PAPER • **OPEN ACCESS**

Use of Daylight and Aesthetic Image of Glass Facades in Contemporary Buildings

To cite this article: Malgorzata Roginska-Niesluchowska 2017 *IOP Conf. Ser.: Mater. Sci. Eng.* **245** 082035

IOP Conf. Series: Materials Science and Engineering **245** (2017) 082035 doi:10.1088/1757-899X/245/8/082035

Use of Daylight and Aesthetic Image of Glass Facades in Contemporary Buildings

Malgorzata Roginska-Niesluchowska [1]

[1] Gdansk University of Technology, Faculty of Architecture, G. Narutowicza 11/12, 80-233 Gdańsk, Poland

maron@pg.gda.pl

Abstract. The paper deals with the architecture of contemporary buildings in respect to their aesthetic image created by the use of natural light. Sustainability is regarded as a governing principle of contemporary architecture, where daylighting is an important factor as it affects energy consumption and environmental quality of the space inside a building. Environmental awareness of architecture, however, involves a much wider and more holistic view of design. The quality of sustainable architecture can be considered in its aesthetic and cultural context with regard to landscape, local tradition, and connection to the surrounding world. This approach is associated with the social mission of architecture, i.e. providing appropriate space for living, facilitating social relations and having positive impact on people. The purpose of the research is to study the use of daylight in creating an aesthetic image of contemporary buildings. The author focuses mainly on public buildings largely dedicated to art and culture which satisfy high functional and aesthetic requirements. The paper examines the genesis and current trends in the aesthetic image of modern buildings which use daylight as the main design strategy, focusing on the issues of glass facades. The main attention is given to the shaping of representative public areas which feature the glass facades. The research has been based on a case study, critical review of literature review, observation and synthesis. The study identifies and classifies different approaches to using daylight in these areas and highlights changes in the aesthetics of architecture made of glass, which uses daylight as the main design strategy. These changes are primarily caused by the development and spreading of new glazing materials and the use of digital method of design. The influence of light and its mode depends on glass materials but also on the local conditions of the site, and has a significant impact on the relationship between architecture and its natural and cultural environment. The subordination of architectural concept to the idea of natural lighting builds the relationship between form, function and the context of architecture, and is expressed in its structural, material and spatial properties, and in the resulting aesthetic order. Search for new architectural solutions is defined by local topographical, climatic, biological and cultural conditions. The architecture subordinate to the conception of contribution of light corresponds to the aesthetic aspirations of sustainability.

1. Introduction - Aesthetic aspects of sustainability

Sustainability is a guiding principle in contemporary architecture. One of the main tasks of architecture is to look after the natural environment and heighten the environmental awareness. Sustainability refers to the essence of an architectural project, which has to satisfy numerous evaluation criteria. Daylight is an important strategy of sustainability as it affects energy consumption and the indoor environment quality of the building. The latter includes air quality, acoustics, daylight and views, all of which influence the users' health, well-being and productivity. "But true green building is about a much wider,

more holistic view of design. You can quantify those aspects which, hitherto, are much more intuitive." [1] Architecture has a significant impact on people because it shapes their environment. Phenomenology of architecture describes space, texture, light, spatial overlap, etc. The idea of architecture is created by its atmosphere: the light, sound, perspective and multiple aesthetic experiences associated with the contemplation of architectural space. "All the dependencies, relations between construction, history, culture, complicated technology of climatic control and all the arts are telling story, very complex story at the edge between architecture and anthropology." [1]

