A story that goes round and round

Report on long lasting disfunctions of tire recycling system in Poland; including how 25,000 wheels end up at illegal landfills

POLISH ASSOCIATION
OF TIRE RECYCLERS

10 key facts showing the state of the recovery and recycling of tires system in Poland

1 Zero

This is the amount of accessible consolidated reports on used tires and the real level of knowledge on the problem scale [1.]. Accessible data from 2021; partly from 2023.

2 Anti-leader

This is Poland's position in European Union in four categories: **the lowest effective level of recycling and recovery of tires** (the first place), **amount of unmanaged tires** (the first place: 60% of all tires' weight in EU), **the most lenient regulations** in the countries of extended producer responsibility (the second place following Greece) and **the lowest real environmental fees** [2.][3.].

3 From+280 000 000 kg to +350 000 000 kg

That is an approximate yearly quantity of tires that appear on the Polish market [2.][4.]. That is triple quantity in weight of all construction materials used to build the Palace of Culture and Science in Warsaw [5.][6.].

4 +400 000 000 kg

That is approximate yearly tire recycling capability for companies being associate members of the Polish Association of Tire Recyclers (PATR). The potential of Polish recycling installations allows for management of 100% tires introduced every year into Polish market [7.].

5 Every fourth pneumatic tire and every solid tire "disappear"

after being introduced into Polish market. They are not visible in the system and **no one is responsible for their management**. Therefore, they are neither effectively recovered, nor recycled [2.][6.][8.].

10 key facts showing the state of the system recovery and recycling of tires in Poland

6 17 years of no due consideration

For so long our branch has been trying to adjust the Polish Act covering the recovery and recycling limits to the European Waste Directive. Current limits date back as late as 2007.

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7 One out of a thousand tires sold becomes environmental waste

and has been found by PATR at one of illegal landfills in one of 57 examined municipalities and forestries. The record illegal tire waste dump found at the former airport in Kluczewo (Stargard city) in 2022 consisted of approx. 99 tonnes (equals 10,000 pieces) [9.].

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8 Almost every fourth pneumatic tire introduced into Polish market has been burnt

a total of approx. 50,000 tires is burnt in cement kilns in Poland every year. When delivering them to mechanical recycling +56 000 tonnes of CO_2 equivalent could be saved additionally every year [2.][6.][10.].

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9 Zero

That is the quantity of effectively collected tires in Selective Collection of Municipal Waste Points (PSZOKs) and treated by Polish courts as municipal waste [11.] which local authorities can include into their effective reach of recycling levels.

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10 250 km

That is the distance of fast roads and motorways that could be made safer, more resistant and noise-damped due to the use of products made of recycled tires [12.]. So far minimum three successful pilotage tests have been conducted [13.][14.][15.].

Four key myths about the tire recovery system and recycling of tires in Poland

MYTH #1 Tire recovery and recycling system in Poland is exemplary for extended producer responsibility implementation.	**FACT #1** The EPR system regarding tires is one of the most lenient ones in Europe. In fact it is effective not due to efforts made by producers and importers, who ought to take entire economic responsibility according to EU legal regulations ("polluter pays"), but thanks to local authorities Selective Collection of Municipal Waste Points (PSZOKs) and tire recyclers (tire collections on their own). And its efficiency equals only 75% of product weight introduced into the market.
MYTH #2 What is the problem? When changing tires, the tire service centre collects used tires for free.	**FACT #2** Free tire collection is limited to authorized services of renowned producers only [16.]. In many places in Poland tires could be left in local Selective Collection of Municipal Waste Points (PSZOKs) but usually only 4 pieces per family/address per year, while a family possesses usually more than one car. In Poland if one wants to change old tires to new ones, it is necessary to pay for leaving them at the tire service centre.
MYTH #3 Illegal landfills? Farmers collect used tires and put them on covers to protect hay/manure.	**FACT #3** Our Association conducted a survey in approx. 100 local municipalities and forestries. Over 40% of them were not able to answer the question if and how many tires in illegal landfils they have as they do not analyze the morphology of illegal landfills. In others over 1,000 tonnes of abandoned tires have been revealed in recent years [9.]. Dumps at farms constitute a separate topic: according to our Association there are about 13,000 tonnes all over Poland (equals approx. 1,300,000 pieces).
MYTH #4 What do you worry about? You make money on that anyway.	**FACT #4** As PATR we are the only organization in Poland that pay attention to the fact that the Polish system does not work properly and is not compliant with EU directive (hierarchy of waste conduct is not maintained). The tire recyclers activity has been for years a low-margin one, as in case of other waste treating companies — and it meets high energy prices, employment costs, lack of „green orders" but that could make a separate report. As a result, due to the lack of legal regulations Polish recyclers make money on recycling used imported tires, realizing recycling for foreign entities.

About PATR, the report and our proposals

Polish Association of Tire Recyclers (PATR) is a non-profit organization established in late 2021 that gathers as its institutional members the majority of Polish companies that possess installations for mechanical tire recycling. **These are small and medium-sized enterprises in majority with Polish capital.** Their recycling capabilities constitute a total of approx. 400,000 tonnes of tires per year [7.]. The aim of Association members is to close the tire life-cycle in accordance with circular economy objectives; to use tires' potential as the source of secondary raw materials; to eliminate tire waste from illegal landfills; to limit wasting of raw materials (deriving from non-renewable resources) by burning them.

Direct reason to create the report has been the scale of Polish tire recovery and recycling disfunction and myths on its "perfect" functioning, which we try to reveal in the report.

