7 km long Jeleniów – Dziwiszów gas pipeline, completed in 2012. In order to diversify gas supplies, construction of a marine terminal for handling liquefied natural gas in Świnoujście, together with a network of transmission gas pipelines has been started.

The implementation of basic investment tasks is facilitated under the Act on the Investments in the Liquefied Natural Gas Re-Gasification Terminal in Świnoujście of 24 April 2009 [24]. According to the assumptions of the above-mentioned Act, by the end of 2014, the company will construct over 1,000 km of transmission gas pipelines. After constructing the LNG terminal in Świnoujście, creation of the North-South Gas Corridor is planned, linking the terminal in Świnoujście with the planned LNG terminal in Croatia. Analyses are also being carried out concerning the construction of a gas pipeline connecting Poland with Lithuania and the construction of the Baltic Pipe transmission line to connect the Polish gas system with the Danish system. The planned gas pipeline will cross the underwater gas pipe connecting Russia with Germany, Nord Stream, constructed in 2011–2012.

1.4. Oil pipes

For strategic reasons, pipelines for transferring oil and liquid fuel (petrol, diesel oil and fuel oil) are also important for the economy. The operator of the transmission network is Przedsiębiorstwo Eksploatacji Rurociągów Naftowych "Przyjaźń" S.A. [46]. The system of pipelines used for the transport of oil consists of three sectors of pipes.

- The East Section combines the Tank Base in Adamowo, situated at the border with Belarus, with the Raw Material Base in Płock, and is composed of three pipes of about 233 km each.
- The West Section links the Raw Material Base in Płock with the oil base in Schwedt in Germany. Two gas pipelines exist in this section, with lengths of about 415 km each.
- The Pomerania Section linking the Raw Material Base in Płock with the Handling Base in Gdańsk through a two-way, with a length of about 236 km.

Additionally, there are short complementary pipelines in service:

- The section between the Raw Material Base near Płock and PKN Orlen, made of three pipelines of about 13 km each.
- The section between the North Port – Gdańsk Base and Lotos refinery, composed of three pipelines with the following lengths: 8 km (two pipes) and 9 km.

Apart from the above-mentioned oil pipelines, the company has some fuel pipelines. The transfer of liquid fuels is carried out along the following routes:

- Płock – Nowa Wieś Wielka by a pipeline, with a length of about 124 km, and further on at the section of Nowa Wieś Wielka – Rejowiec by a pipeline with a length of about 80 km;
- Płock – Mościska –Emilianów by a pipeline with a length of about 180 km + 39 km;
- Płock – Koluszki by a pipeline with a length of about 108 km, and Koluszki – Boronów by a 153 km pipeline .

The total length of fuel pipelines is 612 km. Since 2002, PERN "Przyjaźń" S.A. has been also administering pipelines belonging to PKN ORLEN S.A.

The company is developing and carrying out new investments. In 2010, construction of the second stage of the III East Section of the "Druzhba" pipeline was completed, and in 2011, two oil storage tanks with a capacity of 100,000 m^3 each were commissioned in Adamów. The construction of two similar tanks in Płock was also started. The oil pipeline along the route Odessa – Brody – Płock and further on to Gdańsk has been planned for years, as a part of the Euro-Asian Oil transportation Corridor (EAOTC). In the future, the planned pipeline is to be used for transporting oil from the Caspian Sea region to the Baltic Sea, which includes Poland, Germany and other European countries.

2. The structure of main distribution networks in Poland

The basic distribution networks include: low voltage (0.4 kV – 1kV), medium voltage (3kV – 60 kV, mainly 15 kV) and high voltage (110 kV) power grids, low pressure (up to 10 kPa), medium pressure (above 10 kPa to 0.5 MPa) and medium increased pressure (above 0.5 MPa to 1.6 MPa) gas networks, heat pipelines, sewerage systems and telecommunications access lines.