In the contemporary discourse about architecture a lot of attention is dedicated to the aesthetics that expresses the idea of sustainability. Architects are trying to find the answer to the question:" How may sustainability provide a form of aesthetic thinking about architecture?" The principles of a sustainable design are rooted in the relationship between the building and the site with its environmental conditions, such as topography, vegetation and climate. "In regard to the relationship among form, function and context, a built form should inform and express the principles of its programmatic, structural, material and spatial qualities. And an aesthetic is supposed to emerge from, as well as be embodied in, the order that ties them together as an indivisible whole." [2] Architecture, regarded as the most distinctive form of human work, will only be able to contribute to the sustainability of the natural and man-created environment if its fundamental position in the present model of material economy and culture has been changed. Architecture expresses the civilization and its aspirations and is placed in the natural world. The industrial and technological development observed since the beginning of the 20th century, as well as the dominant market economy model brought about some serious environmental problems. These should be solved and a new approach to sustainable development should be presented. [2]

Today's architecture, following current aesthetic trends, is out -of -date, long before the end of its functional life. [3] This should be perceived as prodigality. Contemporary architecture does not require any radical changes in people's lifestyle, but it focuses on the development of technological strategies that will help to keep the consumer's model of life at the lowest cost of resources and energy. Thus, it becomes a subject to commercial aesthetics. The solution can be found in the poetic aspect of architecture: "Because architecture, like all of the arts, has the capacity to reveal its world, architecture with its poetic capability may yet be able to reveal and respond to how unsustainable the commodification process has become." [3] If architects use space, surface and light in an intelligent way, they will be able to reach more than just the goals of efficiency and economy, but they will create the architecture that is sensual and lasting. [4]

The sensual aspect of designing human interaction with the environment is a key issue in sustainable architecture. Modern buildings should be able to respond to dynamic changes in the environment. [5] Digital tools have modified the creative process of architecture establishment, affecting the aesthetics of the project. The sustainable design aesthetics can also result from a digital search for spatial solutions for various environmental data. The quest for new solutions can be inspired by forms of nature. Mimesis and symbiosis can play a key role, shaping the artificial environment, so that it will become an inherent, more natural ingredient. The aesthetics of sustainable design is an evolving process related to the development of new architectural elements, materials and techniques. [6]

The purpose of the research is to study the use of daylight in creating an aesthetic image of contemporary buildings. The author focuses mainly on public buildings largely dedicated to art and culture which satisfy high functional and aesthetic requirements. The paper examines the genesis and current trends in the aesthetic image of modern buildings which use daylight as the main design strategy, focusing on the issues of glass facades. The main attention is given to the shaping of representative public areas which feature the glass facades. The research has been based on a case study, critical review of literature review, observation and synthesis. The study identifies and classifies different approaches to using daylight in these areas and highlights changes in the aesthetics of architecture made of glass, which uses daylight as the main design strategy.

2. The origins of glass façade

2.1. Aesthetics of transparency and the ideas of modernism.

The Crystal Palace by Joseph Paxton – an exhibition pavilion in the form of a giant greenhouse constructed for the World Exhibition in 1851 to express technical potential of the industrial revolution, awakened the architects' imagination and their dreams about new architectural solutions. The glass façade entered into the language of modern architecture owing to the revolutionary ideas of the modern movement, which introduced the principle of free facade design, being independent of a building structure. The modernistic idea of mutual penetration of the interior and exterior was realized as a skeletal system of structure, an open plan and maximum glazing of a building in order to provide maximum daylight in interiors and ensure connection with the surrounding landscape. This idea was fully manifested in the works of Mies van der Rohe, such as the German Pavilion at the International Exhibition in Barcelona, 1929 (reconstructed in 1986), the Pavilion Crown Hall, Chicago, 1956 (Faculty of Architecture at IIT Illinois Institute of Technology) or the New National Gallery in Berlin (1962 - 1968). These are undoubtedly his greatest architectural achievements in the pursuit of a free articulation of the open space, the space connected with the surrounding area by employing a steel frame construction and glass. Mies van der Rohe is regarded as a spiritual father of minimalism and a leading representative of an international style, as his work was devoted to the idea of the universal architecture, refined in its simplicity, based on the principle of "skin and skeleton", whose outer shell was usually glass. The vision of glazed skyscrapers, the so-called "glass houses", proposed by modernists expressed the expected aesthetic and social changes. In revolutionary Russia iron and glass were to become modern, proletarian equivalents of marble, and are still the symbols of aspirations of the utopian architects of the 20th century.

