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Costs estimation of the asbestos ban in Poland

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1. Introduction and selected information

On June 19th, 1997, the Polish Parliament decided to ban the production of asbestos containing materials.¹ According to the Act, the production of such materials (and use of asbestos) was prohibited from August 28th, 1998. The trade of asbestos and asbestos containing materials was prohibited from March 28th, 1999.

In Poland, the production of asbestos-cement plates started (in a rather small scale) in 1907. After the Second World War, the consumption of asbestos significantly increased (as in all Europe). After 1946 the import of asbestos into Poland, according to official statistic reports and data from Ministry of Economy, was estimated to be 2 000 000 Mt.

At least 80% of imported asbestos were used in asbestos-cement [AC] production. A maximum 20% of imported asbestos was consumed mostly by factories producing friction, seal, gaskets and fitting materials. In small scale, asbestos was used as thermal insulation and in glass production. The construction industry was a major consumer of AC products. The majority of AC plates were used in farms, on roofs of barn, cow houses and other buildings oriented to agriculture and food production. Therefore it is assumed, that about 65% of AC plates were consumed - installed in villages or in small towns, 30% were used on roofs or facades of multi-storeyed buildings in towns over 100 000 inhabitants, and only up to 5% in Industrial building and installation².

In the year 1999, in Poland, 1999 there were around 14 000 000 000m² AC plates (mostly corrugated) on the roofs. Flat AC plates were mounted, mostly on facades.

¹ Act on the Ban of Use of Asbestos-Containing Products of June 19th, 1997. Law Gazette 04.3.20, 05.10.72

² E. g. in the power stations' cooling towers AC plates and tubes were used as a basic material for heat exchangers construction..

Unfortunately about half of it were autoclaved plates, containing not only chrysotile but also amphibole asbestos³

2. Effects of the asbestos ban in Poland

The Act of Polish Parliament banning the use and trade of asbestos in Poland (mentioned above) caused number of effects.

In this paper the psychological effect will be rather neglected. Nevertheless it should be mentioned, that social costs of fear of asbestos as a carcinogenic agent in some areas produced problems mostly for local authorities, and as a consequence, administration lost popularity in some populations (gently speaking).

Social and economy effects, considered as more important from an economical point of view, will be discussed, mostly as a financial consequence of asbestos ban in Poland.

2.1. Social effects

Social effects were mostly connected to unemployment. AC plants in Poland were located in small towns, with population often below 5 000 inhabitants. The number of jobs, in closed AC plants fell down rapidly. For every 1 plant, in the period: summer 1998 to spring 1999, the reduction of working places was from previous ca. a 1000 in 1988 to only 20 to 50. And finally, in the end of 1999, to zero.

It is obvious, that it produced a problem for rather small local communities. Cleaning (from asbestos) and revitalisation took 10 to 15 years, and in some AC plants it has not been completed yet.

Workers received unemployment benefits and, in some cases, received grants supporting either courses or trainings in new jobs, or supporting starting private business activities. Unfortunately, a part of unemployed workers from closed AC plants became permanently unemployed (probably about 10%).

An estimation of the material costs of unemployment benefits is difficult. Evaluating the jobs reduction up to 4000 - in short time, up to a year, the cost of unemployment benefits seems to be not high, only about **48 000 000 zł**. However, the majority of workers from closed plants got special grants usually equal from 6 to 12 month salary. It could be evaluated up to **60 000 000zł** only in AC plants. In all plants where employment was reduced due to changes effected by use or presence of asbestos, the costs amounted to up to **1 500 000 000zł**

Nonmaterial costs due to people's stress and frustration are rather out of evaluations, but influenced local communities.

Workers which had contact with asbestos in factories where asbestos was in use were covered by special care program. The program guarantees the medical control, sanatoriums and additional payments. In rough valuation it could be up to a **2 000 000 000 zł**

³ There are two general types of asbestos, *amphibole* and *chrysotile*. Some studies show that amphibole fibers stay in the lungs longer than chrysotile, and this tendency may account for their increased toxicity (harmfulness to the body).