Table 3. Summary of main operators of power and gas distribution networks, with network lengths

No.	Type of transmitted media	Operator of the transmission system	Line length without connections [km]	Example of surface infrastructure facilities	Approximate number of facilities
1	Gas transmission	**Polska Spółka Gazownictwa Sp. z o.o. in which:** [47, 51]	**119,145**		
		Gdańsk Branch	10,246	Gas pressure reducing and metering stations	663
		Warsaw Branch	19,208	Medium pressure stations	296
				High pressure stations	152
		Tarnów Branch	45,005	Gas pressure reducing and metering stations	no data
		Zabrze Branch	20,961	Medium pressure stations	547
				High pressure stations	203
		Wrocław Branch	7,809	Gas pressure reducing and metering stations	no data
		Poznań Branch	15,916	Gas pressure reducing and metering stations	no data
2	Electricity transmission	ENEA Operator Sp. z o.o. [41]	109,000	Power stations	35,000
		ENERGA-Operator S.A. [35]	193,000	MV/LV power stations	58,000
				Main power supply points	267
		PGE Dystrybucja S.A. [43]	227,204	Power stations	no data
		RWE Stoen Operator Sp. z o.o. [52]	13,921	15 kV power stations	5,998
				110 kV power stations	36
				220 kV power stations	1
		TAURON Dystrybucja S.A. [53]	223,700	Power stations	no data
		Total electrical distribution:	**766,825**		
Total			885,970		

Table 3 presents the distributions of power and gas networks, providing the length of distribution lines without connection lines. It should be emphasized that currently in Poland there are 161 operators of power distribution systems and 41 operators of gas distribution systems [32]. The major electricity distributors include: Enea Operator Sp. z o.o., Energa-Operator S.A., Tauron Dystrybucja S.A., PGE Dystrybucja S.A. and RWE Stoen Operator Sp. z o.o. In the gas distribution sector, the largest Polish operator is Polska Spółka Gazownictwa Sp. z o.o., which operates through its six branches: in Gdańsk, Poznań, Warszawa, Wrocław, Tarnów and Zabrze. Until 1 July 2013, the above-mentioned branches were separate gas companies, derived from one group of companies: Polskie Górnictwo Naftowe i Gazownictwo SA.

As results from the statistical data of the Polish Central Statistical Office (GUS) for 2012 [11]:

- the length of the gas network was 137,371 km, in which 659 km was a transmission network and 117,713 km was a distribution network;
- the length of the heat system line was 23,886 km, in which 15,963 km was a transmission network and 7,923 km were service lines for connection of buildings and other facilities;
- the length of the gas network was 300,282 km, in which 180 km was a transmission network and 283,102 km was a distribution network;
- the length of the combined sewage and domestic waste water system was 125,581 km.

As results from the data presented in Table 3, Polska Spółka Gazownictwa has a longer distribution network (current data) than in information provided by GUS (data for 2012), while the transmission network provided by GUS is almost twice longer than the network presented in Table 1. The difference in length results in both cases from the method of classifying gas pipelines applied by GUS (up to 0.5 MPa and above 0.5 MPa) and a large number of gas network operators in the market that were not taken into consideration in table summaries. The analysis does not include telecommunication networks.

3. General principles for determining the utility easement value

As results from the data provided in Points 1 and 2, the length of infrastructure networks of various kinds and types, owned by various operators, is measured in thousands of kilometres. Although dozens of entities owning transmission and distribution infrastructure operate in the market, dominant entities exist in each industry sector, which has been described above. Due to the linear nature of the technical infrastructure described, it usually passes through areas owned by other entities. For this reason, a market economy should have clear rules for using the space of third-party properties by owners of technical infrastructure. Linear facilities, with regard to the type and kind of the technical infrastructure, can be located underground, on the ground surface (e.g. some municipal heating networks) or above-ground (overhead power lines, as well as some telecommunication lines) of encumbered properties. According to the legal status in Poland, a legal title providing authorization to use third-party properties can be obtained on the basis of:

- established utility easement (easement appurtenant could be established in the past),
- an administrative decision,
- a lease agreement,
- a court decision, or
- land purchase.