2.2. New technical possibilities and the development of glass façade.

The technology applied by modernists allowed the vision of transparent architecture to be realized only on a small scale. In the case of high-rise buildings, the intended effect of lightness and transparency was impossible due to some technical restrictions, i.e. a small size of glass panes (which required additional construction, giving a clear effect of façade distribution) and some utilization problems, such as security or thermal issues. A number of visions of "glass houses" with ethereal coating were realised only on paper at that time. The examples of these are the competition project for the office building at Friedrichstrasse in Berlin (1919) and the skyscraper concept for Berlin (1922) with its soft, curved facades, both designed by Mies van der Rohe. The further development of glass curtain took place during the post-modernism period as a result of technical development, adopting the modern technology of glass (solar-tinted glass and reflective glass) and the high-tech aesthetics in architecture. The invention of structural glazing and the development of building glass technologies played a significant role. The realization of Willis Faber & Dumas Headquarters in Ipswich (UK 1971 – 1975) by Norman Foster based on a pioneering, energy-saving design is an example of applying innovative technological solutions. A three-storey glass curtain wall is suspended from a clamping strip at the roof level. Solar-tinted glazing panels are connected by means of corner patch fittings and silicon joints, and a discreet system of internal glass fins at each floor level provides the indispensable reinforcing structure. [7]

After the Second World War a glass façade became an obligatory element of the so-called "international style" used while modernizing America and rebuilding Western Europe. Subsequently it conquered all industrializing countries from Japan and Australia to Latin America. Shiny glass façades became not only a symbol of modernity, but also a favourite big business fetish, a symbol of power and metropolitan aspirations. The facade changed from a transparent pane into a big screen reflecting the surroundings. Those days reflective glass became especially popular, the material was supposed to equip the buildings with the aspect of invisibility - a specific perversion of the view of the place by multiplying the image of its surroundings. [8]

3. Aesthetics of glass facades – the architecture of light effects

3.1. Translucent glass facades - dematerialization and etherisation of architecture

The further development of glazing technologies, especially the colourless low-emission glazing, was a crucial factor in turning to the traditional transparency of glass facade and restoring the aesthetics

of transparency in the 1990s. The concept of ethereal architecture is not based on geometrical space, but by on the way of using light. This architecture is defined by transparency and light. Traditionally understood transparency in architecture meant manipulating of light, introducing some elements of illusion, penetration and ephemera. Transparency is based on the principle of attenuation of contrasts obtained through filtering, modelling and penetration of light so that the building facades become increasingly difficult to be defined and isolated from the surroundings. The separation of the interior and exterior becomes difficult, too. The transparent architecture is to disappear and the spaces penetrate each other into infinity. [9]

These features are particularly evident in the case of Jean Nouvel's ethereal and refined architecture. It means a combination of contextual requirements and an extremely modern approach to the architectural concept, which distinguishes his architectural works from the others. He uses the effects of disappearance of architecture in the filigree building of the Fondation Cartier pour l'Art Contemporain Museum in Paris (1994) in spite of its large scale. Almost a transparent building rises behind a sequence of diaphanous screens, which confuse our view of the building location. This effect is intensified by the building's connection with the garden and the trees being located between the building and the glass screens. J. Nouvel also uses the manipulation of light and layers of transparency and opacity in the KKL Luzern (Cultural and Conference Centre) in Lucerne (2000) and in the Musée du quai Branly in Paris (2006). He also wanted to achieve the effect of an infinitely high building through dematerialisation of glass facade in the unrealized project of the “Endless Tower” for La Defense district in Paris (1991). The skin of the tower was to change from the bottom to the top, becoming increasingly transparent to finally disappear in the clouds. A part of the assumptions of his design was later realized in the "Tour de Verre" in New York. (Competition: 2007) [10]

