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**BALCONY GLAZING IN POLAND**

**Analysis of potential of balcony glazing market in Poland**

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**ABSTRACT**

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<p>The aim of this thesis was to analyze and understand the Polish market of balcony glazing. This kind of solution in construction enjoys high popularity in Scandinavian countries, as well as in Finland, which is a significant producer of balcony glazing. The research was conducted for Alutec Oy, one of the providers of balcony glazing systems.</p> <p>This thesis brings a broader view on legal issues related to the topic in Poland, applicable norms and choice of glass to be used. Also, the housing resources structure and statistics are presented, as well as the role of a balcony in the process of buying a flat is described. Various techniques and solutions were shown.</p> <p>A list of companies handling balcony glazing in Poland is included, as well as a description of the main providers. Personal interview surveys were carried out. Additionally, there is a price level analysis with examples.</p> <p>This thesis summarizes the balcony glazing market in Poland, with the information on competition, main suppliers, customer target groups and prices. It brings an understanding for the potential future activities of Alutec Oy in Poland.</p>		

**ABSTRACT**

**Key words**

Balcony glazing, glass and aluminium, market analysis, price levels, research, target group

## CONCEPT DEFINITIONS

Housing co-operatives constructions - housing, implemented by housing co-operatives, designed for persons being members of these cooperatives.

Apartment - premise comprising one or several rooms and auxiliary rooms intended for permanent residence individuals - built or remodeled for residential purposes; structurally separated by permanent walls within a building, into which a separate access leads from a staircase, passage, common hall or from the street, courtyard or garden. For ancillary facilities include: an entrance hall (vestibule), lounge, bathroom, a paragon, a pantry, a dressing room, veranda, storage and other facilities located within the housing, serving residential and economic needs of the inhabitants.

Apartments owned by housing co-operatives – apartments located in buildings owned or co-owned by housing co-operatives, excluding apartments for which law of separate ownership to one or a few individuals was established (under the Act of 15th December 2000).

Housing co-operative – a voluntary and self-governing association engaged in business activities aimed at satisfying the housing needs of their members and their families by providing independent residential units or houses, as well as premises for other purposes.

Greenhouse – closed room which construction is made of glass (walls and roof). Greenhouses allow maximum use of light and heat from solar radiation and generate a suitable microclimate for growing plants. Greenhouses are often equipped with electronic devices for heating, humidifying the soil and air.

Housing resources – overall dwellings inhabited and uninhabited located in residential and non-residential buildings. Housing does not include collective accommodation facilities (such as workers' hostels, student dormitories, social welfare homes etc.), makeshift spaces and moving objects (such as caravans, rail cars, barges and ships)

**ABSTRACT**  
**CONCEPT DEFINITIONS**  
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## 1 INTRODUCTION

Balcony glazing systems enjoy great popularity in the Nordic countries, as a solution suitable to the climate. Finnish company based in Ylivieska, Alutec Oy, a producer of these products is considering to enter the Polish market. The main aim of this thesis is to bring necessary knowledge and understanding of the market in order to plan the activities needed for entry.

This thesis is divided into six parts. The first one's aim is to describe and understand market analysis in theory – tools, solutions and reasons to use market analysis in market research. Second part is about the selection of balustrade glass according to German and Polish law. Issues regarding choices of proper glass made during the production and installation are presented. This part focuses mainly on technical aspects of balcony glazing systems.

The next part shows the housing resources in Poland in terms of the ownership. Official statistics of housing resources structure are presented. After that, there is a description of how balcony affects the value of real estate and what are the advantages of balcony glazing.

The following chapter discusses balcony glazing as greenhouse systems – answering a question how balcony's functions can be extended when using balcony glazing. Chapter 7 is the analysis of companies that are involved in balcony glazing business – suppliers and service providers. All of them are shown on the maps of Poland. Additionally, there are descriptions and offers of most popular companies that handle balcony glazing in Poland. As one of the most important bit of information, the price levels are given.

The last part is the survey on opinions about balcony glazing. There are three construction-related people interviewed and they are an architect, a housing cooperative developer and a construction worker.

The thesis is finished with a short summary of the topics and results in this paper.



## 2 MARKET ANALYSIS IN THEORY

Market analysis is the set of activities used to assess a given market and its potential for possible investments. There are several important factors to be taken into consideration, while analyzing the market.

They are:

- assessing the size of the market (actual state and in the future),
- speed of development,
- profitability,
- ways of selling the products or services (distribution channels),
- customers' requirements,
- trends on the market,
- competition.

To assess the size of a given market it is needed to understand the actual levels of sales, demand and supply. Official statistics data provided by governmental institutions might be very helpful. Speed of development is evaluated with help of typical historical data on the given topic. It brings an understanding how the market was changing throughout the years in the past. Thanks to this it is possible to provide an expected growth of the market.

Profitability is one of the crucial factors influencing the decision if to enter or not to enter the market. If the company is expected to gain profits in some term of time, it will be good enough to decide to enter the market. If the expected revenue does not even cover the cost, there is no point to start any business activities. Distribution channels, which mean the ways of selling the products or services, have a great impact on company's performance. Those need to be chosen carefully, with taking into consideration possible partners helping to distribute the products. (Aaker, Kumar & Day 2011, 6-9.)

Customers' requirements are the things that customer wants. If the customer is not really interested in buying a product, there is a need to get the way to promote it or convince the customer to change his/her mind. Trends in the market are simply typical changes in customers' and companies' behavior, already existing on the market. To understand what companies are doing, it is crucial to acquire information on the competition in the area, meaning what companies are already present on the market, what is their performance and how to be better than them. (Hamersveld & de Bont 2008, 37-39.)

## **2.1 Market analysis as a core of market research**

From a company's perspective, market research is about market analysis - they learn about the market situation, determine the market share of a company, and seek to gain a sustainable position on the market. Market analysis is a part of market research. This is an autonomous market research study that consists of a one-time gathering of information to outline the current market situation. Market analysis, understood as a set of activities and methods leading to knowledge of the current situation in a given market in terms of demand, supply, prices and factors shaping them, falls within the scope of broader market research, which also includes market forecasting. (Aaker et al. 2011, 47-49.)

## **2.2 When information about the market is needed**

Every company operates in the market. In order to keep up with the dynamics of its development, it must have the appropriate knowledge base to meet market expectations. For existing companies in the market, knowledge of the industry data in which they operate is essential. Acquiring information about changing consumer needs, competition, customer satisfaction, or brand value is essential for a company to continue to thrive. The fight for a place in the crowded market, the planning and implementation of promotional campaigns, price changes, the introduction of new products, the optimization of services, the efficient use of opportunities - all this also requires gathering information about the market. (Aaker et al. 2011, 92.)

Market research, for sure, also helps individual investors and newcomers to start their business. Knowledge of such information as, for example, entry restrictions, competition coverage, and the size of a particular market, make it much easier for companies to get started, and to increase responsiveness to change and innovation. Companies planning to expand into new markets will have the opportunity to identify and identify opportunities, including obstacles, to market activity and to better plan their strategies (e.g. how to attract customers to the product and what distribution channel to choose) in order to accelerate market entry. (Hague, Hague & Morgan 2013, 8.)

### 2.3 Secondary sources of marketing data

Data collecting is crucial for many marketing researches to achieve the needed results. Because of mass usage of computers in today's life it is a way easier task to collect and organize needed information. Secondary data is one of the easiest information access. The sources of it are numerous and can be utilized in market analysis process. We can distinguish few types of secondary data sources:

- Internal records
  - patronage results,
  - marketing activities,
  - cost information,
  - distributor reports and feedback,
  - customer feedback.
- External records
  - published data (electronic and printed),
  - standardized sources of marketing data,
  - **the Internet**. (Aaker et al. 2011, 93.)

### 2.4 Marketing analysis on the Internet

Internet research is research conducted through the Internet. They may be quantitative and qualitative. The most common method is the CAWI (Computer Assisted Web Interview) survey, a self-filled questionnaire for the respondent. Online qualitative research is conducted through online chats or instant messengers.

Depending on the selection of respondents, web research may be paneled or not. Panel research is conducted on samples selected among the group of Internet users registered for the so- Panel. Panelist activities are rewarded in the form of points exchanged for prizes, cash, prizes and other items (e.g., the ability to support public benefit organizations, participation in lotteries). Another form of online research is mailing surveys which is a link to the study goes to all or a random sample of e-mail addresses or pop-up questionnaires to which internet users are invited to view specific pages in the form of emerging banners encouraging participation in the study. (Aaker et al. 2011, 144.)

## **2.5 Methods of information collecting**

There are many ways in which information can be collected. As mentioned above, in market research and analysis two main groups of information can be distinguished – primary and secondary. When market research is conducted, the difference between quantitative and qualitative need to be understood. (Hague et al. 2013, 62-64.)

Types of secondary data collection:

- Personal interviewing,
- Telephone surveys,
- Mail/postal surveys,
- Computer direct interviewing,
- E-mail surveys,
- Internet surveys,
- Omnibus,
- Consumer panels,
- Retail audits. (Hague et al. 2013, 67-71.)

## **2.6 Usage of tools in market analysis for balcony glazing in Poland**

Due to the fact that most of the work for this thesis was done remotely (with no personal interference on the site in Poland), mostly the Internet and publications sources were used. Data was collected by checking official reports such as statistics, law regulations, and internet websites regarding the balcony glazing topic. List of companies was found using internet information acquisition as well as the description of companies is based on information given on companies' websites. However, interviews were done in person in Poland, with face-to-face contact. This could give the possibility of assessing the information as being valuable.

### **3 THE SELECTION OF BALUSTRADE GLASS ACCORDING TO GERMAN AND POLISH LAW**

In modern construction, glass is a very popular material. Choosing different sets of glass and carrying out static calculations should be based on the relevant national regulations and standards, but because of the lack of detailed regulations in Polish law, many designers and contractors in glass constructions use the German technical rules. These rules show very comprehensively different types of glazing. Requirements described there are clearly defined. These rules apply to tested glazing and applicable in practice.