The following proposals constitute our reaction for the above mentioned system disfunctions:

TIRE RECYCLING	RECYCLATES UTILIZATION
(P1) to raise statutory recovery and recycling minimal levels (to 100% and 50% respectively); **(P2)** to include solid tires into extended producer responsibility system; **(P3)** to support education, logistics and incentive system for small and medium tire service facilities; **(P4)** to tighten the end-life tire (ELT) recovery and recycling system in regards to waste database system (BDO) with the change in DPR documents that confirm packaging waste recycling (R1 process is not material recovery!); **(P5)** to respect the hierarchy of waste handling on the basis of resource saving, low emissions and energy saving criteria; **(P6)** to introduce problem monitoring through making data bases creation and integration more systematic.	We opt for changes that will be coordinated with the works of the European Commission and the European Parliament in the scope of: **(P7)** introduction of environmental aspect duty in public orders (the use of recyclats, among others); **(P8)** introduction of the recyclats use in house construction and engineering works as a rule, particularly in road construction, **(P9)** to establish targeted support measures for innovations in the circular economy, particularly in regards to tire recycling; **(P10)** to introduce a dedicated regulation in regards to circular economy duties and to support Polish participation in Ecodesign Forum.

What a tire is and what materials could be obtained of it? [17.][18.]

Composition:

- 21,2-37,1%: natural rubber
- 10,0-24,5%: synthetic rubber
- 18,9-22,3%: carbon black
- 10,8-21,1%: steel wire
- 7,2-8,7%: antioxidants
- 1,3-7,7%: silica
- 0,8-4,4%: process oil
- 0,2-3,7%: textile fibres
- Cross-linking system, catalysts, other

Application after being used:

- Retreading (and reusage),
- In civil and road engineering (e.g. retention walls),
- **Material recycling e.g. asphalt component (to improve product life and adhesion), used for tire reproduction (rising trend), sport surfaces (falling trend due to EU regulation on microplastics), anti-vibration sleepers and overlays in railroads and roads construction, industrial, household and gymmats, acoustic and termal insulations, rubber accessories, semi-permeable pipes of drainage and irrigation systems, materials for oil, fuel and black carbon production,**
- Energy recovery (combustion of alternative fuel, mainly in cement kilns).

10-15% That is the initial weight loss of a tire during its exploitation [18.].

Legal regulations

There are four main legal acts in Poland in regards to used tires.
The first of them is the Act on Waste from 14th December 2012. It constitutes the basis for the whole waste sector. It introduces definitions and the hierarchy of waste management. It bans to store tires in landfills. It should introduce the EU directive on waste (2008/98/WE) into Polish legal system.

According to it tire recycling ought to be always prior to recovery. According to the EU directive no. 2018/851/UE (art. 10. sec. 4) Poland ought to adapt measures which counteract combustion of waste collected selectively, including tires. These rules are not implemented into Polish regulations on used tires.

The second one is the so-called "Act on Products", that is the act from 11th May 2001 on enterpreneurs' duties in regards to management of some waste and on product fee. It introduces extended producer responsibility. It means that producers and importers of tires, among others, are obliged to achieve certain level of product recovery and recycling compared to the amounts introduced into the market. They achieve these aims either on their own, or with the help of recovery organizations. As the system requires recovery and recycling of „wastes of the same kind" like these generated from products introduced by the producer/importer to the market, in fact the producer/importer can fulfill the duty through recovery and recycling of competitors' products. Moreover, fulfilling the duty by recycling is at the same time fulfilling the duty of recovery. Failure to fulfill the obligation results in product fee duty in the amount of 2.20 PLN per kg of new tires.

Despite the intention declared with the reform to raise the limit to 100% for recovery and 20% for recycling, respectively [19.], the required level for pneumatic tires is still 75% for recovery and 15% for recycling are practicly frozen since 2007 in Poland. Increasingly more popular solid tires are not covered by the system.

The remaining two acts are the Act on Maintaining Cleanness and Order in Municipalities from 13th September 1996 and the regulation of the Climate and Environment Minister from 3rd August 2021, which concerns level calculation for municipal waste to be reused and recycled.

The prior Act among others defines tires as municipal waste and obliges municipalities to collect them (it was definitely confirmed by the sentence of the Supreme Administrative Court III OSK 192/23)[11.]. Nevertheless, the second Act does not allow municipalities to include tire recovery and recycling into realisation of duties to prepare municipal waste for reuse and recykling.

Disfunction 1:
Producers and importers of tires do not bear responsibility for all products introduced by them into the market, as required by the EU laws (selective responsibility)

Poland has legally accepted almost the lowest level of tire recovery and recycling among the examined EU member states [3.]. Lower level has been established only in Greece (65%). In Spain minimal tire recovery equals 100%; at least 80% has to be recycled and 20% energetically recovered. Similarly in Slovakia, where minimal recycling level is 75% and recovery - 24%.

In Poland actual recovery in 2019 and 2021 equalled 79% and 74.7%, respectively, while recycling level was 47% and 44.5% [2.]. At is also one of the lowest results among examined EU member states. Leaders of tire recovery are Portugal, France and Spain; in 2019 and 2021 they recovered over 100%. The highest recycling level is implemented in Belgium.

Poland has only 8% shares in European tire market but it is responsible for 60% of non-recovered and non-recycled tires in all EU [2.].

Legally established low levels result in the following way: firstly, the **limits are executed mostly neither by producers, nor recovery organizations but by municipalities and tire recyclers, who organize the process themselves**. Secondly, low legal level results in Polish basic recovery/recycling fee for importers/producers being **one of the lowest effective basic fees in Europe**. Official product fine (2.20 PLN/kg) for not implementing the obligation is, in fact, not executed.