3.2. Democratization of space

The symbolism of transparency referred to democratic values and represented openness, public availability, accessibility and security. It is especially recognized in the buildings of public utility, in particular the ones of cultural and social function. They gained functionality typical of "exhibition windows", at least in the entry zones. A good illustration of this is the Rosenthal Centre for Contemporary Art in Cincinnati, Ohio, USA, by Zaha Hadid (1998 - 2003), where a dynamic urban space was created in the form of an "urban carpet". It looks like a pavement, curved upwards, passing from the outside through the interior and rising to make the rear wall of the building. The wall is intended "to draw in the pedestrian movement from the surrounding areas - running from the building exterior through the entrance, lobby and into the interior", [11].

This is the realization of a vision of so-called “anti-elitist” museum, with the arcaded entrance resembling the entrance to the shop. The most spectacular examples include the glass dome for the old Reichstag building, created for the New German Parliament in Berlin (1992 - 1999), after the fall of the Berlin Wall. The copula became a newly established Berlin landmark and symbolises the renaissance of German democracy after the fall of communism. It also supplies natural light into the interiors, blocks the excessive heat and glare providing natural ventilation. The dome is open to the public, so spectators can observe parliamentary debates through the glass ceiling and also admire the surrounding horizon, [12].

3.3. Translucent glowing facades

In the 1990s the minimalism became popular in architecture and started to be widely expressed by means of light and glass. It manifested the sophisticated simplicity of a form, a respect for disused materials and established some rational principles of technical solutions, realized in a poetic and sensual way. The use of unconventional materials (such as matt-brushed and sand-blasted glass, as well as transparent thermal insulation) and innovative structural solutions (carefully thought-out stratification of façade) resulted in unconventional effects of fuzzy, translucent glass blocks, shimmering in natural light. This architecture often stands in contrast to rich historical buildings and also creates a neutral background to the natural or cultural surroundings.

The unusual project of the Museum of Art in Bregenz, (Austria, 1990-1997) by Peter Zumthor was designed to meet the requirements of the concept of natural lighting in all museum galleries by the diffused upper light. The entire structure of the building was subordinated to the purpose of collecting, filtering and supplying daylight into the museum space. The minimalist building has a double structure: the exterior constitutes a glass façade made of matte, etched raw glass tiles while the interior is made of concrete. This rule applies also to the glass slings and the ceilings between floors. The space left between the glass surfaces, the reinforced concrete walls and the ceilings is used to transfer light. It is also used for heating in winter and for natural ventilation and cooling in summer. The semi-transparent glass façade creates a blurry and misty image of the building, so it looks like an "immaterial apparition", which varies depending on the angle of vision, time of the day and weather. The glass enclosure partly absorbs and partly reflects the changing light and colour of the sky, giving the impression of "the inner life". The museum is referred to as a "light box" or a "light tower". Daylight bounces off the internal concrete walls, bringing about the effect of the facade being illuminated from the inside. The striking feature of this "economical" architecture inside the museum is a special quality of light, which, being numerously filtered, creates a unique atmosphere of an "underwater world". Owing to this "special light", the simplest materials in the interior take on a sensual appearance - grey concrete walls look smooth and velvety, the terrazzo floor is grey ("pepper and salt") in colour, and the matte etched glass ceiling glows and glistens with a pale greenish light. [13]