In Poland, the right of utility easement (limited property right) entered into force on 3 August 2008 under amendment of the Civil Code Act (CC) [19]. In Art. 305^1 – 305^4 CC, the Act specifies the issue of utility easement. Art. 305^1 and 305^2 provide that utility easement is established for linear devices specified in Art. 49 §1 (devices used for supplying and disposal of liquids, steam, gas, electricity and other similar devices) if it is required for the correct use of infrastructure devices within the determined scope in the property encumbered. Art. 305^2 emphasizes that if the owner of the property or the entrepreneur-owner of the infrastructure refuses to establish the easement, then the other party may demand its establishment against remuneration. The remuneration for the use of the property is a typical income subject to taxation. In order to avoid problems with the reservation of financial means for current payments of amounts due in individual years in which the property is used and the costs of possible valuation of due claims, the owners of the infrastructure prefer remuneration payment on a one-off basis.

The problem related to establishment of one-off remuneration and, in exceptional cases, a recurring, e.g. annual or monthly fee [1, 2], results from the lack of statutory procedures for calculating this benefit. The commonly applied formula for determining the value of the right of utility easement, reflecting a one-off fee, is not complicated, since it is limited to:

- establishing the area of utility easement,
- determining the degree of the co-use of the commonly used space, except for the land occupied by infrastructure devices (e.g. by poles, chambers, cabinets and other surface devices of this type), where the owner of the infrastructure uses 100% of the occupied land,
- establishing the market rental rate for using similar devices and similarly encumbered properties (a possible situation, but very unlikely for establishing) or determining the market value of the property, assuming that with a long-term use of the encumbered property, the sum of rent for using the occupied space will correspond to the value of the land occupied.

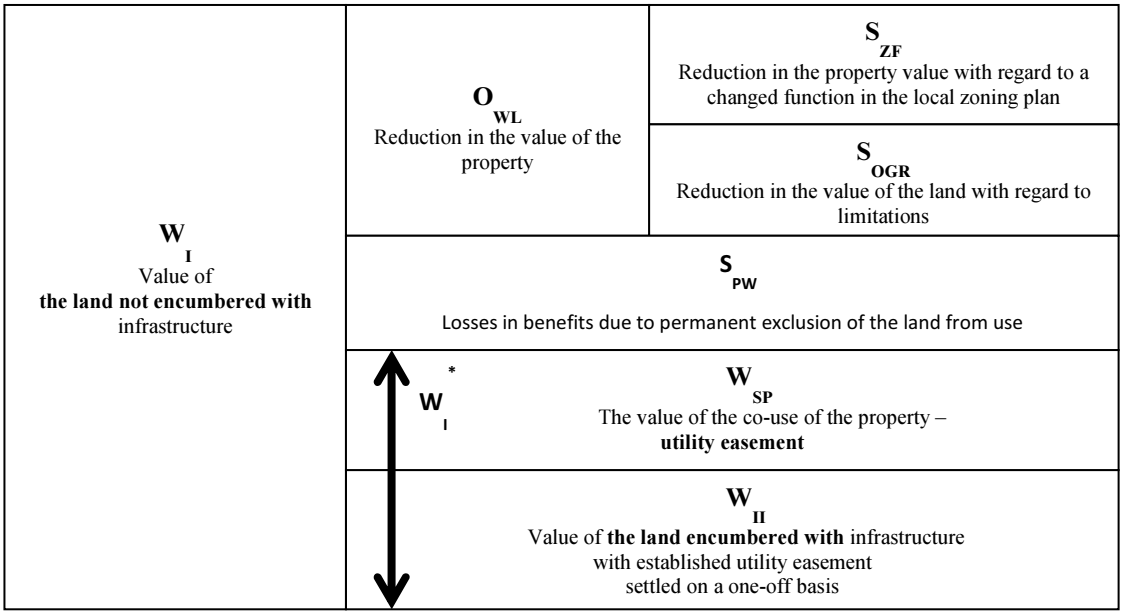

Fig. 1. A scheme illustrating a change in the value of the property as a result of locating and operating a transmission device within the space of the property

The general procedure for establishing the value of the utility easement based on the market value of the encumbered property [3–9, 12] results from formula (1) and complementary formulas, necessary to determine the unit value of the property encumbered with an unwanted infrastructure.