Current status does not implement the rule indicated in art. 14 of waste directive 2008/98/WE, which states that waste management costs, including necessary infrastructure and its operation, are borne either by the waste producer, or current/previous waste owner. Current obligatory recycling (15%) and recovery (75%) levels do not have any economic and technical grounds.

The situation is clearly visible in the Table below [3.]:

Disfunction 1:

Producers and importers of tires do not bear responsibility for all products introduced by them into the market, as required by the EU laws (selective responsibility)

Country	Key company responsible for collection of tires [20.]	Tires placed on the market [in tons] [2.]	Basic fee (Feb.2024)	Recovery statutory level	Effective recovery 2021 [2.]	Effective recycling 2021 [2.]
Poland	Centrum Utylizacji Opon S.A.	252 600	**0.69 EUR/tire[A]**	**75%**	**74,7%**	**44,5%**
Belgium	Recytire	89 531	from 1.93 to 3.76 EUR per tire [21.]	(Wallonia) 85% [22.]	100,0%	100,0%
France	Aliapur	369 769	1.40 EUR/tire [25.]	100% [26.]	108,2%	43,4%
Greece	Ecoelastika	52 761	1.15 EUR/tire [27.]	**65% [28.]**	84,4%	66,4%
Spain	Signus	255 613	1.64 EUR / tire [29.]	20%[B][30.]	101,0%	57,0%
The Netherlands	Recybem	84 199	1.70 EUR/tire [31.]	100% [32.]	99,8%	98,1%
Ireland	Circol ELT	33 146	2.80 EUR/tire [33.]	no statutory level [D][34.]	100,1%	87,2%
Portugal	Valorpneu	71 131	1 EUR/tire [35.]	96% [36.]	114,8%	78,0%
Romania	Eco Anvelope	48 691	0.20 EUR/kg [37.]	80% [38.]	100,0%	0,0%
Slovakia	ELTMA	32 377	0.281 EUR/kg [39.]	24% [40.]	91,0%	68,9%
Sweden	Svensk Däckåtervinning	79 308	from 1.76 EUR/tire [41.]	90% [42.]	100,0%	26,0%
Hungary	Ecopneus	370 000	0.22-0.37 EUR/kg [43.]	95% [44.]	92,7%	37,0%

[A] Illustrative conversion rate, assuming an exchange rate of 4.34 PLN/EUR.

[B] Energy recovery only. Consequently, it is recovery other than material recovery and recycling, making the recovery rate in Spain 100%.

[C] Material recovery, recycling.

[D] In Ireland, regulations do not specify minimum levels, but the CIRCOL ELT permit forces scheme participants to achieve certain levels of recovery and recycling, 70% and 30% respectively.

What is tire supply in Poland?

There have been more new cars on Polish roads and consequently the number of imported tires has also been rising. According to Statistics Poland (GUS) data in single year 2021 the total of 354.7 thousand tires were introduced into Polish market. They will have to be disposed of in the future [45.].

year	weight of tires introduced into the Polish market (thousands of tons)
2017	281.1
2018	274.4
2019	345.9
2020	282.4
2021	354.7

The data is not entirely reliable as it does not include tires which have been imported with second-hand cars by natural persons. Only entrepreneurs are obliged to record the weight of tires imported with the car.

Average age of cars imported in 2022 was 13.23 years. Frequently, the age of tires in these cars is similar [46.].

In 2022 about 772,000 second-hand imported cars were registered in Poland, while in 2023 the number was as high as 805,775 [46.]; that equals additional 30-40 thousand tires.

Disfunction 2:
Lack of consistent data on tires in Poland

The key obstacle to examine worn tires in Poland is the lack of current data. Public and publicly available private resources (e.g. ETRMA data), provide the numbers from 2021, seldom from 2023 [2.].

Statistics Poland (GUS) stopped publishing data on tire management in Poland in 2018. It has resulted in common postulate from the Polish Association of Tire Industry (PZPO), the Tire Utilization Centre plc (Centrum Utylizacji Opon S.A) and the Polish Tire Recyclers Association (PATR) directed to the President of Statistics Poland (GUS) in 2022.

Theoretically, the data ought to be available in database of products and packages and waste management (BDO) but, as our Association's this year experience proves, to obtain horizontal data is technically difficult for the Ministry of Climate. It twice has set the deadline of about two months [1.].

Another difficulty lies in consistency of the collected data. In 2024 Polish Tire Recyclers Association (PATR) made such a request to over 100 municipal governments, which are responsible for public land in cities and villages, and to forestries, responsible for State-owned Forests [9.]. Data received directly from these entities based on the right of access to public information has revealed discrepancies when compared with the Supreme Audit Office (NIK) reports, for instance in regards to number of wild landfills [48.].

Disfunction 3:
Tire disposal system meets the producers/importers objectives rather than environmental (systemic) goals

Centrum Utylizacji Opon Organizacja Odzysku S.A. (CUO) as the biggest recovery organization plays the key role in end-of-life tires management system in Poland: it represents producers and importers of approx. 50% tire weight introduced into the Polish market every year. While this organization and some other ones that deal with recovery perfectly fulfil the statutory objectives for producers and importers and constitute the strongest system element, they do not play the systemic role they ought to regarding environmental targets and waste management rules due to regulatory landscape.