The expansion of the Nelson-Atkins Museum in Kansas City by Steven Holl (1999-2007) was intended to be entirely in contrast to the already existing museum built in a Classicist style of the 1930s. Steven Holl proposed an extension that was largely hidden in the hilly, diversified terrain of the museum garden. The architecture, which the designer decided to combine with the historical form of the building, is peculiar. Glass skylights emerge from the ground in the form of glass pavilions of various size. They co-create the external exhibition space for sculptures placed in the museum's gardens. The architect called them "lenses", as their task is to capture daylight from the outside, filter it and distribute into the galleries. The structure of the project is directly related to the concept of skylights. The proper circulation of light and air is provided by the T-shaped walls placed in the centre of the skylights and perpendicular to the north-south axis (so-called "breathing T"), which at the top are shaped like a reflector. The lantern walls are composed of two glass shields, each of different glazing with the operating (circulating) space between them. It provides thermal stability and allows to install an automatic solar control shade system for controlling a light input. The outer glass shell is made of double- layered, U-shaped glass units with semi-translucent insulation. They block the radiation that may be harmful to the pieces of art exhibited in the gallery. "The walls of the lenses are composed of 16-inch-wide planks of structural self-spanning channel glass. An intricate system of stippling the centre glass surface along with a sandblasted translucent insulation gives the glass either a satin reflection or a moiré effect, depending on the viewing angle. Inside the cavity wall, two layers of low-iron laminated sheet glass are applied to maintain the clearest colour rendering of daylight as possible." [14] (Figure 1)

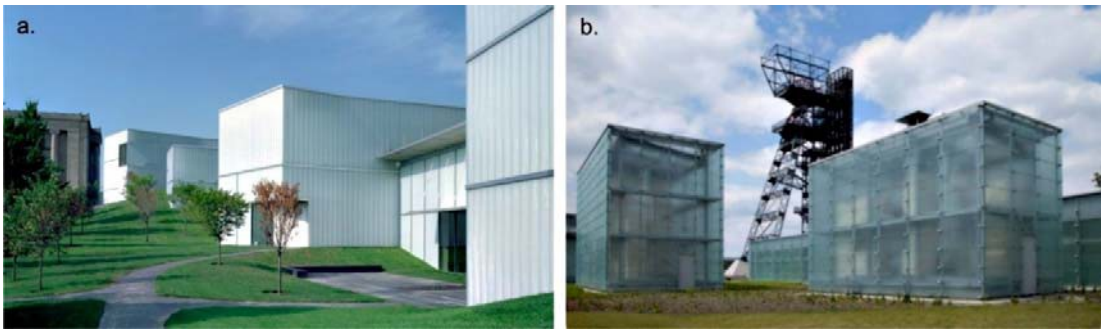

Figure 1. Effects of translucent glass:
a) - Nelson-Atkins Museum in Kansas City by Steven Holl (1999-2007) [15]
b) - Silesian Museum in Katowice (Riegler Riewe Architekten, 2007-2015)

Similar solutions for translucent façades were also applied in Poland in recently realized cultural facilities. The Philharmonic Hall in Szczecin (Estudio Barozzi/Veiga in cooperation with the Studio A4, 2011-2014) is surrounded by a double facade: the external - slightly transparent, glass-aluminium one and the internal – concrete, with numerous openings. The empty space between them captures and reflects light, which gives the building facade a distinctive glow and causes the building to be perceived as a light emitting object in the urban space. The free space between the layers of the façade functions as a service space - it houses, among the others, an automatically controlled LED lighting installation, which supplies spectacular night lighting that distinguishes the building from the others. The form of the building differs from that of cubic pavilions, although it is still a simple geometric convention. Vertical fragmentation of the façade, the prevalence of repetitive vertical directions and the steep slope of the roofs correspond to the neo-Gothic historical buildings of the city. The use of exterior glass coating provides a contrast to the local materials and emphasizes the distinctiveness of the building in relation to the surrounding. Owing to its transparency, the interior of the structure remains in contact with the city. Being shiny, glossy and translucent, the building is easily recognized and makes a well-known city landmark.