More information in next sections:

2.1.1. List of plants using asbestos (up to 28 August 1998), actual names. Asbestos-cement plants in bold.

1. *Friction materials.* Fabryka Okładzin Ciernych „FOMAR ROULUNDS” S.A. w Markach k. Warszawy (poprzednia nazwa: Fabryka Okładzin Ciernych „POLMO”) wraz z kooperantami,
2. *Gaskets and seal materials.* Przedsiębiorstwo Państwowe „GAMBIT” Zakład Pracy Chronionej w Lubawce (poprzednia nazwa: Zakład Wyrobów Azbestowych „GAMBIT” w Lubawce).
3. *Gaskets.* Wytwórnia Uszczelek „MORPAK” Sp. z o.o. w Gdańsku,
4. *Asbestos cloth and seal materials.* Fabryka Odzieży i Tkanin Żaroodpornych „IZO-TERM” w Gryfowie Śląskim (poprzednia nazwa: Dolnośląskie Zakłady Uszczelnień i Wyrobów Azbestowych „AZBESTOLIT” w Gryfowie Śląskim), ***(not existing)***
5. *Gaskets and seal materials.* Zakłady Wyrobów Uszczelniających i Termoizolacyjnych POLONIT Sp. z o.o. w Łodzi (poprzednie nazwy: Zakłady Uszczelnień i Wyrobów Azbestowych AZBEST, Zakłady Uszczelnień Azbestowych POLONIT), ***(not existing)***
6. **ACF⁴, Mazowieckie Przedsiębiorstwo Materiałów Izolacji Budowlanej „Izolacja” w Małkini (poprzednia nazwa: Zakład Wyrobów Azbestowo-Cementowych w Małkini). Partly free of asbestos and partly revitalized**
7. *Gaskets and seal materials.* Pruszkowskie Zakłady Materiałów Izolacyjnych w Pruszkowie,
8. **ACF, Lubelskie Zakłady Eternitu w Lublinie *(not existing)*** ,
9. *Asbestos-cement for electrical installations.* Zakład Produkcji Płytek Cementowo-Azbestowych w Końskowoli k. Puław ***(not existing)***,
10. *Gaskets and seal materials* Przedsiębiorstwo Materiałów Izolacji Budowlanej „IZOLACJA” w Jarocinie,
11. *Laboratories and and quality control,* Zakłady Wyrobów Azbestowo-Cementowych „COBRPIB” w Katowicach,
12. *Laboratories and and quality control* Centralny Ośrodek Badawczo-Rozwojowy Przemysłu Izolacji Budowlanej w Katowicach Oddział w Pruszkowie,
13. *Gaskets.* BEMA Fabryka Płyt Filtracyjnych i Tektury w Pilchowicach (poprzednia nazwa: Fabryka Płyt Filtracyjnych „FILTR” w Pilchowicach),
14. **ACF, „Dachy Szczucińskie” Sp. z o.o. w Szczucinie (poprzednie nazwy: Zakład Wyrobów Azbestowo-Cementowych w Szczucinie, Przedsiębiorstwo Materiałów Budowlanych „IZOLACJA”, „ETERNIT” Polsko-Austriacka Spółka z o.o.). Free of asbestos and revitalized**