German technical rules apply to three types of glazing:

- glazing fixed linearly
- glazing fixed spot
- glazing protecting against falling

To perform glazing, the following types of glass are mainly used:

- float glass SPG
- glass ESG
- glass ESG-H (heat-treated glass)
- VSG laminated glass
- thermally toughened glass (so called semi-tempered)
- glass units MIG

Following methods for fixing the glass panels are used:

- mechanical
- along the edge line
- positioning by fasteners (or passage comprising a pane of glass)
- by gluing using structural adhesives

Because of the different way of use and situating, German technical rules apply to the differentiation of glazing in construction:

- vertical
- located above the heads of users
- to prevent falling out
- suitable for walking

Construction balustrades (railings) are designed to protect against the danger of falling of a person standing or moving on the surface protected by balustrade. Typical railings can be used to secure the stairs, balconies, loggias, terraces, French windows or porches in residential, collective residential and public buildings. (Dz.U. 2002 nr 75 2002)

Railings can be used in residential buildings for single or multi-family, office buildings, hospitals, nursing homes and public facilities. On surfaces generally available for the public such as concert and sport halls, including stands, railway station platforms and entrances special railings (with increased strength) have to be used.

Railings have to be done in accordance with applicable national construction regulations. If such security balustrade is to be glazed, then we are talking about glazing protecting against falling out.

Those kind of glazing are under TRAV technical rules (development of TRLV and TRPV). We can differ three categories of these glazing:

- Category A – vertical glazing fitted linearly, without a carrier lock sill or without the front railing, installed before construction of the glass at the height required for the adoption of a horizontal load
- Category B - bearing glass railings, mounted linearly along the lower edge of the clamping construction, wherein the individual panes are connected by the mounted fixed rail.
- Category C - glazing protecting against falling, which do not serve to absorb horizontal loads at the height of the railing. We divide them into sub-groups:
  - C1 - paneling mounted linear and / or spot on at least two opposite sides;
  - C2 - vertical glazing fitted linearly along on at least two opposite sides, below the cross-bar, which bears the load horizontally and is situated at the height of the railing;
  - C3 – category A glazing with handrail letting out horizontal loads, which is mounted in front of the glass structure on the amount specified in the provisions of the construction law. (TRAV 2003)

According to TRAV, it is allowed to be used (depending on the category and type of glazing) only toughened glass (ESG) and laminated (VSG) of symmetrical construction. Other types of glass can be used only under the condition of using additional safety structural solutions. The use of tempered glass as a single glass or a glass external insulating glass over surfaces, on which pedestrian traffic takes place, requires providing additional precautions. Technical rules for the glazing given in the TRAV rules, apply to mechanically fixed glazing, which is secured against falling out of people moving on the road in

pedestrian traffic. To meet the extraordinary conditions of use (e.g. football stadiums) or associated with a particular risk of exposure to impact (e.g. transporting heavy objects, steeply sloping ramp in front of the glazing etc.) need to take further security measures (e.g. increasing the strength of the railing, fenders etc.).

According to TRAV rules mentioned above, in different categories, different kinds of glass are needed as presented below.

### **3.1 Category A**

Single glazing of category A shall be made of safety laminated glass of VSG type. However, in the case of insulating glass, so-called work surfaces, meaning glazing in isolated windows, which are exposed to the direct impact, should be made out of laminated safety VSG glass, tempered ESG glass or VSG laminated safety glass made of tempered ESG glass.

Glazing fixed linearly must comply with the TRAV guidelines. PVB used in laminates must have minimum thickness of 0.76 mm. Glazing of category A are generally produced in the construction of VSG/VSG, ESG/VSG or VSG/ESG (internal/external side system). Thickness of the glass and foil can be increased in comparison to those given in the table. The thickness of the glass used for the production of laminated glass (VSG) can differ, if they do not exceed a multiplication factor of 1.5. (TRAV 2003)

### **3.2 Category B**

For the construction of this type of glazing only safe laminated VSG glass can be used. Particular windows are connected together by a railing applied from above, extending over the entire length of the railing. Except of security function of the upper edge of the railings, handrail must provide proper drainage of the planned horizontal loads that can occur on that its height (handrail load), also in this case, if one of the glass falls off from the construction of railings.

Glazing must be rectangular with a smooth surface and cannot be compromised by any additional holes or cut-off holes except of constructions holes made for ferrule. Single toughened glass (ESG) in laminated glass (VSG) cannot be subjected to any treatment that could weaken the glass surface (e.g. enameling). (TRAV 2003)

### 3.3 Category C

Every single glazing of category C should be made of safety laminated VSG glass. Only glazing categories C1 and C2 mounted on all edges can be made of tempered ESG glass. For the production of insulating glass glazing, that are directly exposed to impact, only tempered ESG glass and safety laminated VSG glass can be used.

Free edges of railing fillings fixed linearly along the two edges must be protected by the railing structure or adjacent panes of fillings from unintended impacts. This condition is fulfilled when the gap between elements is not bigger than 30 mm. In the case of railing fillings made of laminated safety VSG glass, spot-mounted using mechanical fasteners passing through, edge protection can be dispensed.

C1 Category constructional conditions for spot-mounted glazing using mechanical fasteners passing through: glass pane (maximum height of 1.0 m) having rectangular steel filled frame railing is made of laminated glass (VSG) mounted inside the room (there are no static lateral loads here) using screw fittings with round saucers mounting on both sides.

These ferrules pass through holes made in the corners of the glass. Screw fitting plates and brackets are made of steel. The distance from the edge of the slot must be within the range of 80 to 250 mm. Glazing must be rectangular and flat in its structure and cannot be weakened by any additional holes or cut-off mounting holes. Mounting plates must be bigger at least 10 mm from the diameter of the hole in glass. It should be noted that, to avoid the possibility of direct contact between the plates fastening screw fittings and glass. This is done by using special spacers sealing. Each glass fitting must be resistant to static load of at least 2.8 kN.

Polish constructional regulations contained in the 'Technical conditions to be met by building and their location' (Act of the Minister of the Minister of Infrastructure from 15.06.2002 – with later amendments) are to limited to formulating the general requirements for safety and they do not include the division of different types of glazing (unlike to German regulations, mentioned above). Entries in the field of safety in relation to the glass used in the railings as follows: § 298.1. Railings of the stairs, ramps, French balconies, balconies, loggias should not have sharp-edged elements and their design should provide the transfer of horizontal forces, defined in Polish Standard on basic technological and assembly loads. The



height and fill of the vertical planes should provide effective protection against falling out. Glass balustrades elements should be made of glass with high impact resistance, breakable into small, blurred fragments. (Michalowski 2012.)

Glass balustrade can be a filling for the structure made out of metal frame, or – in case of all-glass balustrades also called self-supporting – to carry the load all alone. There are also large glass curtain wall, which play a significant role in protecting against falling. A middle way between the patio doors with access to the balcony with a glass railing and independent glazing on the height of the entire floor is a French balcony.

In the balustrades we use, mainly glass ESG, shows greater strength than ordinary float glass, and in the case of break crumbling into tiny, blurred pieces that do not pose a risk of injury - or laminated glass, also showing greater strength than float glass and if damaged, broken glass adhere to the foil lamination, they are held in place. Tempered glass and laminated glass are classified as safety glass, which is verified in studies according to PN-EN 12600:2004 Glass in building. Pendulum test. Impact test method and classification for flat glass. Research conducted by this standard are intended to classify architectural glass for the safety of persons in the event of injury in the event of its shatter. Laminated glass can consist of two or more sheets of float glass, tempered glass or half-tempered glass connected together with the plies of foil. Partitions protecting against falling at the same time forming part of the exterior curtain wall - are glazed with insulating glass composite which include sheets of tempered glass or laminated placed on the side threatened by damage. (Michalowski 2012.)

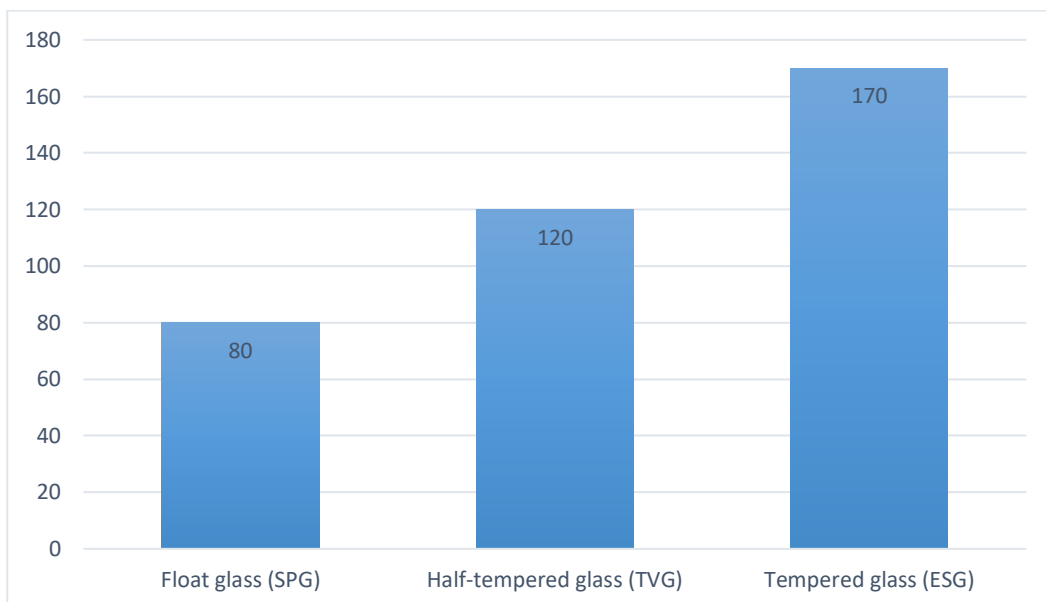
### **3.4 Hardiness of flat glass in terms of impact**

This feature of flat glass, important from the point of view of safety, is determined in accordance with DIN EN 12600: 2004 Glass in building. Pendulum test. Impact test method and classification for flat glass. This standard describes the method of testing - by the pendulum hammer - single pane of glass used in the construction industry in order to classify glass products into three major classes depending on the effects that result in the collapse of the glazing body percussion from different heights and on the assessment of the way of cracking (A Type, B Type and C Type). The way in which the different types of glass are broken in the case of application of impact load is varied and depending on degrees of hazard for people who are close to breaking glass. (PN:EN 12600-2004)

### 3.4.1 Three types of flat glass cracking

- A Type – numerous cracks appearing in the form of separated fragments with sharp edges, some fragments are large - type characteristic of annealed glass (or float glass) - thereby fracturing poses a big threat to the public.
- B Type – numerous cracks but the fragments are held together and unseparated – characteristic type for laminated glass – reduced risks of injury to bystanders
- C Type – the occurrence of disintegration including a number of small pieces relatively harmless - characteristic type for tempered glass - a small risk of injury to bystanders. Requirements and test methods specified in this standard, are referred when you must guarantee protection against injury from pieces of glass with a case of breaking the glass in the construction, for example glass railings on the stairs.