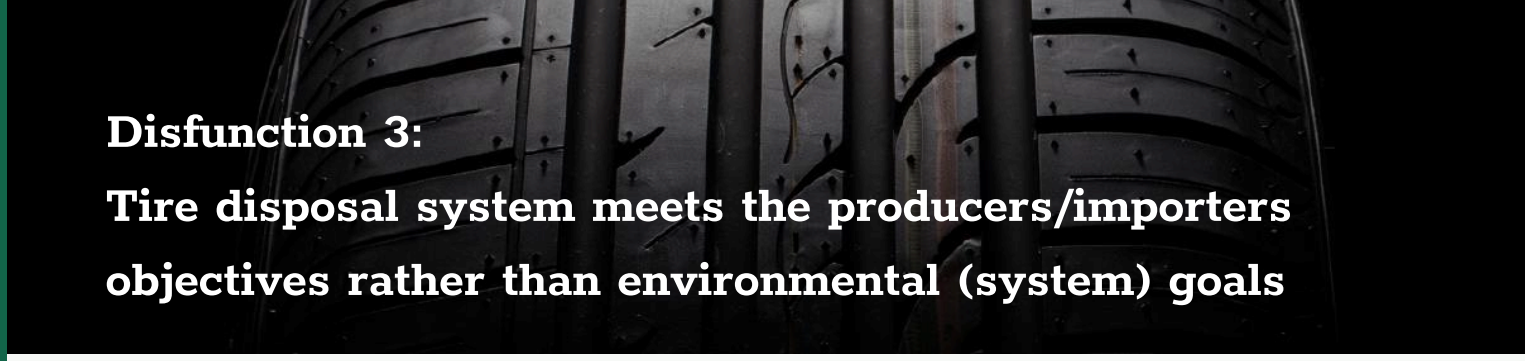
Firstly, the **CUO** [16.] and other recovery organizations collect end-of-life tires for free only in case of purchasing new tires from one of the producers cooperating with CUO or other recovery organization. Entities that obtain tires from other sources are obliged to manage them on their own.

Secondly, CUO introduces minimal amounts when collecting worn tires. It equals 100 pieces in case of motorbike tires, 70 pieces for truck and bus tires and 250 pieces for passenger cars [16.].

Services of CUO and other recovery organizations are dedicated only to companies (e.g. tire service centre) which cooperate with CUO clients in sales of new tires.

The CUO service to collect end-of-life tires is closely related to sales of new ones. Entities that purchase new tires directly from producers associated within the framework of CUO will be provided with free collection of end-of-life tires. In case when an entity has purchased tires through a vendor, for instance a wholesaler, it has to contact directly the supplier.

In practice it means that tires which are not changed into new ones, for instance removed from vehicles withdrawn from service, are not covered with free collection system.



Disfunction 3:
Tire disposal system meets the producers/importers objectives rather than environmental (system) goals

Entities which do not purchase new tires in official distribution from producers associated in CUO framework have to act on their own. They can use services of companies dealing with end-of-life tires' collection but there are limits and the cost is relatively high.

The price for 1 tonne of passenger cars tires varies from 200 PLN to 250 PLN net. In case of agricultural or industrial tires they are much higher. The price for 1 tonne of such tires varies from 590 PLN to 1850 PLN net [48.].

Additionally, minimum amount levels required for tire collection result in difficulties to store them. Specialistic tire services need additional space for that purpose. Moreover, CUO and other companies that collect tires require to clean them from sand or snow, to keep their proper shape, eliminate rims and other rubber elements like tubes or protectors. Tires that do not meet the requirements will be not accepted.

Current limitations make the tire utilization process significantly difficult for small firms and tire -changing points who service smaller numbers of clients. Current system favours bigger suppliers and discriminates against smaller entrepreneurs. It results in inequalities in access to utilization services. Small firms and tire specialists who are not able to meet quantity criteria are forced to bear costs themselves, or they get rid of waste illegally.

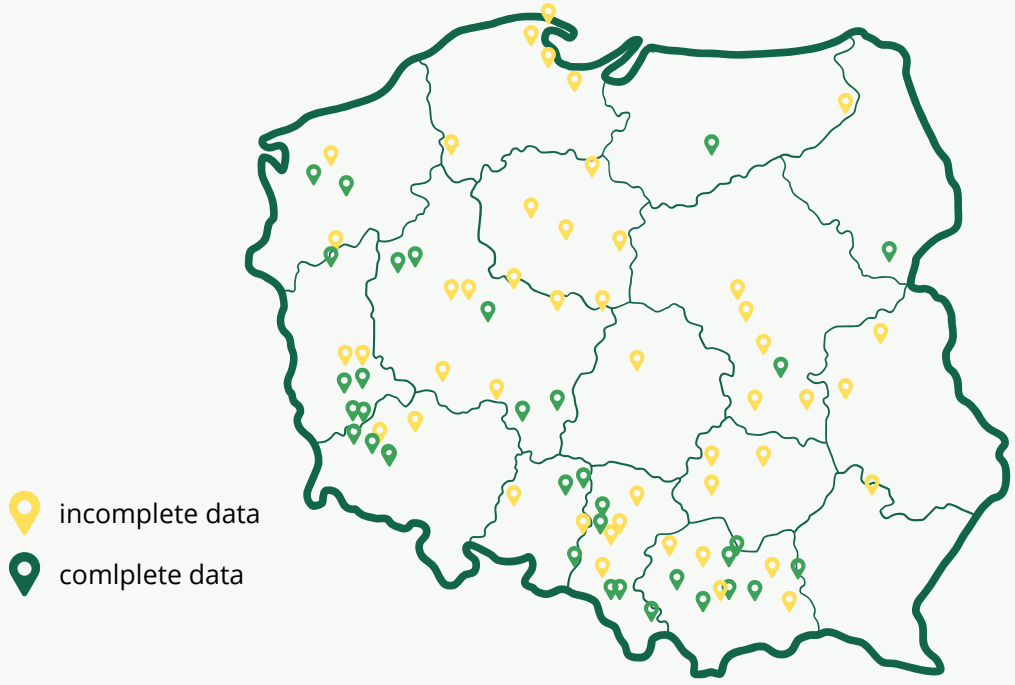
Disfunction 4:
Tires end up at illegal landfills [9.]