$$W_{SP} = P_{SP} * k * W_1^* \tag{1}$$

$$W_1^* = W_1 * (1 - S) \tag{2}$$

As results from formula (2), the unit value of the property (plot) encumbered with the linear infrastructure should be lower than the value of the property not encumbered, by the value of damage caused by the infrastructure. A loss in the value of the land can be expressed by a property value reduction ratio (S). It should be emphasized that an infrastructure loss will occur at the moment of establishing the location of infrastructure within a given area (planning loss) and at the moment of constructing infrastructure devices, including surface items (a loss related to limitation in land use and exclusion of land from use). Losses related to construction of infrastructure are compensated after the completion of investment and are not taken into consideration in the case under analysis. A formula for determining the property value reduction ratio is expressed by the ratio of the value of infrastructure losses (O) to the value of the encumbered property (plot).

$$S = \frac{O}{W_1 * P_{dz}} = \frac{S_{ZF} + S_{OGR} + S_{PW}}{W_1 * P_{dz}} \tag{3}$$

The value of a planning loss related to the ban or limitations possible development of the property depends on the size (scale) of a negative effect of the infrastructure on the property space (P_{ZF}), including the manner of crossing the plot with an infrastructure line, and the unit value of the land (W_R) that property market participants will be eager to pay for the encumbered land (property).

$$S_{ZF} = P_{dz} * (W_1 - W_R) * \lambda \tag{4}$$

$$\lambda = \frac{P_{ZF}}{P_{dz}} \tag{5}$$

The value of a loss related to limitations in land use, including a ban on tree planting, should be calculated on the value of the land, reduced by the unit value of the planning loss S_{ZFogr}. If the planning loss S_{ZF} does not cover the entire plot, then the reduction in the land value occurs in the strip of planning limitations – P_{ZF}. A loss related to limitations in land use occurs in the network operational strip – P_{PE}, which is necessary for the infrastructure owner for using the network in a non-disturbed manner, and which is often narrower than the P_{ZF} strip (which concerns mainly transmission networks, although not exclusively). Since the width of the operational strip P_{PE} should be established by the technical infrastructure owner so that he could perform necessary maintenance and operating work along the infrastructure line, the width of this strip should allow transit along the network. For this reason, utility easement is generally established in the network operating strip P_{PE}, and consequently, it can be claimed that $P_{PE} = P_{SP}$. It is disputable to reduce the area of the operating strip by the area permanently excluded from use under surface infrastructure devices P_W, since despite established compensation for the excluded land, the property owner still incurs tax costs related to ownership of the land.

$$S_{OGR} = S_d * (P_{PE} - P_W) * (W_1 - S_{ZFogr}) \tag{6}$$

$$S_{ZFogr} = W_1 - W_R = \frac{S_{ZF}}{P_{ZF}} \tag{7}$$

The value of a loss related to permanent exclusion of the land from use depends on the number and the type of surface facilities and the market rate for compensation for similar objects.

$$S_{PW} = L_1 * W_{SŁ1} + L_2 * W_{SŁ2} \tag{8}$$

As results from the methodology presented (1, 2), it is quite a difficult task to establish the unit value of the property encumbered with infrastructure devices. In order to reliably establish the value of the encumbered property, the value of a loss related to the existence of the infrastructure within property boundaries should be established (3–8), although it is not the direct aim of valuation. It is erroneous to assume the value of plots not encumbered with the infrastructure for purposes of valuating the utility easement. The value of utility easement should be always the same if it is determined for the same case at the same time, which means that it should be of no importance whether the property owner received compensation for the infrastructure loss, whether the valued easement is related to the primary owner of the plot encumbered or to its new purchaser. It should be assumed that a potential purchaser of the property will pay less for the property encumbered with undesirable infrastructure limiting the enjoyment of the property. For this reason, while determining the utility easement, one cannot add the value of the loss to the remuneration for the use of the property. Since damage occurred in a specific

time in the past, they should be compensated with a one-off compensation, taking into account Art. 118 of the Civil Code [19] providing that material claims are extinguished by prescription.