### 3.4.2 Allowable stresses



GRAPH 1. Allowable stresses of different kinds of glass (PN-EN 12600:2004).

These ‘allowable stress’ can only occur for a short time, as observed in the impact strength according to EN 12600. The resulting impact stress for each type of glass cannot exceed the following values:

- Float glass (SPG) – 80 N / mm<sup>2</sup>
- half-tempered glass (TVG) – 120 N / mm<sup>2</sup>
- tempered glass (ESG) – 170 N / mm<sup>2</sup>.

#### 4 ANALYSIS OF HOUSING RESOURCES IN POLAND IN TERMS OF POSSIBLE BALCONY GLAZING

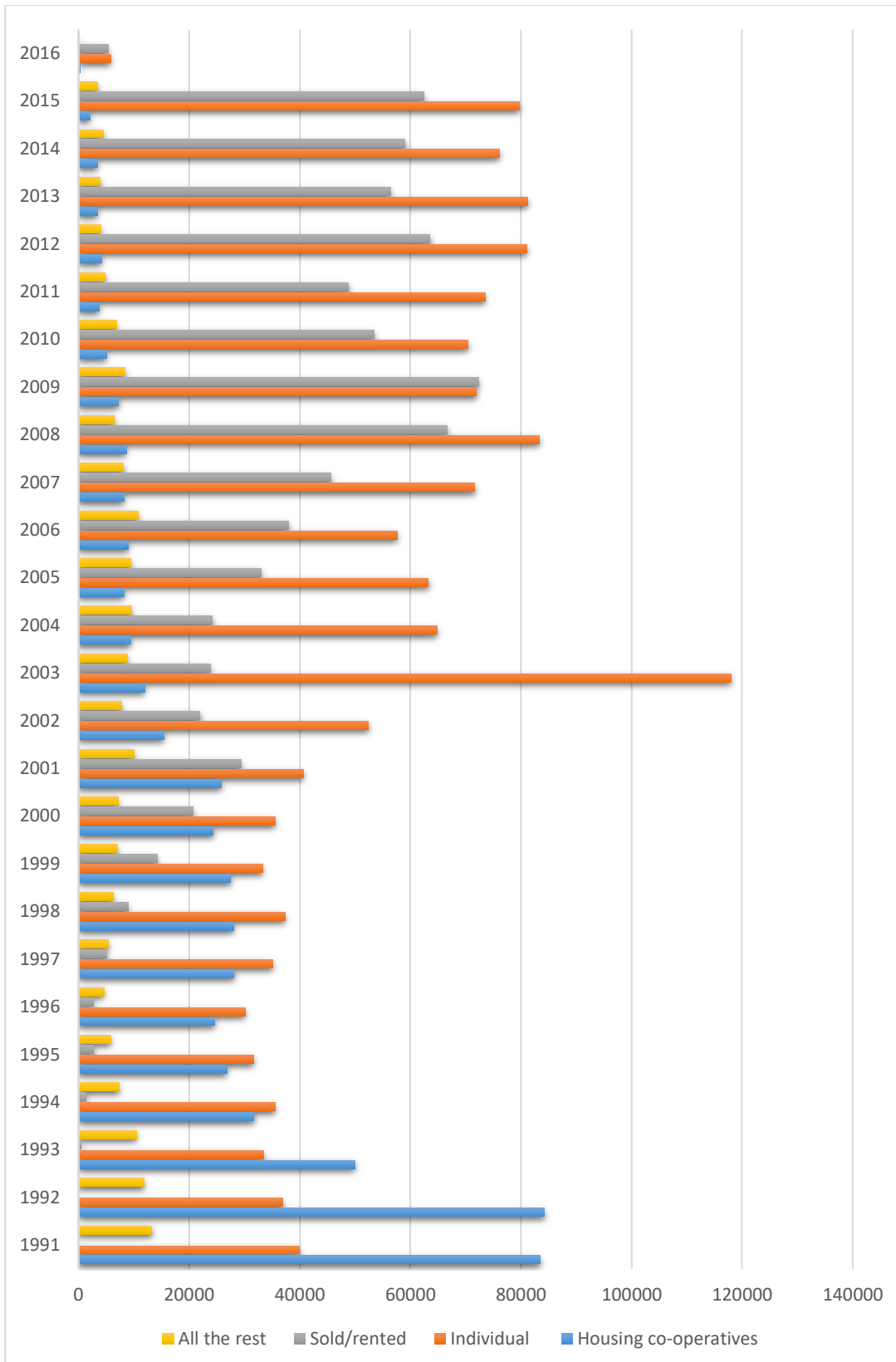
During last 26 years housing resources in Poland have changed significantly. Following table and graph show the changes throughout the years in terms of owners. After the collapse of communism, in early 1990's most of the new dwellings put to use were owned by housing co-operatives. After that, share of housing co-operatives owners of new housing has significantly decreased, while sold and rented dwellings were on the rise. More and more individual housing was popular, reaching the maximum point of nearly 120000 dwellings put to use in 2003. As for the year 2016, the most popular were sold/rented and individual housing.

TABLE 1. Number of apartments put to use in Poland in years 1991-2016 (Central Statistics Office of Poland 2016).

	<b>Housing co-operatives</b>	<b>Individual</b>	<b>Sold/rented</b>	<b>All the rest</b>	<b>Total</b>
<i>1991</i>	83554	39958	0	13278	136790
<i>1992</i>	84260	36863	0	11846	132969
<i>1993</i>	50002	33463	485	10499	94449
<i>1994</i>	31741	35516	1404	7419	76080
<i>1995</i>	26800	31675	2767	5830	67072
<i>1996</i>	24641	30135	2691	4663	62130
<i>1997</i>	28131	35074	5099	5402	73706
<i>1998</i>	28039	37322	8963	6270	80594
<i>1999</i>	27490	33304	14195	6990	81979
<i>2000</i>	24391	35542	20728	7128	87789
<i>2001</i>	25835	40642	29403	10087	105967

TABLE 1. (continues).

	<b>Housing co- operatives</b>	<b>Individual</b>	<b>Sold/rented</b>	<b>All the rest</b>	<b>Total</b>
2002	15406	52433	21970	7786	97595
2003	11957	118034	23844	8851	162686
2004	9432	64858	24230	9597	108117
2005	8222	63279	33047	9518	114066
2006	9032	57594	37960	10767	115353
2007	8240	71643	45653	8162	133698
2008	8647	83338	66703	6501	165189
2009	7260	71971	72326	8445	160002
2010	5052	70441	53505	6837	135835
2011	3786	73553	48814	4801	130954
2012	4194	81050	63586	4074	152904
2013	3493	81228	56447	3968	145136
2014	3490	76129	59065	4482	143166
2015	2052	79731	62448	3479	147710
2016	240	5806	5333	164	11543



GRAPH 2. Analysis of apartment types in Poland in years 1991-2016 (Central Statistics Office of Poland 2016).

#### **4.1 Housing cooperatives**

Apartments located in buildings owned or co-owned by housing cooperatives, (with the exception of apartments, which under the Act of 15 December 2000 of Housing Cooperatives had established right for separate ownership to one or a few individuals). Housing cooperative - a voluntary and self-governing association members engaged in business activities aimed at satisfying the housing needs of its members and their families by providing members with independent residential units or houses, as well as premises for other purposes. There are two types of laws: - condominiums cooperative right to premises, - cooperative ownership right to the premises.

#### **4.2 Social housing**

Apartments located in buildings owned by a legal entity, which in its name has the words 'public building association' (Towarzystwo Budownictwa Społecznego - 'TBS'), regardless of the fact whether they participate in the construction costs of the building of another entity (commune, housing co-operative, the employer) in exchange for obtain housing (for hire) for indicated by these entities to third parties. Society building social formed under the Act of 26 October 1995. on certain forms of support for housing construction.

#### **4.3 Other owner's housing**

Dwellings owned by:

- private organizations building or buying houses for profit: for sale (developers) or for rent;
- trade unions, associations, foundations, political parties, professional associations and business;
- the Catholic Church and other churches and religious organizations, including Catholic universities and institutes church:
- entities other than individuals covered by the concepts of 'Apartments owned by natural persons', 'Apartments owned by factories', 'Apartments owned by the community', 'Apartments owned by the State', 'Apartments owned by a housing association'.

#### **4.4 Private housing**

Dwellings, which are owned by a natural person (one or more, e.g. spouses), while this person: may be the owner of the entire property, where apartment is located; example of such a property is individual detached house, that can have a share in the common property, as the law related to the separately owned dwelling e.g.: located in a building in a housing community. Ownership of the entire property or just dwelling with the assigned part of the property (i.e. Share in the common property) should be disclosed in the land register, and in case of its absence, in another document confirming ownership.



## **5 BALCONY AS AN ATTRIBUTE AFFECTING THE VALUE OF REAL ESTATE**

Balcony enclosure is a professional structure made of glass and aluminum. It is used to isolate the balcony of external factors such as rain, wind or snow. Screened in balcony allows you to use it all year round regardless of weather conditions.