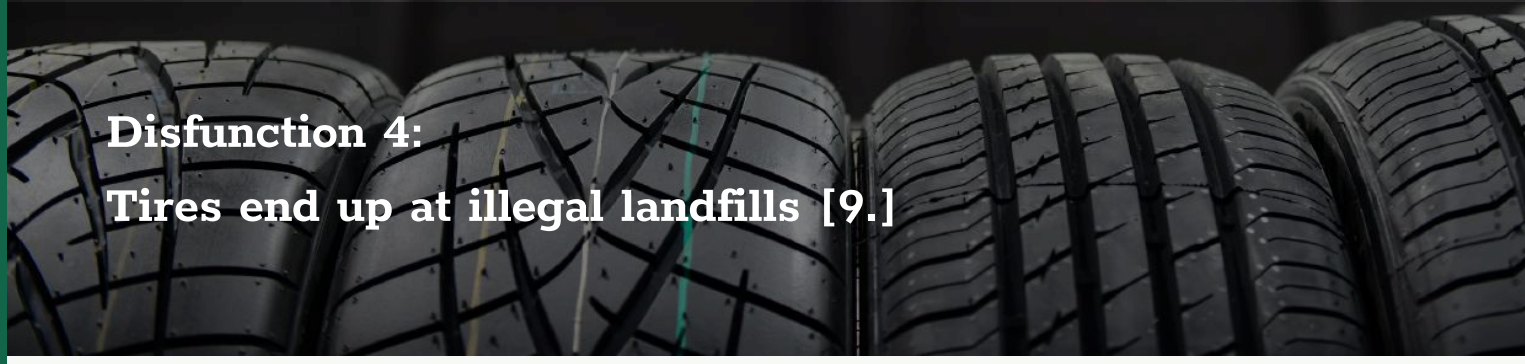
On the basis of email correspondence and phone conversations with State Forests and municipal organizations the Polish Association of Tire Recyclers (PATR) concluded that due to lack of duty to collect data, there is no central evidence of tires in illegal landfills (landfills in the environment resulting from illegal dumping of garbage, mostly in remoted areas). Taking into account high level of recycling and recovery, and low level of legal duty one could expect the problem does not exist. Unfortunately, the facts show a contrary picture.

Polish Association of Tire Recyklers (PATR) examined the issue on its own: on the basis of regulations that guarantee access to public information we asked over 100 municipalities and forestries for data on illegal landfills, tires in these sites and costs to remove them [9.].

Municipalities and forestries have been randomly selected to guarantee variety in number of their sizes and their locations. The examined period covered time from 2019 to February 2024 [9.]. Numerous press articles describing illegal landfills confirm the issue.

There have been 107 answers received from over 100 entities (29 forestries and 78 municipalities) in data collection period, which was February and March 2024. The examined units are pictures on the map below.

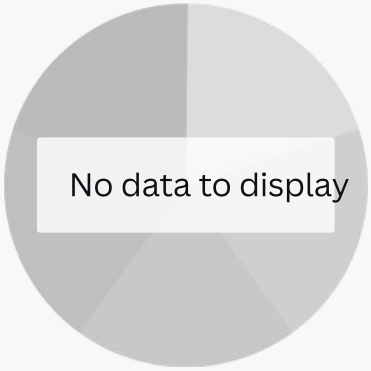




Disfunction 4:
Tires end up at illegal landfills [9.]

Forestries (forest districts)

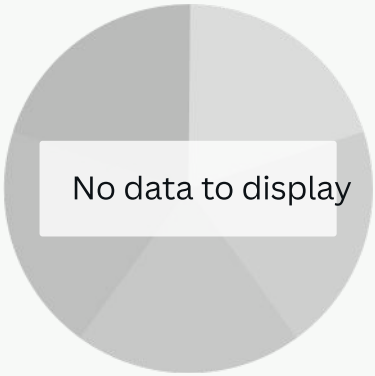
Among 29 forestries that provided their answers, 8 (27.6%) were not able to specify number of tonnes, quantity and amount of tires left in forests. Only 4 (13.8%) forestries have not recorded tires in illegal landfills. Other 17 (58.6%) forestries declared that in 2019- 2024 they removed from illegal landfills a total of 163.61 tonnes of ELT (over 16,000 pieces).



Distribution of data on disposal of ELT in illegal landfills in the surveyed forest districts

Municipalities

Among 78 municipalities only 2 (2.6%) have not observed illegal landfills in their area. Analyzing the data received, 33 municipalities (42.3%) have not had data on quantity, number of tonnes, or number of abandoned tires. Only 3 (3.8 %) of them indicated that tires constitute a minor percentage of all waste in illegal landfills. 40 municipalities (51.3%) declared that illegal landfills are a serious problem for them.



Distribution of ELT in illegal dumps

Disfunction 4:
Tires end up at illegal landfills [9.]

As many as 60 out of 78 municipalities (76,9%) were able to provide information regarding costs of illegal landfills' removal.

Only 64 out of 107 examined entities were able to specify the tire share in removed illegal landfills. On the basis of their data it was stated that in period 2019-2024 (to March) 1,017 tonnes of tires were left in illegal landfills. It results in average about 250 tonnes (25,000 pieces) of tires per year in examined areas.

Despite regular campaigns, higher fines for leaving waste in forests and general condemn the conduct, the problem of illegal landfills is still a fact. Why people still leave waste illegally, for example in forests?