The best solution would be to establish the value of utility easement on the basis of the differences in the value of the property encumbered with infrastructure devices in relation to the value of property encumbered in a similar way without established utility easement [16], according to the following formula:

$$W_{SP} = W_I^* - W_{II} \tag{9}$$

For the lack of properties for comparison purposes, the application of the above-mentioned formula (9) is not highly feasible and this method is not used in practice. Relations between the value of unencumbered property (W_I), property encumbered with infrastructure and the value of the property after establishing utility easement (W_{II}) are presented in Figure 1.

The Polish legislation has provided an exception and determined general rules for establishing utility easement for the area of Państwowe Gospodarstwo Leśne Lasy Państwowe (State Forests National Forest Holding). Art. 39a of the Forest Act of 28 September 1991 [20] provides that "remuneration for establishing utility easement for the power company dealing with transmission or distribution of electricity shall be established in the amount corresponding to the value of taxes and fees incurred by State Forests from this part of the property, the use of which is limited as a result of its encumbrance with the easement".

4. Principles for establishing the ratio for co-use of properties belonging to another entity

The utility easement strip co-use ratio reflects the share of the easement holder in the use of the property space encumbered with technical infrastructure. The amount of the ratio should depend on the manner in which the property space is occupied. The space may be taken up underground (cables laid in the ground, underground pipelines), on the surface level (poles, cabinets, etc.) or overhead (suspended cables).

In case of occupying underground and overhead space, the property owner may use, to a limited extent, the land under or over which infrastructure cables are located. In such a case, there is co-use of the commonly used property space. If we assume that compensation settled on a one-off basis should be paid for all losses (including limitations) related to the construction and existence of infrastructure devices within the boundaries of the property, then there are no grounds to establish other co-use of the burdened space of the property than by 50% for each of the parties (k = 0.5). Compensation for all limitations in the use of the property, regardless of whether they are low or high, are due, and should be calculated and paid on another basis than utility easement.

In case of occupying the surface space, there is 100% use of the occupied land by the infrastructure owner. In such a situation, the co-use ratio k = 1.

5. Establishing the width of protective strips and strips necessary for operating the infrastructure

Polish legal regulations do not provide principles for establishing the utility easement strips for line infrastructure. This situation provides many interpretation problems. As results from the above-presented formula for calculating the value of utility easement (1), the value of this right is directly proportional to the area of the easement established. Therefore, incorrect determination of the easement strip width and, consequently, of its area, will be reflected in the value of the right established. The problem does not exist in companies with internal guidelines concerning this issue, but there are only a few such companies, with the Gaz-System and the Gdańsk Branch of Polska Spółka Gazownictwa as leaders. In other companies, this case is not regulated and the responsibility is often assigned to property appraisals who establish the value of utility easement. Consequently, ridiculous situations occur, in which a third party (property appraiser) determines for a company that has been dealing with operation of a given network for several dozen years, a strip of land necessary for proper operation of this company. Such procedures lead to huge discrepancies concerning determination of the strip width for which utility easement should be established for the same infrastructure line. Discrepancies result from free interpretation of any of the regulations related to a given infrastructure. It should be emphasized that implementing rules have been established for some types of line infrastructure, in the form of appropriate regulations to the Construction Law Act. These regulations include regulations related to telecommunications lines [26], oil pipelines [27] and gas pipelines [30], while appropriate standards or guidelines are applied for other networks [31]. All of the regulations and standards mentioned above are applied at the stage of designing and constructing appropriate lines of infrastructure, as appropriate minimum distances from various types of area objects must be ensured. In view of the variety of those elements, it is not possible to establish, on the basis of various minimum distances, a strip of land of the same width for purposes related to the establishment of utility easement - unless the widest strip is assumed. As results from practical experience, employees representing infrastructure owners have been introducing, repeatedly, the widest limitation strips into planning studies performed under the Planning and Spatial Management Act of 27 March 2003 [23] or earlier acts. Afterwards, planning information is often used by property appraisers to determine the utility easement area or provides a basis for property owners to claim high remunerations for use of the property. Quite often, such a procedure has been justified by regulations

concerning environmental protection [22, 28]. A sample width of the land strip, with account being taken of the environmental impact of the infrastructure, is presented in Figure 2b.