Another major advantage of balcony enclosure is warming our homes and isolating it from external noise, which in recent years has gained a great importance. Silence, purity and the ability to use additional facilities throughout the year, is the biggest attributes of the building balcony. No negative effects of weather conditions on the technical condition of the balcony makes for many years, we will not worry about the renovation of terracotta, plaster on the walls or damaged ceiling.

Balcony enclosure is becoming increasingly common and gains new followers. The amount of enclosure balconies is increasing year by year. Balcony glazing system came from Scandinavian countries. However, Poland is still very far from the popularization of systems glazing balcony. (Michalowski 2012.)

In multi-family apartment houses balcony space is becoming more and more appreciated and desired by the tenants. Properly arranged, they allow you to take a break and relax in the fresh air without leaving the apartment. Enclosure terrace and balcony becomes more and more popular every year. It affects positively on the comfort of staying in that kind of room. Balcony glazing protects against harmful weather conditions, as well as undesired neighbors' eyes.

Enclosure terraces and balconies also affect beneficially for maintaining a constant temperature level in homes and apartments, as it protects against heat loss. It is also ideal for people who want to have flowers on the balcony.

Moreover, the only possession of the balcony significantly increases the value of housing, up to 23 thousand PLN. Therefore, it is worth mentioning about the system building balcony glass system, if we want to raise the value of our apartment. Website: ([inwestycje.pl/nieruchomosci](http://inwestycje.pl/nieruchomosci), 2016.)

TABLE 2. Attributes affecting value of the apartment. Website: (inwestycje.pl/nieruchomosci, 2016.)

Attributes affecting value of the apartment	Values in percentage [%]
Playground nearby	1,8%
Separate toilet and bathroom	2,4%
Dressing-room	3,4%
Separate kitchen	3,6%
Cellar/basement	4,2%
Security and monitoring	6,6%
Private park or green areas nearby	7,0%
Own garden	8,0%
Balcony	9,0%
Private parking place	10,4%

Table above shows that balcony is one of the most significant features influencing the value of the apartment. Balcony is second in the ranking of attributes that affect the value of the apartment. As you can see it is a key feature of residential development. And thanks to additional functions of glazing of the balcony, you will enjoy it the whole year, not only in warm, sunny day.

It is not possible to buy balcony after purchasing an apartment as it is possible with parking place. Moreover, possibility of building a balcony after acquiring the property is small (technically sometimes undoable). It requires approval from the county (building permit) and from the residential community. Price of an apartment with a balcony is on average about 9% higher than that which can achieve the same premises without a balcony. In the average flat it means a difference of about 23 thousand PLN. But that is not all because the apartment without a balcony in the current market situation it is very difficult to sell. ‘According to the experience of consultants Home Broker, up to 95% of buyers’, balcony is a necessary attribute of the apartment’. Website: (inwestycje.pl/nieruchomosci, 2016.)

### 5.1 Advantages of balcony and terrace glazing

According to the research conducted by inwestycje.pl, the following are the most important factors taken into consideration when choosing a balcony glazing:

- Thermal and acoustic insulation – thanks to greenhouse effect, in winter, the temperature gets inside and is retained by the sheets of glass and which do not allow air pollution, noise and dust into the balcony.
- Protection against rain, snow and wind – the balcony glazing has been tested in the toughest weather conditions, effectively acting as a barrier to rain, snow and wind, making the balcony extra room for use throughout the year
- Protection from birds and insects – glass panes protect against getting into the room uninvited guests. Effectively solve the problem of bird droppings and flying, bothersome insects: flies and mosquitoes, which makes use of the built-up of balconies and terraces more convenient
- No need for permits and possibility of dismantling – glazing is a lightweight, removable construction that don't interfere with the building's external façade. According to construction laws, glazing is included in a 'installing devices and constructions not higher than 3 meters on the building' which doesn't need a permission
- Easy to clean and maintain – thanks to the use of glass and aluminum, as well as easy access to the entire building, cleaning, including brushing, is as simple and convenient as regular window washing
- Does not limit access of light – large and transparent glass surfaces, not separated by elements of the structure, provide maximum light and visibility
- Protection and property security – glazing can be opened only from the inside. Getting from outside is possible only by shattering the glass sheet, which is very loud and difficult with tempered glass surfaces
- Comfort and safety – when shattered, tempered glass breaks into thousands of small pieces without doing harm to people nearby. Only broken elements has to be replaced which means that it is not needed to repair all the glazing, what minimizes the cost
- Modern and aesthetic look – by using aluminum and large glass surfaces, the appearance of glazing is extremely light and transparent, as well as very modern-looking. Website: ([inwestycje.pl/nieruchomosci](http://inwestycje.pl/nieruchomosci), 2016.)

## 5.2 Balcony as a buffer zone

Balcony glazing becomes a thermal buffer zone between outside air and inside area. This buffer zone collects both so-called passive heat from sunlight as well as the escaping heat from inside of the apartment. This is the mechanism of saving thermal energy.

The interior balcony is on average 2-8 ° C warmer than the air outside. This buffer is very effective and brings additional thermal insulation by layer of thickness of 100 mm. The period of use of the balcony is extended to an average of 1 month per year and up to 2 and half month per year. Balcony glazing reduces differences in temperature – for example in last February that was more than 20 ° C difference during a single day. Website: ([inwestycje.pl/nieruchomosci](http://inwestycje.pl/nieruchomosci), 2016.)

## 6 BALCONY GLAZING AS GREENHOUSE SYSTEMS

Glazed balconies are becoming increasingly popular in existing buildings and newly designed, thanks to the attractiveness of architectural and utility combined with thermal protection and sound insulation of adjacent rooms.

The relatively low cost of the balcony enclosure makes this solution widely available and easy to implement. In addition to traditional balconies on a rectangular design there are balconies on the projection of a triangle, a trapezoid or semicircle. Their shape is chosen most often by the designer on the basis of evidence and aesthetic appearance of the facade. Enclosing such structure does not pose technological problems, but the same shape can affect the amount of the profits of solar and heat loss. Website: ([inwestycje.pl/nieruchomosci](http://inwestycje.pl/nieruchomosci), 2016.)

### 6.1 The best solutions in choice of glazing

The choice of the type and area of glazing is a key issue in the design of systems logging passive solar energy. What solutions are the best? The basic parameter determining the permeability of the radiation through the glazing is the ratio of the total solar energy transmittance 'g'.

It comprises two components - the direct transmission of  $\tau_e$  and a secondary  $\rho_i$ :

$$g = \tau_e + \rho_i$$

Direct permeability characterized by the amount of radiation passing through the glass in the form of short-wave radiation, while the secondary permeability specifies how much of the absorbed solar radiation through glass is transferred towards the interior by convection and radiation, as a long-term energy. (Michalowski 2012.)

### 6.2 Balcony glazing in frameless system

Frameless balcony glazing are modern systems based on the body of aluminum and tempered glass. Tempered glass is very resistant to weather conditions and the breakage is not a threat to passers-by.

Frameless balcony protection system allows you to arrange the windows, that they form a completely invisible and uniform plane – balcony elevations. However, in the warm and sunny days, **it lets** you fold all the glass panels **into** one package, thus facilitating the free flow of air. Balcony frameless system is practical cover without interfering with the architecture of the building. Its form gives a higher standard use and a very modern design.

Frameless balcony glazing - characteristics of the system COPAL Frameless

- Large dimensions: sliding window casement with a maximum height of 3000 mm
- Filled with tempered glass 6, 8 or 10 mm ensuring the highest levels of security windows
- Profiles powder coated RAL and Decoral
- Slide system - closed for ease in cleaning windows and allowing full opening covers on balcony
- Modern balcony façade



PICTURE 1. COPAL Frameless system. Website: (COPAL 2016.)



PICTURE 2. COPAL Frameless system. Website: (COPAL 2016.)

## 7 ANALYSIS OF THE POTENTIAL OF THE COMPANIES HANDLING BALCONY AND TERRACE GLAZING IN POLAND

There are 157 companies in Poland which handle balcony and terrace glazing. This chapter aims to highlight the most important of them in terms of possible competition or partnership. Maps and table of the companies are shown as well as analysis of their offer and history. Last but not least, pricing levels are described.

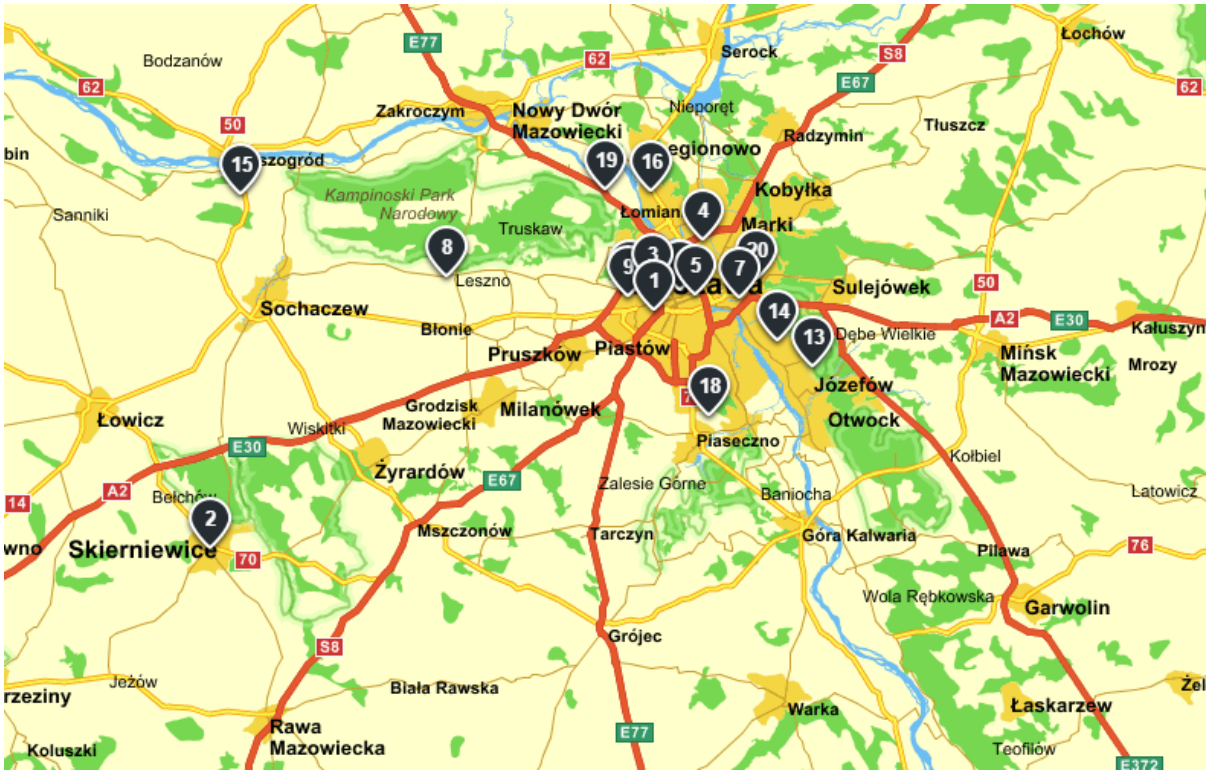
### 7.1 Maps and table

Following maps show the companies that handle balcony glazing in Poland with distinction of different areas of the country.