The new building of the Silesian Museum in Katowice (Riegler Riewe Architekten, 2007-2015) was established as part of the revitalization program concerning the site of the disused coal mine, located close to the city centre. It was the first point of the so-called “cultural axis” of Katowice. The architectural concept resembles the idea of expanding the Nelson-Atkins Museum in Kansas City. In both the substantial volume of the facility is hidden underground (in the case of the Silesian Museum inside the former mine), while on the surface there are some neutral, semi-translucent cubic forms of glass pavilions. They function mainly as skylights, but also as an administration and an entrance pavilion. Being in harmony with the urban layout of existing buildings, they provide daylight to the exhibition spaces and co-create the attractive public space around the museum, together with the post-industrial brick buildings of the mine subjected to revitalization. This concept does not interfere with the mine historic landscape but creates a neutral, ephemeral glass structure - noble and timeless. (Figure 1)

3.4. Three-dimensional glass facades and dichroic glass - twinkling and rainbow effect

A good example of artists and architects’ cooperation is the design of the elevation for the Reykjavik Concert Hall and Conference Centre (Henning Larsen Architectsand Batteriid Architects together with Olafur Eliasson's studio, 2007-2011), known as Harpa. The architectural form of the Harpa Centre was inspired by nature (the rocky landscape of Iceland), in particular the characteristic local basalt formations, which provided an inspiration for the geometric structure of the facade. Spectacular light effects are the result of different moods of light, typical of the island. These are especially visible on the southern three-dimensional glass/steel facade, modelled on a honeycomb and made up of various hexagonal elements. The other façades and the roof were constructed as planar cross-sections of this three-dimensional structure. According to the authors of the project: “Light and transparency are key elements in the building”. The crystalline structure created by the geometric figures of the facade captures and reflects the light, promoting the dialogue between the building, the city and the surrounding landscape. Dichroic glass, developed by NASA (National Aeronautics and Space Administration) for satellites mirrors and now used in high-tech art because of its artistic potential, found application in this artistic vision of the structure. The iridescence effect is the result of the interference of light waves. Natural light reflected from the transparent and translucent panes made of dichroic glass produces unusual twinkling rainbow effects displayed on the glass facade. Three-dimensional computer models, finite element modelling, various digital visualization techniques as well as Marquette models and mock-ups were used in the design process to develop all ideas of the glass facades. One of the main ideas has been to "dematerialize” the building as a static entity and let it respond to the surrounding colours - the city lights, the ocean and the glow of the sky. In this way, the expression of the facade changes according to the viewing angle. With the continuously changing scenery, the building will appear in an endless variation of colours”, [16] (Figure 2).

Figure 2. 3D glass façade and dichroic glass:
a) b) - Reykjavik Concert Hall and Conference Centre (Henning Larsen Architectsand, Batteriid Architects and Olafur Eliasson's Studio, 2007-2011) [17]
c) - Ports 1961 Shanghai Façade (UUfie, 2013-2015) [18]

3.5 Reflective glass and optical illusion

Reflective glass is widely applied in modern facade systems. When used in moderation and in a thoughtful way, it can give the interesting effects of transformation and deformation of space. They result from multiple mirror reflections and optical illusions. Reflective glass is often combined with other materials, as in the contemporary realizations of cultural facilities in Cracow and Katowice. The building of CRICOTEKA Museum of Tadeusz Kantor (Wizja and nsMoonStudio, 2009-2014) refers to the Tadeusz Kantor's art, who gave the rank of work of art to everyday objects, however worn out or destroyed. Inspired by Kantor's picture showing a man carrying a table, a former 19th-century power plant in a post-industrial district has gained a new life because of its extension erected in the form of packaging. Its image is processed and amplified in the mirrored lining of the building above it. (Figure 3.). The Katowice International Conference Centre (JEMS, 2006-2015), part of the "cultural axis" of Katowice (mentioned in 3.3), was built close to the famous Katowice “Spodek” (Saucer) in Poland. Designed by Maciej Gintowt and Maciej Krasiński it is one of the finest achievements of the Polish contemporary architecture. It does not compete with the “Spodek”, the symbol of Katowice and the Upper Silesian region, but tries to melt into the surrounding landscape. Using the mirror glazing, it duplicates the reflection of the “Spodek” and introduces illusionistic reflections of the floor in the mirrored finishes of the pedestrian overhang. (Figure 3)