⁴ Asbestos cement factory

15. **ACF, Przedsiębiorstwo Produkcyjno-Handlowo-Usługowe „IZOPOL” S.A. w Trzemesznie. Free of asbestos and revitalized**
16. **ACF, Przedsiębiorstwo Materiałów Izolacji Budowlanej „IZOLACJA” w Ogrodzieńcu (poprzednia nazwa – Zawierciańskie Zakłady Eternitu w Ogrodzieńcu). Not free of asbestos not revitalized**
17. Fabryka Styropianu i Wyrobów Pokryciowych „Izolacja” PP w Wierzbicy k. Radomia (poprzednie nazwy: **Zakłady Wyrobów Azbestowo-Cementowych w Wierzbicy**, „Izolacja Wierzbica” Fabryka Styropianu i Wyrobów Pokryciowych PP). (**not existing**)
18. *Paints*. „POLIFARB”-CIESZYN” S.A. we Wrocławiu (poprzednia nazwa: „POLIFARB” Wrocławska Fabryka Farb i Lakierów).
19. *Friction materials* PPHU HAMEX we Wrocławiu (poprzednia nazwa: Wyrób Okładzin Hamulcowych i Renowacja Korków).
20. *Building materials*. Kombinat Budowlany we Włocławku .
21. *Building materials*. Rolnicza Spółdzielnia Produkcyjna w Parczewie. (**not existing**)
22. **ACF, Przedsiębiorstwo Produkcyjno-Wdrożeniowe „Polinova” Sp. z o.o. w Katowicach - Zakład w Trzebini (poprzednie nazwy: Zjednoczone Fabryki Portland Cementu „Firlej” w Górcie, Chrzanowskie Zakłady Eternitu w Trzebini-Sierszy, Zakłady Wyrobów Azbestowo-Cementowych w Szczucinie, **Przedsiębiorstwo Materiałów Izolacji Budowlanej „Izolacja” w Ogrodzieńcu - Zakład w Trzebini) Not free of asbestos not revitalized****
23. *Gaskets and seal materials*. Metsa Tissue S.A. w Konstancinie-Jeziornie (poprzednia nazwa: Warszawskie Zakłady Papiernicze).
24. *Gaskets and seal materials*. Zakłady Chemiczne i Tworzyw Sztucznych Boryszew S.A. w Sochaczewie (poprzednia nazwa: Zakłady Chemiczne „Boryszew”).
25. *Seal materials*. KONIMPEX Sp. z o.o. Konin, Oddział w Sokółce (poprzednia nazwa: Przedsiębiorstwo Produkcyjno-Handlowe KONIMPEX Sp. z o.o. w Koninie, Oddział w Sokółce).
26. Wytwórnia Materiałów Izolacyjnych Azbestowo-Cementowych S.C. w Żelechach, gm. Piątnica (**not existing**).
27. *Gaskets*. Wytwórnia Uszczelek „PZL MORPAK” Zakład w Łapinie.
28. Asbestos elements for glass production. PILKINGTON POLSKA w Sandomierzu (poprzednia nazwa: Huta Szkła Okiennego „Sandomierz”).
29. Additionally **asbestos-cement factory in Wierzbica**.

Factory in Trzemeszno actually produce cement roof plates free of asbestos.

2.1.2. Employees in AC plans

Below is the number of employees (production, administration and sell dep.) in main (largest capacity) 6 asbestos-cement factories [ACF]. (Average, data from 1980 – 90 y.):

1. ACF in Szczucin 800

2. ACF in Trzemeszno 550
3. ACF in Wierzbica 500
4. ZCF in Małkinia 950
5. ACF Trzebinia 150
6. ACF in Ogrodzieniec 800

TOTAL in major (6) ACF: 3750

Total in all factories (39) using asbestos: 4550.

The majority of the above factories were cleaned and revitalised. Currently, the estimated number of employees in these factories is 600. **Reduction of jobs: 3850.**

An estimation of the reduction of jobs neglects all lost jobs connected to asbestos import, local asbestos marked and AC products trade. In the author's opinion these workers relatively easily changed specialization or profession and are currently working.

2.2. Economic effects

2.2.1. Estimated costs of cleaning and revitalisation of a plant previously using asbestos

The estimated costs of cleaning and revitalisation of 1 asbestos cement factory can be evaluated from 6 to 10 million zł.

Totals, above – p. 2.1.2. for ACF Nr: 1 to 6: 48 million zł.

For all 29 plants previously using asbestos: **160 000 000zł**

2.2.2. Estimated loss of value of plants previously using asbestos

Current situation of plants previously using asbestos is different:

- 2 are neither cleaned nor revitalized.
- 1 is only partly cleaned and partly revitalized (approximately 50%)
- 7, rather small factories do not exist anymore.
- 20 factories were cleaned and revitalised, but in the 19, machines and other equipment were scrapped, in 1 (in AC plant in Trzemeszno) about 40% of machines and other technical equipment is devoted to the production of asbestos free plates.

An evaluation of loss of value of plants (including machines and technical equipment), previously using asbestos is doubtful, not only due to the different actual plants' situation, but also, because value of these plants in 1999 is actually either unknown or unreliable.

In rough evaluation, the loss of value of plants' previously using asbestos might be estimated at: **3 500 000 000zł**

2.2.3. Costs of removing AC plates from roof and facades

It will be practical to divide the total cost of removing of AC plates from roofs (and facades) into:

1. Cost of removing (dismounting) plates from roofs or facades. It should be mentioned that the cost of removing AC plates from roofs is lower than from facades. Costs of dismantling roof plates on multi-storey building is much higher than from one family house. That is why cost (price) vary from 60 to 320 zł/Mt.

2. Packing into the plastic backs and temporary storage,

Cost 10 to 50 zł/Mt.