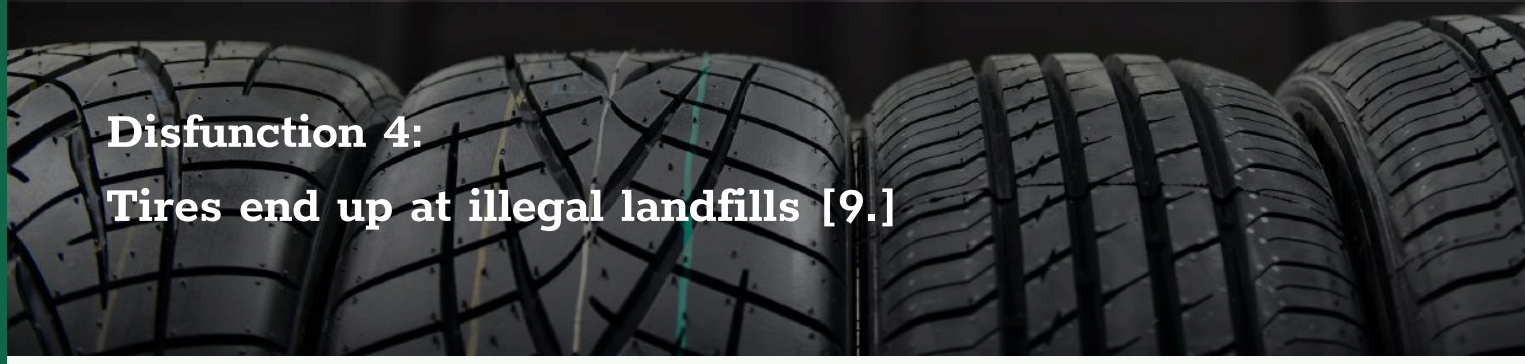
Research on that subject was conducted in 2023 by Statistics Poland (GUS) and the report was titled „Environmental protection 2023". It comprised illegal landfills quantity data from all voivodships (administrative units). According to the report the highest number of illegal landfills is noted in silesian and lower silesian voivodships [49.].

Silesian voivodship is the one with the highest number of removed illegal landfills in 2022. The second one is małopolskie voivodship. On the basis of the report one can conclude that the most industrialized voivodships with the highest level of urbanization degree and employment in industry represent the biggest problem of illegal landfills.

In 2019-2022 on the Polish territory there were almost 43,000 illegal landfills removed [50.].

According to Statistics Poland (GUS) in years 2019-2022 3,691 illegal landfills were registered in towns and as many as 4,648 in the country [45.].

The municipal waste weight of removed dumps all over Poland in years 2019-2022 was as high as 196,105 tonnes [50.].



Disfunction 4:
Tires end up at illegal landfills [9.]

Supreme Audit Office (NIK) raised the issue of illegal landfills in its report on municipal waste as early as 2015 [28.]. It has already proved legal disfunctions in that matter. It has described the issue of illegal landfills, and lack of reliable register regarding some waste types. According to the Supreme Audit Office (NIK) rising number of illegal landfills are not only problem for municipalities. „Their location and reason to appear have trans municipal range" [51.].

The Supreme Audit Office (NIK) analyzed the issue after 8 years again and concluded an urgent need of systemic changes.

In 2023 NIK audited again the activities taken by municipalities, forestries and the National Environmental Protection Fund to eliminate threats provoked by storage of hazardous waste in non-dedicated places. A total of 58 illegal landfills have been noted in the audited area [47.]. They were usually located in private real estates.

Audits undertaken by the Supreme Audit Office (NIK) revealed financial difficulties of municipalities in regards to illegal landfills' removal. Until the audit completion a half of illegal landfills have been removed from municipalities. The remaining ones have been placed in private grounds. One of the reasons was the lack of financial resources.

Due to the audit results, the Supreme Audit Office (NIK) requested the Minister of Climate and Environment to prepare financial, legal and organizational solutions which are necessary to guarantee immediate and efficient elimination of threats for human life and health and environment provoked by illegal hazardous waste storage and to submit a proposal of appropriate legal changes to the government.

Disfunction 5:
Victimization of municipalities

Currently, local governments are burdened with duty to reach statutory levels of recover and recycle pf municipal waste according to Polish and European regulations. It has been known for years that the required limits are difficult to achieve for municipalities and the fines they have to pay burden their budgets [52.]. Parallelly, regulations on the targets of tire recovery and recycling are frozen since 2007 [19.]; unclearly, in 2010, 2016 and 2023 the plan to raise them was abandoned contradictory to introduced European regulations.

The following facts prove the current state is improper:

1) legal — general definition of municipal waste deriving from EU waste directive and from the Act on Waste is very broad. As the latest jurisprudence of the Supreme Administrative Court confirmed [11.], not only passenger cars tires, but also lories and buses tires ought to be treated as municipal waste due to their character (waste code: 16 01 03). The decree by the Minister of Climate and Environment from 2018 provides more narrow definition in connection of recycling duties for municipalities. Although the definition repeats the content of EU waste directive amendment from 2018 [53.], it is not binding for member states [54.];

2) justice-related — end-of-life tires are differently defined in the same regulations on maintaining order in municipalities in similar cases. They are defined as municipal waste in case of duties of municipalities to manage ELT. Although they are not treated as such when regulations describe their collection to fulfill recycling duty. It is unfavourable and legally illogical situation for municipalities. Moreover, municipalities that collect worn tires in Selective Collection of Municipal Waste Points (PSZOKs) bear the costs which, according to the regulations, ought to belong to tire producers and importers. Currently, they do not take part in the process, which is contradictory to the system of extended producers responsibility (EPR);

Disfunction 5:
Victimization of municipalities

3) logistic and operational — currently municipalities allow for collection of worn tires in Selective Collection of Municipal Waste Points (PSZOKs) in substantial amounts, so the change will not bring any additional difficulties. Tire recyclers associated in Polish Association of Tire Recyclers (PATR) declare their technical readiness to manage that amount of waste;

4) environmental — due to lack of incentives to include tire collection to implement obligatory recycling levels by municipalities, significant percentage ot tires from Selective Collection of Municipal Waste Points (PSZOKs) is directed to energetic recovery, which is less beneficial environmentally and is contradictory to waste management hierarchy;

5) financial — suggested change of the decree by the Minister of Climate and Environment from 2018 will rightly allow to include the work currently executed by municipalities into recovery and recycling duty implementation. That will lower fines they pay from their budgets.