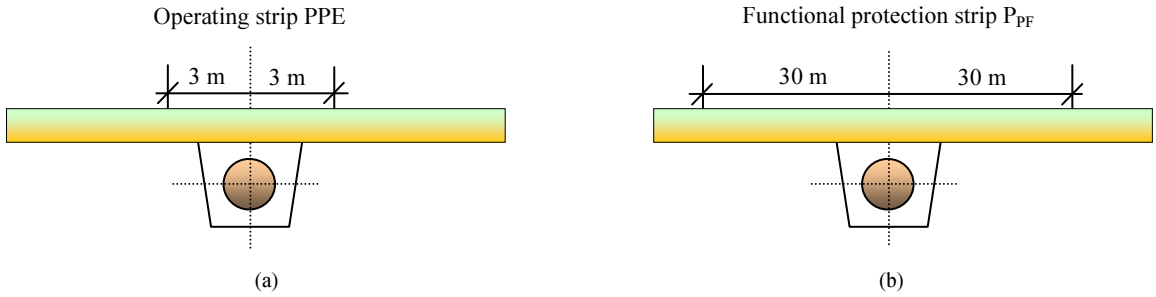

Fig. 2 Scheme of the operating strip and the functional protection strip

Undoubtedly, such wide land strips, in which limitations in use of the property exist, are, or should be, rewarded by appropriate compensation. Limitations created at the moment of the infrastructure construction are present for the entire time of its existence, starting from the moment of its design. However, the width of this strip cannot be regarded as the utility easement strip, since such a wide strip of land is not required for operating the network. The width of the utility easement strip should correspond to the easement range entered into the notarial deed. As a rule, notarial deeds record information concerning the right of way and/or passage along the line of the infrastructure in order to carry out appropriate maintenance works or to enable network repairs.

Taking into account the scope of the utility easement, each network operator should establish principles for determining the width of strips necessary for appropriate use of the infrastructure, and not of the property. Such strips are referred to as network operating strips, and utility easement is established within the boundaries of those strips. An example of operating strip for an underground network is presented in Figure 2a.

6. Administrative decisions

Administrative decisions concerning the technical infrastructure under discussion are issued in the case of:
- acquiring the rights to administer the land for investment purposes if property owners do not express their consent,
- the lack of consent of property owners to perform works related to maintenance or repairs of technical infrastructure located in their area,
- performing investment tasks under special purpose acts restricting the rights of property owners.

In the first and the second case, the problem is solved, respectively, under Art. 124 or 124 b of the Property Management Act of 21 August 1997 [21]. In the third case, special purpose acts concerning line infrastructure are applicable, such as the Act on the Investments in the Liquefied Natural Gas Re-Gasification Terminal in Świnoujście of 24 April 2009 [24] and the Act on Supporting the Development of Telecommunications Services and Networks of 7 May 2010 [25]. If administrative decisions concerning the possibility of using land of another entity in relation to line investment implementation are issued, utility easement is not established for such cases, since the access to the constructed infrastructure is guaranteed by appropriate statutory provisions.

7. Summary

Problems related to determination of the value of utility easement are complex since they involve up to four groups of entities, who have other interests and various knowledge concerning utility easement. The first group of entities include owners and perpetual usufructuaries of the properties, who – wanting to obtain higher remuneration – try to demonstrate limitations in using the encumbered properties, without admitting that for those limitations, they are entitled to compensation for losses suffered and not to remuneration for the use of the property. The second group includes owners of technical infrastructure, who do not have satisfactory knowledge concerning utility easement or standardized principles for determining the strip of land necessary for proper, undisturbed use of the infrastructure owned by them. The third group include property appraisers, who try to establish the width of the strips for owners of technical infrastructure, for whom they determine the value of utility easement and who often, many times groundlessly, include the value of infrastructure losses into the utility easement value, thus overestimating the value of the easement. The third group of entities are lawyers, who provide their services both to the property owners (one subgroup) and to the owners of technical infrastructure (the second sub-group), and who issue decisions in disputable cases (the third sub-group). In Poland, since opinions concerning the subject of utility easement among lawyers and property appraisers are divided, the subject of utility easement is still widely-

discussed and the knowledge of this subject matter continues to evolve, an example of which is the third draft version of standards for the procedure of establishing the value of this right [14].

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