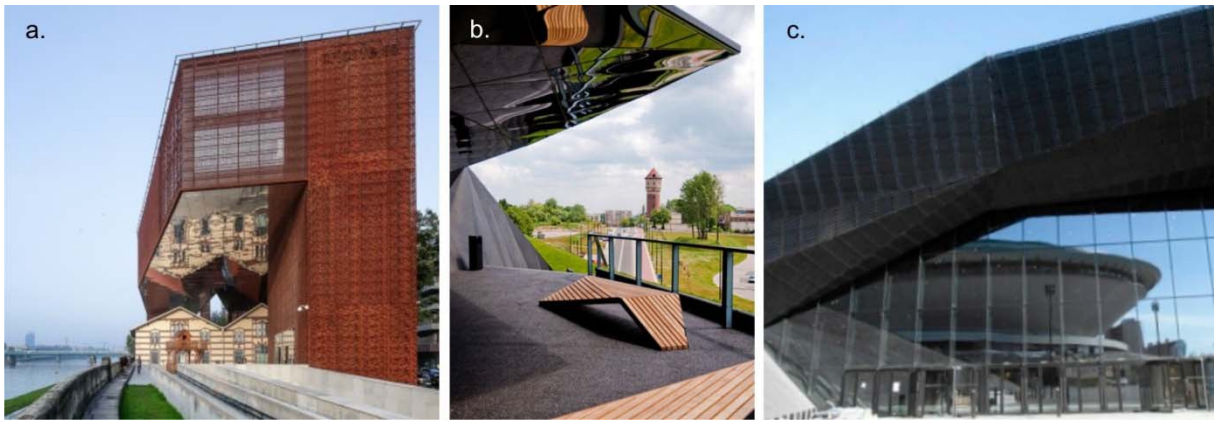

Figure 3. Reflective glass and mirror reflection:
a) - CRICOTEKA Museum of Tadeusz Kantor (Wizja and nsMoonStudio, 2009-2014),
b) c) - Katowice International Conference Centre (JEMS, 2006-2015)

4. Results and discussion

The criterion for selecting the buildings presented in this paper refers to materials which cooperate with daylight. Different types of glass have been used in the facades of the selected buildings: transparent, translucent, reflective and dichroic. Table 1 contains the examples of some activities of light typical of the presented projects.

Table 1. Main types of glass facades and their interaction with daylight

Type of glass	Visual effects	Aesthetic impression	Symbolism
Transparent glass	Mutual penetration of inner and outer space, Overlapping multiple image plans	Lightness, Featherweights Evanescence Dematerialization Hiding, illegibility, Optical illusions	Openness and accessibility of facility Transparency in functioning Indoor and outdoor security Social democratization
Translucent glass	Effect of light Brightness Glitter, sparkle Blurring contour Variability of image	Brightness Highlighting Evanescence Mysteriousness Silkiness Iceberg	Materializing of light Tranquillity and energy Mystery Sacrum Neutrality
Reflective glass	Mirror reflection, Image distortion	Dematerialization, Optical illusions Shine and brilliance	Prestige Splendour Performance
Dichroic glass	Iridescence effect Rainbow colours Glitter, sparkle	Phenomenon Crystallinity	The northern lights Rainbow
Three-dimensional glazing	Multidirectional reflections, Multidirectional gloss and shine	Crystallinity Multiple reflections Kaleidoscope effect	Crystal Diamond Kaleidoscope Iceberg

Technologically, the most advanced glazing belongs to the group of materials capable of responding to changes in the environment, so called “smart” materials. The change in physical properties, such as colour, shape, viscosity, light “conductivity” and energy conversion can take place as a result of certain input (e.g. thermal, chemical, mechanical, electrical). Among the smart materials are photochromic and electrochromic glass, suspended particle devices (SPDs), liquid crystal glass, photovoltaic glass, piezoelectric materials, etc. Their use in architecture is limited (because of high cost) but is steadily increasing. Some extensive work is being done on technologies that will allow them to be widely used in the construction industry.