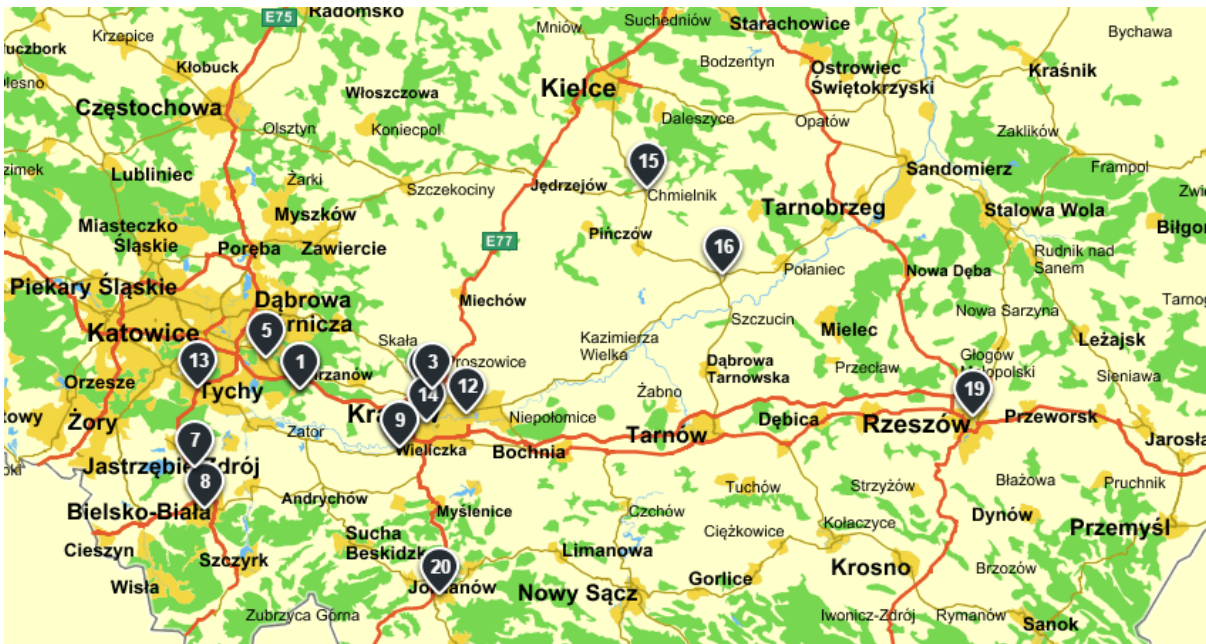


PICTURE 3. Location of balcony glazing-related companies throughout Poland. Website: (Google Maps 2016.)

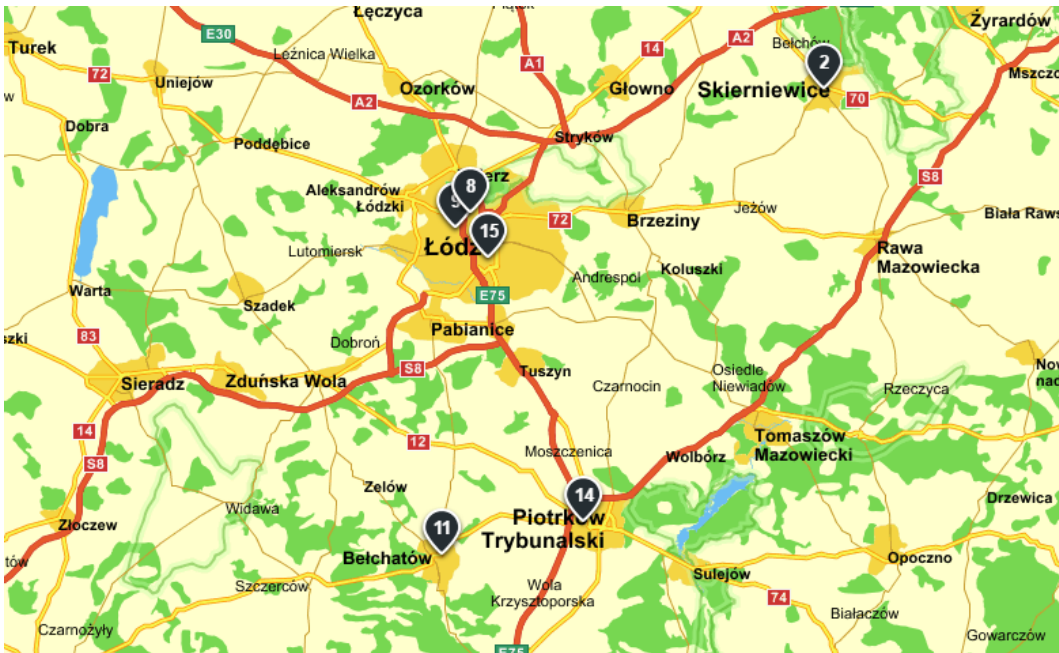




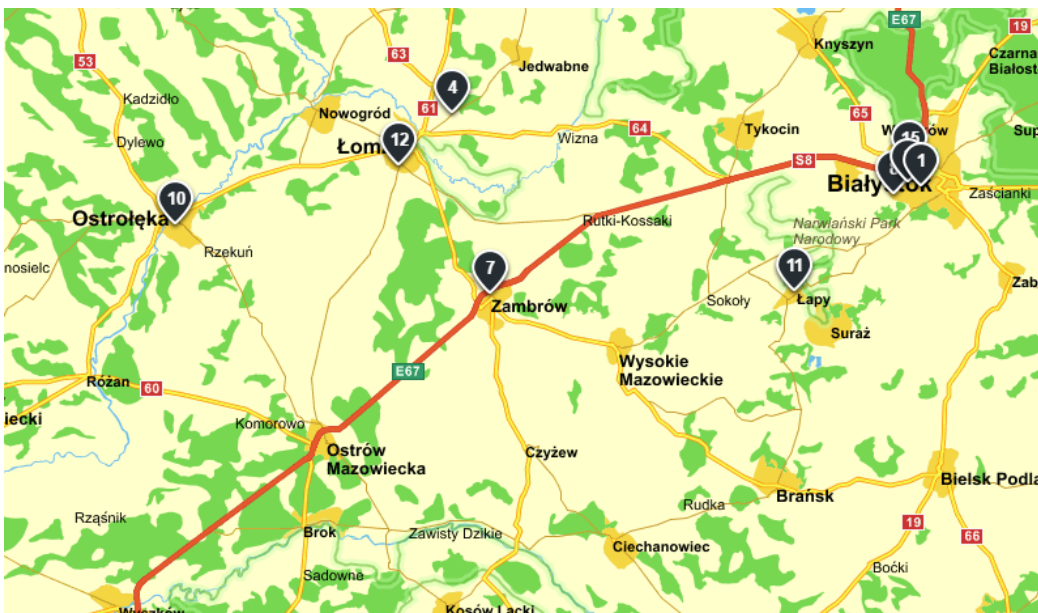
PICTURE 4. Location of balcony glazing-related companies in area of Warsaw (capital city). Website: (Google Maps 2016.)



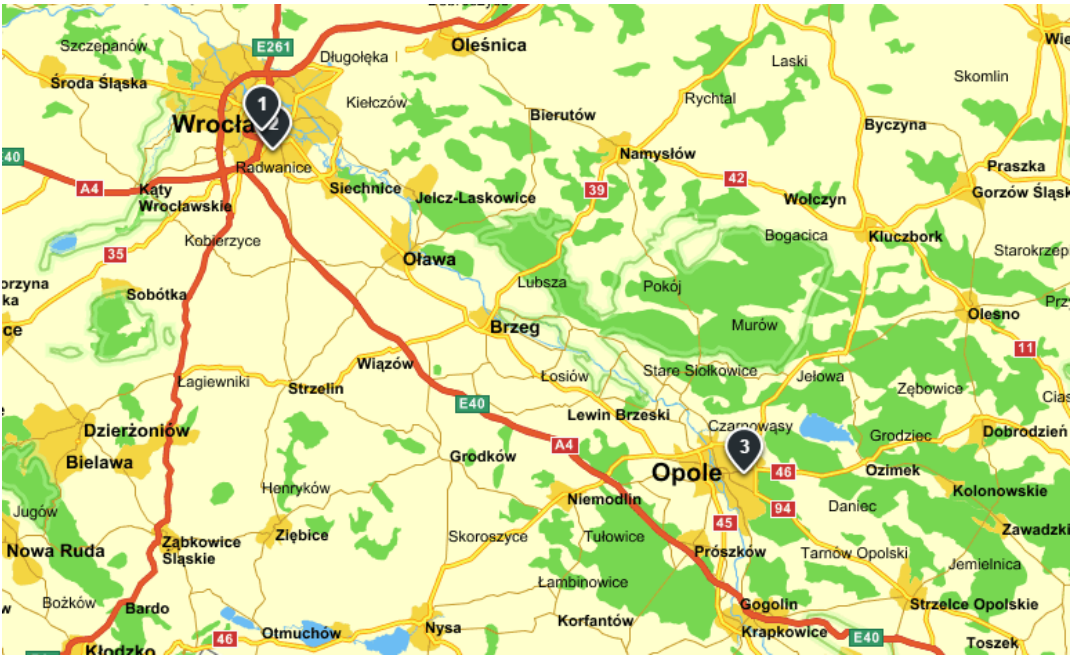
PICTURE 5. Location of balcony glazing-related companies in area of Katowice, Krakow and Rzeszow (southern Poland). Website: (Google Maps 2016.)