3. Transportation to hazardous waste stockpile

0,23 zł for 1ton and 1 km. Distance (connection length) varies significantly, usually it is 150 to 220 km

The total cost (according to data from verified auction): varies from 1000zł/Mt to 1714 zł/Mt

For 14 000 000 Mt of AC plates it makes from 14 000 000 000zł to 24 000 000 000 zł

But it is only a cost of removing, packing and transportation. Additionally costs are due to new roof covering materials and costs of eventual roof construction changes.

AC plates have relatively low weight per square meter of covered roof and are much larger then e.g. ceramic roof tiles. This needs to rebuild the roof supporting construction.

In rough evaluation it may be up to 50% of the above given values.

So, the above quotas increase to about **14 000 000 000 + 700 000 000zL** for minimal cost of AC removing, and to about **24 000 000 000 +12 000 000 000zł**, respectively, for maximal costs of AC removing (from roofs and facades)

It should be added, that according to the official Governmental “Program of asbestos and asbestos containing materials removing”, the total costs of cleaning out the asbestos and asbestos containing materials from Poland, are evaluated on **48 232 000 000zł** (for 30 years: 2002 to 2030)

2.4. Other costs of asbestos cleaning in industry – mostly power station, metallurgy, chemistry and engineering industry

During first years of the 21st century, a number of factories and other enterprises were privatised and modernised by the new owners. Often, all production lines were substituted. Sometimes, modernization brought to partial rebuilding of previous factories' halls and/or houses. The costs of cleaning of “industry” from asbestos are often a part of modernisations' expenses.

In rough evaluation, the cost of asbestos removal and final plants' cleaning might be estimated at: **150 000 000zł**

Costs of a necessary modernisation or total machines exchanging due to asbestos presence might be estimated at: **2 000 000 000**

Among other costs, at least 3 more chapters should be added...

2.4.1. Organization and construction of the net of hazardous waste stockpiles

Considering the number and time of activities of the hazardous waste stockpiles (depending on capacity) these costs seem to be not so high and can be estimated on **35 000 000zł**.

2.4.2. Costs of “program administration”

The “Government Program of removal of asbestos and asbestos containing materials” is in force in Poland since May 14th, 2002. This chapter entitled Program administration”, consists in accompanying the implementation of the Program, the control and inspection and, finally, educational and informative activities, e.g. lectures on the asbestos risk mineralization. The costs of Program administration have an impact on the Polish budget of **53 200 000zł**, for 30 years: 2002 to 2032

2.4.3. Costs of the roof materials market changes

In Poland, substituting asbestos products was difficult, expensive and in some cases impossible. In addition, prices of new, asbestos-free products increased significantly. Fibres – cement roof and façade plates are 35 to 60% more expensive. Previously, commonly used AC plates on roofs and façades was substituted from the year 2000 by other products. Cement-fibre (asbestos free) products lost up to 90% of the market.

Also price of friction, gaskets and sealing asbestos free materials increased.

Neglecting consequents of substituting asbestos in some products on the quality, market of roof materials changed, Cheap AC roof material disappeared. More expensive asbestos-free materials lost 80% of the market.

Processes of market changes and process of introducing new asbestos-free material was costly. In the author’s opinion, evaluation of these costs is practically impossible.

3. Conclusions

In the presented evaluation, the cost of removing of asbestos and asbestos containing materials is evaluated at 45 506 200 000,00 zł in the maximal resumption.

Costs mentioned above (maximal) are given and summed in table below:

	Point in above Text	
1	2.1	48 000 000,00 zł
2	2.1	60 000 000,00 zł
3	2.1	1 500 000 000,00 zł
4	2.1	2 000 000 000,00 zł
5	2.2.1	160 000 000,00 zł
6	2.2.2	3 500 000 000,00 zł
7	2.2.3	24 000 000 000,00 zł
8	2.2.3	12 000 000 000,00 zł
9	2.4	150 000 000,00 zł
10	2.4	2 000 000 000,00 zł
11	2.4.1	35 000 000,00 zł

12	2.4.2	53 200 000,00 zł
sum		45 506 200 000,00 zł

The total costs given in Governmental Program are higher, and equal to 48 232 000 000zł. The difference is 2 815 800 000zł. Probably in the presented evaluation, the costs of necessary modernisations and losses of value in plans where previously asbestos was present are underestimated.

The necessity to use more expensive asbestos-free products affected the Polish economy. In the Author's opinion, these costs estimation is too difficult, too doubtful and even risky, but these costs are certainly significant in Poland and as other EU countries.