The role of municipalities in ELT collection is invaluable. According to research commissioned by OPONEO in February 2022 and executed by SW Reaserch agency 57% responders declared they leave their tires at a tire service centre to be utilized when changing them for new ones, 29% bring them to Selective Collection of Municipal Waste Points (PSZOKs), and 27% dispose them when high volume waste collection is organized [55.].

The most convenient solution is usually leaving ELT at a tire service centre when changing them for new ones. Although, it is not practiced at every servicing point; legal regulations do not specify if some fee for leaving worn tires is required.

In the area of 40 examined municipalities that provided data on worn tires management when their illegal landfills were removed, there are 57 Selective Collection of Municipal Waste Points (PSZOKs). It means that there is one such a point to 76 thousand inhabitants [56.].

Disfunction 5:
Victimization of municipalities

In 78% examined municipalities Selective Collection of Municipal Waste Points (PSZOKs) limited number of tires to be delivered yearly by a household. Most radical case was Lipowa municipality with only one tire limit but most frequently there were 4 tires per year allowed.

Usually according to the regulations of every Selective Collection of Municipal Waste Point some worn tires can be rejected if their amount is higher than a typical household could produce or their type indicates that their origin is other than a household. In case the limits are exceeded, additional fees are required.

Worn tires that are waste deriving from business activity are not defined as municipal waste and cannot be accepted by Selective Collection of Municipal Waste Points.

18 examined Selective Collection of Municipal Waste Points do not accepted tires of vehicles over 3.5 tonnes, according to their regulations.

When choosing a method of disposing worn tires, 27% responders indicated high volume waste collection organized locally by municipalities or housing association. Unfortunately, inhabitants are often not informed if in such case there is a possibility to dispose tires.

Gdańsk

Gdańsk may serve as a perfect example of municipality that undertakes actions in order to limit illegal landfills on its territory. In 2019-2024 there were 1,352 of them and the removal costs exceeded 1 mln PLN. In 2024 the Mayor of Gdańsk signed an agreement to establish the third Selective Collection of Municipal Waste Point. The project value equals 8 mln PLN [57.].

According to the Regulations on Maintaining Order in Lipowa municipality, worn tires are collected only in Municipal Selective Waste Collection Point. In 2021-2024 the established limit was one tire per one household.

Gmina Lipowa

Disfunction 6:
Under-implementation of recyclate potential

End-of-life tires recycling (ELT) is recognized to be the most beneficial management option for the environment.

The process of mechanical recycling through multi-stages cascade shredding: in the first step tires are cut into small pieces (shreds, bites), which are directed to a crusher, which fractions them into chips (3-5 cm size). Finally, the chips undergo final fragmentization to obtain rubber granulate. The effect of worn tires mechanical recycling process gives three material fractions: rubber granulate (approx. 70%), steel wire (approx. 15%) and textile cord (approx. 15%) [17.].

Rubber granulate is widely applied due to its exceptional physical and chemical features in many industrial branches [17.].

Due to its perfect cushioning properties and its flexibility, rubber granulate constitutes excellent material for playing yards' surfaces; it provides high safety level for children [17.].

In animal breeding, mats made of rubber granulate guarantee proper cushioning and thermal insulation. It results in better living conditions for animals. Additionally, rubber granulate is applied in production of industrial linings, anti-vibration pads and various technical products [17.].

Steel wire received in the process of tire recycling is a precious material which can be reused in steel production process. Due to high quality steel received in recycling, primary raw materials use will be lower. That brings economic and environmental advantages. Steel wire can be used in many branches, including building construction, automotive industry and industrial production.

Disfunction 6:
Under-implementation of recyclate potential

Textile cord can be applied as alternative fuel in industrial processes; it allows for energy recovery in more balanced manner. Research is being conducted to use textile cord as thermo-insulation material and as dispersed reinforcement in building and road construction.

First road surfaces with the use of tire recyclates have been built in Poland. That solution increases resistance and sustainability of roads on one hand, and on the other increases their adhesion, lowers noise level by half (sic!) and shortens vehicle braking distance. Waste tire rubber appliance in asphalt-rubber compounds of proper structure results in noise reduction by 3—6 decibels in comparison not only with traditional roads but also with more silent concrete ones [13.][14.][15.][17.].

Due to its high flexibility surface with rubber can find its appliance in places with substantial deformations of road substructure and surface, for instance as a result of mining damages.

Technology of asphalt surface production with the appliance of ELT has been still evoluating. In 2023 experimental asphalt surface was used in construction of voivod road DW 609 Mikołajki — Nowa Ukta placed in Śniardwy Lake bypass. That technology is based on asphalt modification with micronized rubber dusts received in tire recycling process [15.]. That investment is one of several successful piloting projects which have been implemented for the last years [13.][14.][15.].