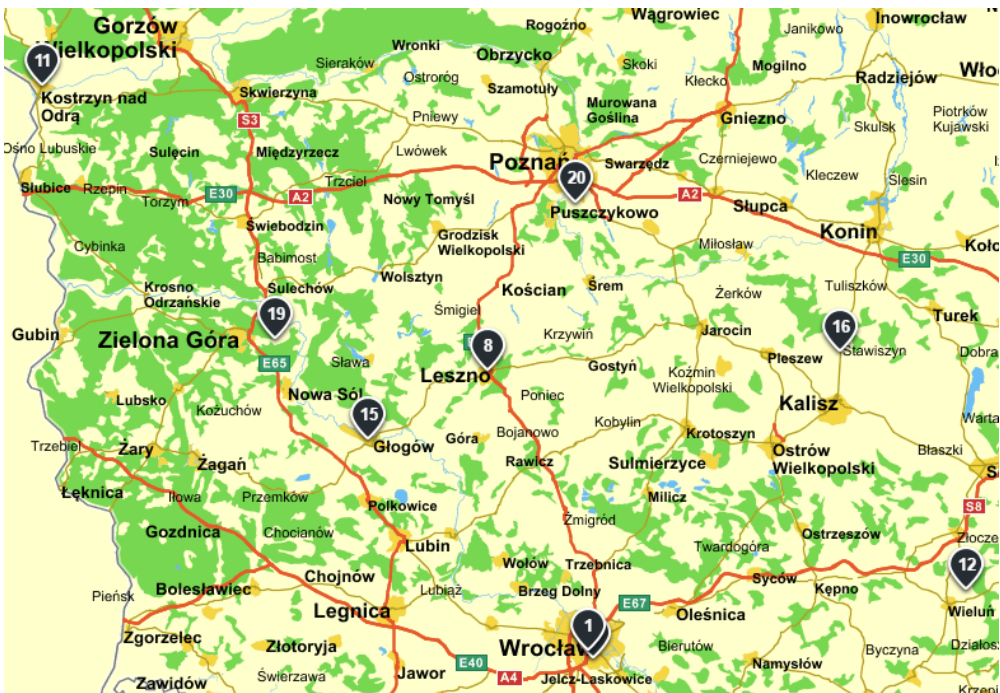
PICTURE 6. Location of balcony glazing-related companies in area of Łódź, Piotrków Trybunalski and Skierniewice (central Poland). Website: (Google Maps 2016.)



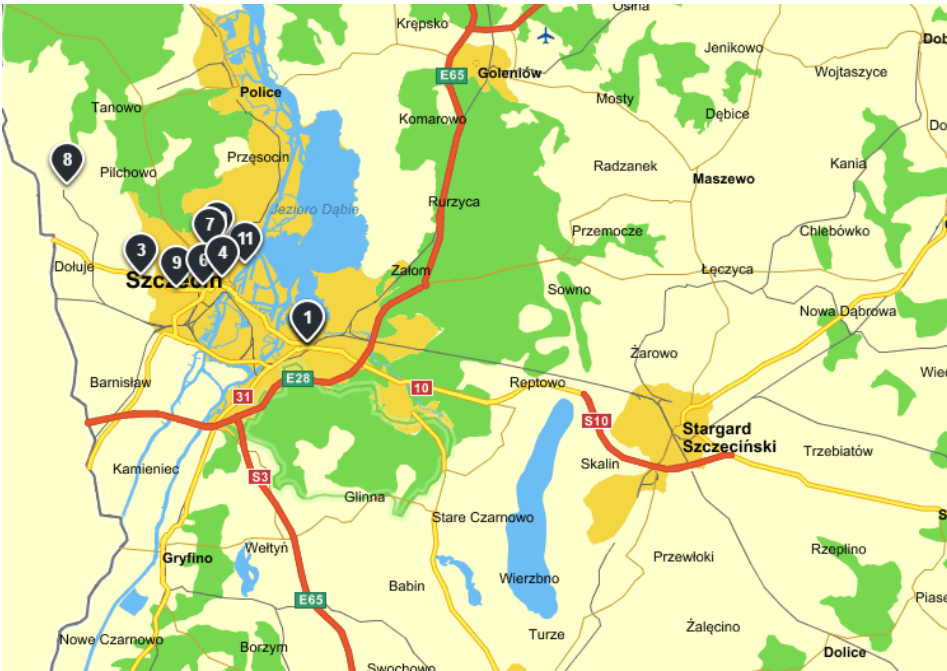
PICTURE 7. Location of balcony glazing-related companies in area of Białystok, Łomża and Ostrołęka (eastern Poland). Website: (Google Maps 2016.)



PICTURE 8. Location of balcony glazing related companies in area of Wrocław and Opole (south-western Poland). Website: (Google Maps 2016.)



PICTURE 9. Location of balcony glazing-related companies in area of Poznań, Zielona Góra, Gorzów Wielkopolski, Leszno and Wrocław (western Poland). Website: (Google Maps 2016.)



PICTURE 10. Location of balcony glazing-related companies in area of Szczecin (north-western Poland). Website: (Google Maps 2016.)



PICTURE 11. Location of balcony glazing-related companies in area of Gdansk, Gdynia, Pruszcz Gdański and Sopot (northern Poland). Website: (Google Maps 2016.)

TABLE 3. The most popular companies handling balcony glazing in Poland. Website: (Companies register in Poland 2016.)

	Name of the company	City
1	Alkon Krzysztof Bartczak	Warszawa
2	Vetro Stanisław Żurawski	Warszawa
3	Rosa S.C. Joanna i Andrzej Strzelczyk	Warszawa
4	Aluhit Damian Kozikowski	Chrzanów
5	Firma "Rom" Romuald Kraszewski	Białystok
6	CK-Stolarka	Leśniewo
7	Robert Kmiecik-Bocheński Glass-Go	Zielonki
8	"Żaluzje" Marcin Ćwiek	Radom
9	Wojtdach	Warszawa
10	Sunglass	Jaworzno
11	Jan Zalewski "Tech-Roll"	Warszawa
12	"Agmen" Andrzej Waśkiewicz	Warszawa
13	ALUOKNA Adam Meina	Gdańsk
14	"KD Partner"	Wrocław
15	Selko Katarzyna Dziak	Toruń
16	Okna Sega	Czechowice-Dziedzice
17	FHU "Alumark" Marek Celary	Skawina
18	Techluk	Włocławek
19	Ogrody Zimowe Alusun	Szczecin
20	Alumark Plus	Wrocław
21	"Fenster-Blum" FHU Patryk Blum	Malbork
22	PPUH MEDIAX Monika Chojnacka	Włocławek
23	Loggia System Paweł Broszko	Kraków
24	Firma Ogólnobudowlana Tomasz Rosiak	Daszewice
25	Firma Produkcijno-Handlowo-Usługowa "Wizal"	Kraków
26	Firma Remontowo - Budowlana Dariusz Wołkowski	Białystok
27	"Glassio" Jakub Gałka	Szczecin

TABLE 3. (continues).

28	Green House Zbigniew Rek	Koszalin
29	"Kozbud" Zakład Handlowo-Uslugowy	Warka
30	Onyks Top Line	Gdańsk
31	PHU Kamil Bielous	Białystok
32	PHU Techbud Sławomir Piecuch	Bydgoszcz
33	Pinokio Zakład Stolarski Paweł Zawendowski	Szczecin
34	QubaGlass	Rabka-Zdrój

Those 34 companies in the table above are the most popular and the biggest that handle balcony glazing business in Poland. Some of them are just service providers and some of them are also suppliers of the systems.

## 7.2 Description and offer of chosen companies

Following companies are the biggest and well-known suppliers and/or service providers in the terms of balcony glazing.

### 7.2.1 Alu-Best

The company was established in 1995 and is located in Szczecin. It does not produce balcony glazing but offers installation and maintenance. System is a modern construction of sliding, and fixed windows and walls, made of aluminum and glass. Lightweight and durable construction enhance the attractiveness and extend over the lifetime of the balconies, verandas, terraces, etc.

Sealing system consisting of snagging of the various windows, and additional textile seal drainage system makes the structure effectively protecting against rain, snow, wind and reducing noise. Among other, the main advantage is the possibility of sliding all the windows along the track, which in practice allows to set to agree one behind the other.

High quality anodized aluminum surface ensures a long service life without the need for maintenance.

Company offers balcony glazing systems from three different suppliers (official partnership): COPAL, Cover and Masca. Website: (Alu-Best 2016.)

### **7.2.2 Alumark Plus**

The main activities conducted by the company ALUMARK Plus Wroclaw is the production of aluminum structures for private and multifamily construction. They also handle installations.

They produce:

- terrace enclosures
- sliding balcony glazing systems (frame and frameless)
- roofs
- aluminum balustrades
- aluminum sliding windows
- aluminum sliding doors
- partition walls
- aluminum constructions

‘During production, our company uses modern production line, which has a very high quality and precision machine tools. For servicing of machines and production elements are responsible professionals who care about maintaining a high level of offered products.

Thanks to our knowledge and experience, we can offer you assistance at the design stage, which allows for optimal selection of materials and technology solutions.

In order to ensure the highest quality, a wide range of design solutions and very favorable prices, our company has partnered with carefully selected cooperators.’

This company offers three variants of enclosures:

- sliding windows from the balustrade
- sliding windows from the balustrade and enclosure below the windows (polycarbonate slab 10 mm)
- sliding doors (floor to ceiling)

Additional elements:

- additional window with steel-made net protecting the pets
- additional window with plastic-made net protecting against bugs
- drip over windows

- construction profiles
- powder coated profiles
- other color of the glass
- locks protecting against sliding the windows from outside

ALUMARK Plus Wroclaw cooperates with COPAL as well. Website: (Alumark 2016.)

### **7.2.3 Balteam S.C.**

Balteam is a company with years of experience, specializing in the production of aluminum joinery. Modern technology, original design and individual approach is the success of our company. Systematic development has meant that the company of a family and local level has become a nationwide organization focusing partner companies throughout the country.

The company headquarters is located in Warsaw, including the office, storage halls and production. Complete production line composes of machinery and equipment of a new generation, and qualified engineering and technical team, assures production at the highest level.

Good organization of production ensures continuous quality control, from the analysis of materials and resources for control at each stage of production, the quality control of the finished product on a special test station. Balteam s.c. is trying to run a business on the principle that customer satisfaction is the first step to achieve success.

It offers a wide range of services related to buildings balcony or terrace complete the construction of winter gardens; all work is guaranteed. They have years of experience in providing this type of service for residential and business customers. Employees are experienced, efficient, and always professional. Customer will receive high-quality service, full attention to detail and with precise and clear valuations.

Frameless Balteam system - The system is an innovative sliding system, the system is constructed of individual glass panels without visible vertical aluminum profiles and is a modular system for balconies enclosures, terraces enclosures, and interior partitions. It has been designed to meet the requirements of modern light and transparent architecture.





PICTURE 12. Balteam frameless system. Website: (Balteam 2016.)

Frame Balteam system – The BT-S is sliding and solid aluminum and glass construction windows and doors, designed for light construction facilities that do not require heating, built-ins outside balconies and loggias, terraces, verandas and for indoor use as light partitions and doors. Doors and windows move along the guide wheel carts. Website: (Balteam 2016.)



PICTURE 13. Balteam frame system. Website: (Balteam 2016.)

#### 7.2.4 COPAL

COPAL is one of the biggest company handling balcony glazing industry in the area. It was established in 1994 and it is located in Trzcianka.

From the beginning, the company focused on dynamic development and at the same time it continued to provide high quality services and products, constantly improving its technology. Within several years, the company earned its reputation and the leading position among Polish producers of light aluminum systems. Highly experienced and qualified personnel, together with vast machine resources ensure a high standard of production and prompt fulfilment of orders, maintaining the advanced level of quality control procedures.

They provide their customers with 3 kinds of frame and frameless balcony enclosure systems:

- Full-length profiles and components in packages for their own production. Become independent and do all by yourself on site, providing your clients with a short completion time and reasonable prices in accordance with your own production capability.
- Semi-finished products are cut to size and packaged in compact packages, and are prepared for glazing, assembly, and on site installation.
- Finished products with glass for simple on-site assembly.

A fully glazed patio enclosure / glazing enables us to admire nature freely and comfortably, without any limits. The glass panels can be arranged in various ways, and allow opening a terrace, fully or partially, at any time. The innovative design, together with the unique functionality of the frameless system for glass enclosures / glazing, makes any house look luxurious and modern, while the people living in it can enjoy exceptional comfort. Website: (COPAL 2016.)

Frame balcony enclosure – Copal balcony glass system specifications:

- Large maximum dimensions of the sliding elements, depending on the applied infill – width up to 1400 mm and height up to 2700 (Patios)
- Different infill, e.g. float-type single glass, 4, 5, 6 or 8 mm thick, safety laminated glass – 6.4 mm (3.3.1) or coupled glass – 16 and 18 mm.

- Anodized or varnished structures in a standard offer – beautiful structures protected against corrosion.
- Sliding windows within our systems are easy to disassemble. You can take the sash out of the guide bar in order to clean it and as easily assemble it again with one simple move.
- You have the possibility to connect guide bars in an uncomplicated and very precise manner, which allows you to create enclosures of an indefinite length and significantly facilitates the transportation of larger structures where the guide bars are always the longest elements.

TABLE 4. Parameters of COPAL frame balcony enclosure. Website: (COPAL 2016.)

<b>max. enclosure height</b>	<b>max. sash width</b>	<b>max. number of sashes</b>	<b>Glass thickness</b>	<b>Muntin</b>	<b>For</b>
<b>2700 mm</b>	1400 mm	any	4 - 18 mm	yes	balcony/patio



PICTURE 14. COPAL frame system. Website: (COPAL 2016.)

Frameless balcony enclosures – Copal Frameless system specifications

- Large dimensions: a top–hung sliding window with a maximum height of 3000 mm
- Tempered glass infill (6, 8 or 10 mm) provides the highest level of window protection
- Ral or Decoral powder–coated profiles
- A top–hung and sliding system provides easy window cleaning and allows the cover to be fully opened
- Modern appeal of the balcony façade
- European CE marking provides the highest level of quality and safety of our structures

TABLE 5. Parameters of COPAL frameless balcony enclosure. Website: (COPAL 2016.)

<b>max. enclosure height</b>	<b>max. sash width</b>	<b>Max. number of sashes</b>	<b>Glass thickness</b>	<b>For</b>	<b>Arches</b>
<b>2700 mm</b>	700 mm	any	6 / 8 / 10 mm	balcony/patio	yes

### 7.2.5 Faktor

It is a modern and dynamically developing company. It has been in the market since 1996. They sell and assembly windows, doors, shutters, garage doors, balconies and terraces enclosures and winter gardens. An important segment of their business is building services, including residential buildings and finishing turnkey.

Among many other services, the company handles balcony and terrace glazing as well. There are two main suppliers of those:

- COPAL Frame system,
- COVER Frameless system. Website: (Faktor 2016.)

### 7.2.6 Montarek

MONTAREK The company was founded in 1999. The project was emerging from professional service of the most demanding investors. Youth, full of enthusiasm and dedication has resulted in success. Throughout this period they create and implement solutions tailored to the individual needs of our customers. First of all, we put the emphasis on lightweight aluminum joinery. Offering a unique glass building, shutters, balconies and loggias residential and multi-family, providing you with a very stylish, beautiful and yet practical space for development. Website: (Montarek 2016.)

- MONTAREK Frameless system – The big advantage of the system is a system of compensation which allows you to overcome the inequalities balcony slabs to 25mm. Unlike systems of low and much lower quality compensation circuit allows for quick adjustment of buildings. The four-wheel chassis, is made of stainless steel and high quality plastic on each glass panel, it allows you to apply it to 3 meters in height.
  - Glazing, passing through all the angles up to 90 °
  - Maximum width of a sheet of glass of 1200 mm x 2400 mm
  - Maximum height of the glass pane 3000 mm x 800 mm
  - The possibility of opening the building on both sides of the balcony by using an integrated two-point lock
  - Two specially designed lock that prevents opening of the glazing from the outside

- Precision four-roller chassis, allows for smooth, quiet travel along the guide.



PICTURE 15. Montarek frameless system. Website: (Montarek 2016.)

- MONTAREK Frame system - Very aesthetic light system of sliding windows made of glass and aluminum provides high tightness glazed room.
  - Aluminum profiles with high stiffness allow for glazing in full.
  - Unlimited number of windows that run along the guide track 1-8.
  - The system framework is used for window glass float 5mm depending on the needs and circumstances of construction may be used glass or safety glass 6mm 33.1 film in the middle.



PICTURE 16. Montarek frame system. Website: (Montarek 2016.)

### 7.2.7 Żar-Kar

The beginning of the company's activity in the industry is the year 1994. Constant and systematic development, lasting for years has led to the fact that owner Robert Karkuzewicz with his wife Margaret Karkuzewicz built a company with a high reputation and leaned it on a solid foundation. Selected at this time, a team of professionals is the best of the best. Website: (Zar-Kar 2016.)

Company is handling 3 different type of balcony glazing systems produced by Copal and Cover.

- COPAL VISION Frameless system – it's a system that is based on the innovative design of the chassis vertical rolls. Sliding glass panels is therefore quiet and does not require the use of force. This system allows you to arrange the windows, that it is completely invisible and allows air to circulate freely. COPAL VISION enclosure system is a practical cover of the balcony without interfering with the architecture of the building. Its form gives a higher standard use and a very modern design. High durability and reliability of the system is achieved through aluminum profiles the highest quality, as confirmed by the approval of the Building Research Institute.
  - maximum enclosure height – 2400 mm
  - maximum sash width – 650 mm
  - maximum number of sashes – any

- glass thickness – 6/8 mm
- for – balconies and terraces
- arches – no



PICTURE 17. COPAL Vision frameless system. Website: (Zar-Kar 2016.)





PICTURE 18. COPAL Vision frameless system. Website: (Zar-Kar 2016.)

### 7.3 Pricing

Below there are example prices for different kind of balcony glazing systems.

TABLE 6. Price of frame system enclosure from balustrade to ceiling with glass 4 mm thick (assembly included). Website: (Vidro 2016.)

Balcony length	Number of windows	Price
1,5 m	2	1100 zł ( <b>255 €</b> )
1,8 m	2	1300 zł ( <b>300 €</b> )
2,0 m	3	1400 zł ( <b>325 €</b> )
2,5 m	3	1500 zł ( <b>350 €</b> )
3,0 m	3/4	1600 zł ( <b>370 €</b> )

TABLE 6. (continues).

3,5 m	3/4	1800 zł <b>(420 €)</b>
4,0 m	4	2000 zł <b>(465 €)</b>
4,5 m	4	2250 zł <b>(525 €)</b>
5,0 m	5	2400 zł <b>(560 €)</b>
5,5 m	5	2660 zł <b>(620 €)</b>
6,0 m	6	2900 zł <b>(675 €)</b>

TABLE 7. Price of frame system enclosure with antifreeze PCV panels from floor to balustrade and glass from balustrade to ceiling (4 mm thick). Website: (Vidro 2016.)