Disfunction 7:
Precious raw materials are burnt in cement klins

In Poland mechanical recycling of ELT and their combustion in cement kilns constitute two main utilization methods. Unfortunately, tire combustion in cement factories competes with recycling. It is contradictory with waste hierarchy management which prioritizes reuse and recycling to energy recovery. At present 70% energy that is needed for clinker production uses alternative fuels; cement industry declared in 2021 the increase of share in energetic balance to 90% [58.].

In the recycling process there are by-products of low quality or yet non-applicable in production (e.g. much degraded rubber or textile fractions) but still being of high calorific value (26-30 GJ/t). They will be used in energy recovery processes in cement factories and other places. Energetic recovery will be decisive in the manner of handling the by-products only if there is no raw material application for them. That is in line with waste management hierarchy.

Environmental footprint analysis in life-cycle assessment (LCA) conducted by FORCE Technology Brondby on the request of GENAN Holding A/S in May 2020 (project no. 118-31036) compares two scenarios of worn tire reprocessing: material recycling and combustion in cement kilns [10.]. Analysis results prove that mechanical recycling carbon footprint saving ranges from 838 to 972 kg CO2 eq., while in case of energetic recovery it reaches only approx. 197 kg CO2 eq.

It proves that tire mechanical recycling carbon footprint is 4 to 5 times lower than in case of combustion. Material recycling compared with combustion in cement factories proves lower negative values for environment in 14 out of 16 examined categories. Recycling influence is 76-80% lower for the environment than combustion. It particularly concerns acidity, eutrophication, abiotic resource depletion and many others. Moreover, material recycling in comparison with combustion considerably saves water supplies. That would be hard to prove without LCA analysis.

As a result, mechanical recycling of worn tires ought to be preferable recovery method according to waste conduct hierarchy and current legal regulations but, unfortunately, it is not.

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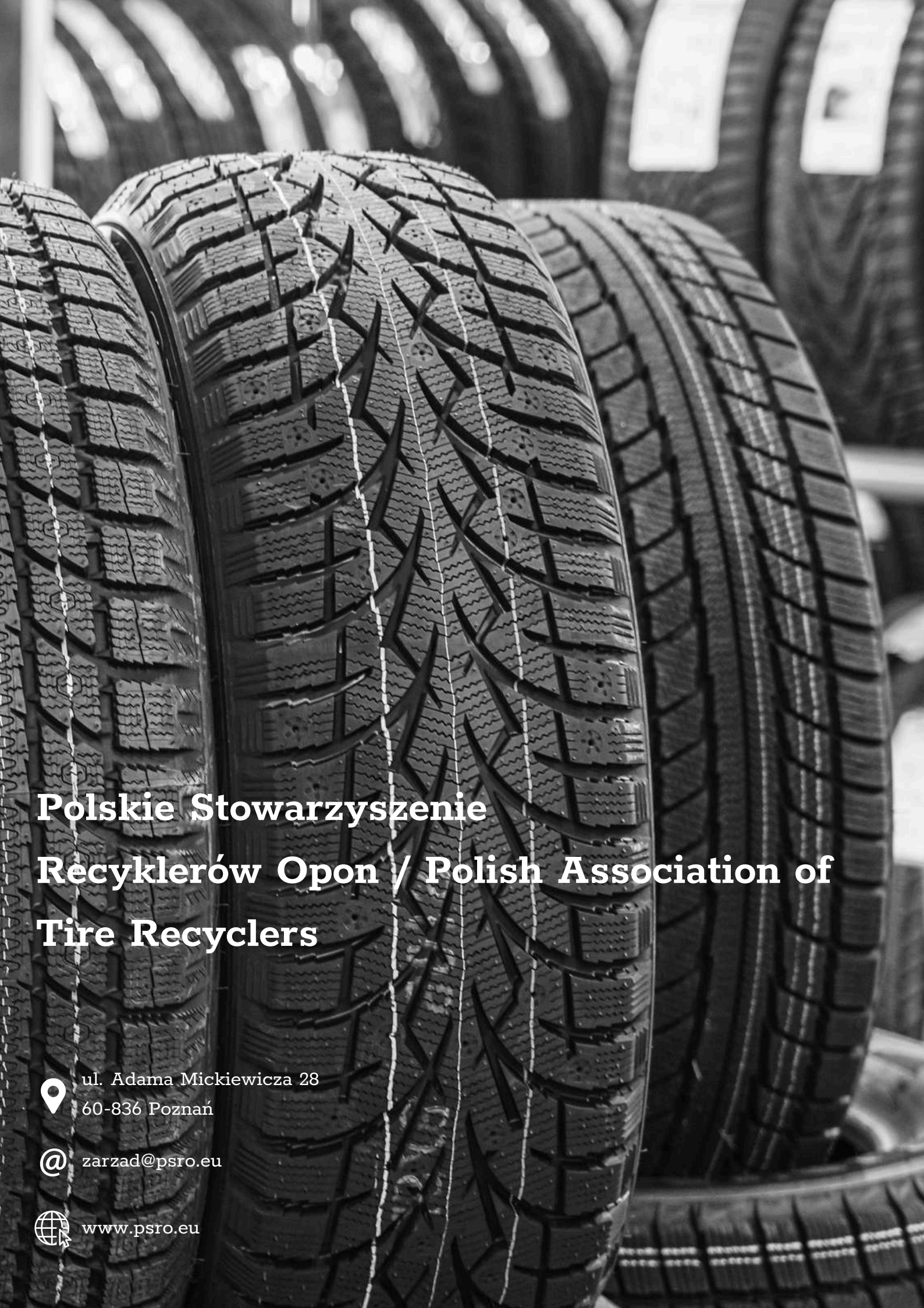

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