Balcony length	Number of windows	Price
1,5 m	2	1250 zł <b>(290 €)</b>
1,8 m	2	1500 zł <b>(350 €)</b>
2,0 m	3	1650 zł <b>(385 €)</b>
2,5 m	3	1820 zł <b>(425 €)</b>
3,0 m	3/4	2150 zł <b>(500 €)</b>
3,5 m	3/4	2360 zł <b>(550 €)</b>
4,0 m	4	2600 zł <b>(605 €)</b>
4,5 m	4	2930 zł <b>(680 €)</b>
5 m	5	3200 zł <b>(745 €)</b>
5,5 m	5	3430 zł <b>(795 €)</b>
6 m	6	3750 zł <b>(870 €)</b>

Balcony glazing frame system enclosure from floor to ceiling (assembly included) average price per square meter is:

330 zł (76 €)

Balcony glazing frame system enclosure with sliding windows (assembly included) average price per square meter is:

750 zł (175 €).

Example prices:

- Copal frame system (anodized), 4 sashes, from balustrade to ceiling, no lock – width 4400 mm, height 1000 mm
  - with assembly (VAT rate 8 %) – 3491 zł (812 €)
  - with assembly (VAT rate 23 %) – 3976 zł (924 €)
  - without assembly (VAT rate 23 %) – 3361 zł (634 €)
- Copal frame system (anodized), 4 sashes, from floor to ceiling, no lock – width 4400 mm, height 1600 mm
  - with assembly (VAT rate 8 %) – 3824 zł (889 €)
  - with assembly (VAT rate 23 %) – 4355 zł (1012 €)
  - without assembly (VAT rate 23 %) – 3740 zł (870 €)
- Copal Vision frameless system (anodized), 8 sashes, from balustrade to ceiling, no lock – width 4400 mm, height 1000 mm
  - with assembly (VAT rate 8 %) – 4330 zł (1006 €)
  - with assembly (VAT rate 23 %) – 4931 zł (1146 €)
  - without assembly (VAT rate 23 %) – 4316 zł (1003 €)
- Copal Vision frameless system (anodized), 8 sashes, from floor to ceiling, no lock – width 4400 mm, height 1600 mm
  - with assembly (VAT rate 8 %) – 5094 zł (1184 €)
  - with assembly (VAT rate 23 %) – 5802 zł (1349 €)
  - without assembly (VAT rate 23 %) – 5187 zł (1206 €)

Most of the companies give only orientation prices, due to the fact that balcony glazing has to be adapted to the specific balcony construction. Many of them do not specify what are the prices until they come and make an analysis in the place. Prices above are only average and can significantly vary on the type of the building as well as area of the country and the company assembling the enclosure. Prices are given in PLN (Polish zloty) currency and calculated into Euro by 1 € = 4,3 PLN.

## 8 INTERVIEWS

There are six questions given to three persons linked to construction industry – architect, housing cooperative developer and construction worker. As mentioned in Chapter 2 Market analysis in theory, these are the interviews conducted face-to-face.

### 8.1 Architect

The design of future housing should contain basic information on the basic shape and dimension of a possible balcony. This difficult despite appearances, the process requires a great deal of attention, the ability of the orientation of the building, as well as knowledge of modern trends in construction. Architect, is a very responsible profession dedicated to people about the abilities of self-control, creationism intellectual and faith in the power of hand. Especially for our study we conducted interview with a respected, local architect Ms. Agnieszka Przybylska who expressed its approval for the introduction of a permanent balcony glazing for residential development.

1. What do you think about balcony glazing replacing standard balcony construction schemes?

Solutions such as balcony glazing is quite young, only a fledgling idea in general construction. We, architects, like this type of challenge, because it allows us to use the knowledge acquired in the field of statics and strength, and structural design. Drawing performed simulations are necessary. As for the answer to the above question: definitely yes. Because it is the idea of innovative, ergonomic and comprehensive.

2. When will it happen?

As I have mentioned earlier this idea is just unfolding. However, its stage of development is much more dynamic and quick than traditional balconies. But it will be very difficult to change the way of thinking in terms of traditional balconies...

3. How do you assess profitability of balcony glazing usage?

The actual price of their installation for average people can be depressing. However, the majority of them, sooner or later finally will decide to get it. In terms of the profitability of such an investment for the companies that will generate costs but happily to return with a surplus. In view of our variable climate

and Sunday, lazy habits of such a solution as balcony glazing is ideal. That is why I most recommend to all lovers of the outdoors.

4. Do you think customers will be interested in apartments with balcony glazing?

It's a very interesting question. The fact that innovation is quite young in our country, but historically goes back at least to 1980s, I could see that clients over 50 years old approach to this idea quite skeptically. Perhaps this is due to the fact that they never had anything to do with it before. I wondered even on one factor: the rampant claustrophobia and fear of accidental breakage and damage. Therefore, the idea of this type of glazing is received with undisguised approval from persons under 50 years old, and young families with small children.

5. What is the possible influence of balcony glazing concept in big block of flats architecture?

It is a difficult architecturally and structurally idea, because it never occurred builders to pre-communist introduce any innovations from Europe. More and more people are interested since the concept was born in the cold Finland. Construction based on big concrete panels was a miracle 70 years ago, but now is the bane of modern families, for whom it is important contact with the outside world. The very process of building a traditional balcony was so complicated that it was in only a small percentage of them. Building balcony in blocks of concrete slabs is a good idea, but the cost of its introduction increased by double.

6. Please define your experience in that area.

In my short career as an architect I faced frame and frameless systems only four times. It's not much, but the projects themselves encouraged me to familiarize myself with this trend. These projects were based rather on performed the appropriate outline the balcony, so that the ratio to the total size of the property housing was 1:5. Only balcony had to be adapted to the possible implementation of the balcony glazing.

## 8.2 Housing cooperative developer

Thanks to the competition in the overall costs of construction, housing cooperative succeed, because cost of buying an apartment is on average 10-20% less than at normal private developer company. Thanks to that, balcony glazing trend is being introduced, additionally possible to assembly or remove which brings more and more interested customers. Our interlocutor, Mr. Michal Owczarzak, Director of Resource Management Department in Gniezno Housing Cooperative has shared his observations about balcony glazing.

1. What do you think about balcony glazing replacing standard balcony construction schemes?

It is hard to say, because this trend is mostly visible in bigger cities such as Poznan or Warsaw, not really in Gniezno.

2. When will it happen?

Honestly speaking, it is not easy to define exact time. I think the more people will get familiar to those kind of systems, the more will decide to implement it in their own apartments. However, I believe it will not happen fast in our city.

3. How do you assess profitability of balcony glazing usage?

Costs of assembly might be very high, due to the fact they depend on the size of the balcony. But I have never thought about this.

4. Do you think customers will be interested in apartments with balcony glazing?

It would be needed to analyze the market, because in smaller cities such as Gniezno, the interest in balcony glazing is very little because of the high cost applying to each square meter and as well little knowledge of this kind of solutions.

5. What is the possible influence of balcony glazing concept in big block of flats architecture?

Balcony glazing surely will improve the visual aspect of our sad, grey block of flats with balconies where most of the people hang their laundry.

6. Please define your experience in that area.

I do not consider myself as an expert, and my knowledge regarding those issues is quite little. If I put myself into 1-10 scale, I would evaluate myself as 4.

### 8.3 Construction worker

The most important role in the process of constructing and improving the block of flats is the hands and power of construction workers. They do the most difficult task, because success of each investment of building apartments for people depends on them. Point of view of the construction worker will have more or less practical character, dependent on daily observations in the construction sites. The last interview was with Mr. Marek Karwanski, construction worker.

1. What do you think about balcony glazing replacing standard balcony construction schemes?

Absolutely yes. I observed myself, that balcony glazing has many more advantages. One of the residential houses constructed by us in Poznan was about to have balcony glazing systems from the very beginning. My colleague even assembled them later.

2. When will it happen?

Implementation of balcony glazing is going forward, but slowly. I could not give you an exact timing.

3. How do you assess profitability of balcony glazing usage?

So far when building houses in Poznan, this kind of systems were affordable only for rich people. Most of the average population just don't have money for it. As far as I know, thanks to balcony glazing it is possible to save energy.

4. Do you think customers will be interested in apartments with balcony glazing?

Until now, only educated and rich people decided to install balcony glazing in their houses.

5. What is the possible influence of balcony glazing concept in big block of flats architecture?

Block of flats have usual apartments. Rarely they do have balconies. And even if they do, they are very small. It would not be profitable to implement balcony glazing in this kind of housing. Why? Assembly would be very difficult, if not impossible.

6. Please define your experience in that area.

I have very little experience in balcony glazing systems, so far only once I have met it. Most of the balconies we construct are usual balconies or terraces. Sometimes we just do winter gardens.

## **8.4 Conclusions**

Based on the interviews above, we find out that only architect has a wider knowledge of balcony glazing systems and can say more than few words about it (page 42). Rest has heard just few things, but do not possess specific information. Construction workers do know very little (page 45), most of them have no experience in the construction or assembling balcony glazing systems. Housing Cooperative representative seems to know even less (page 44), due to the fact none of the houses in his company has balcony glazing so far.



## 9 SUMMARY

Polish society is not very familiar with balcony glazing systems, that is why those are not very popular in Poland. Due to the fact, that Polish climate is warmer than in Finland, there has never been a big need for this kind of solutions so far. However, rising popularity of minimalistic Scandinavian architecture brings up new possibilities for companies with experience in producing balcony glazing. Every year there are more and more balcony glazing systems being set up in Polish housing, firstly as winter gardens and terrace glazing, but now in wider range also in block of flats housing as well.

In the last twenty years, many new companies have established its performance in this area, such as COPAL, which produces its very own balcony glazing systems. This is an example of a company which is now expanding to abroad markets. Still there are not many experienced, foreign companies in Poland which can produce high quality products out of checked raw materials. Many innovations being placed now in Scandinavia haven't found their own place in central Europe so far.

Finding a good partner company in local market is a key issue for all the companies which want to enter Polish market. It would not be profitable to open a big branch (at least for a few years) due to the fact labor and materials in Poland are much cheaper than in Finland. The main target group for company entering Polish market is people who can afford better quality but more expensive systems.

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