The examples of realized cultural facilities presented in this paper are based on concepts that feature the use of daylight. The projects were selected in architectural competitions and were rated as the best, the most original and unconventional spatial and aesthetic solutions. They owed their success to the concept of daylight illumination, subordinated to functional and spatial solutions and to the aesthetic expression of the building. After dusk the lack of daylight is compensated by artificial light installations. These extraordinary buildings contributed enormously to the creation of attractive public space, where the natural environment and cultural facilities come together. The aesthetics of glass and daylight is sensitive to the changeable weather conditions and the surrounding landscape. Glass facades seem to merge into the environment, imitate or discreetly complement the surroundings. Thus the architecture gains a neutral, poetic and timeless character. It integrates well with the protected natural or cultural landscape. The effect of daylight on the aesthetics of glass envelopes concerns not only the interaction of light and glass but also the use of shading devices, the influence of light on shaping architectural

forms, and finally the effects of light and shadow. This subject, however, goes beyond the limits of the study.

5. Conclusions

The architecture subordinate to the conception of contribution of light corresponds to the aesthetic aspirations of sustainability. The influence of light and its mode depends on glass materials and also on the climatic conditions of the site, and has a significant impact on the relationship between architecture and its natural and cultural environment. The subordination of architectural concept to the-idea of natural lighting builds the relationship between form, function and the context of architecture, and is expressed in its structural, material and spatial properties, and the resulting aesthetic order. Searching for new architectural solutions is based on local topographical, climatic, biological and cultural conditions. Daylight is a significant factor of the aesthetic impact, which prevents architecture from following aesthetic trends and is not subordinated to commercial aesthetics. Avoiding prodigality, it is not subordinated to commercial aesthetics. It will rather assume a poetic and sensual character, carrying/conveying/fostering universal values. Thus, it can be recognized as a long-life architecture, which promotes the idea of sustainable development.

References

N. Foster, Inaugural Lecture for Harvard CGBC (Center for Green Buildings and Cities), November 5, 2015

S. Lee, “Introduction,” *The Aesthetics of Sustainable Architecture*, ed. S. Lee, pp. 7- 25, 2011

G. Hill, “The Aesthetics of Architectural Consumption,” *The Aesthetics of Sustainable Architecture*, ed. S. Lee, pp. 26-40, 2011

M. Sauerbruch, L. Hutton, “What Does Sustainability Look Like?” *The Aesthetics of Sustainable Architecture, ed. S. Lee,* pp. 41-49, 2011

G. Mangone, P. Teuffel, “Constructing Sensuous Ecologies: Beyond The Energy Efficiency And Zero-Carbon Argument,” *The Aesthetics of Sustainable Architecture*, ed. S. Lee, pp. 243-258, 2011

L. Finocchicaro, A. G. Hestnes, “Symbiosis and Mimesis in the Built Environment,” *The Aesthetics of Sustainable Architecture*, ed. S. Lee, pp. 259-271, 2011

Foster+Partners, http://www.fosterandpartners.com/projects/willis-faber-dumas-headquarters/, Access: 03/2017

J. Trybuś, ”A Brief History of Glass in Modern Architecture,” *The World of Glass (Świat Szkła)* vol. 5 [86] pp. 6-10, 2005

W. Leśnikowski, "Phenomenon of Transparency in Architecture"*, A&B* 12/1995 p. 16, 1995

The Pritzker Architecture Prize, http://www.pritzkerprize.com/2008/works, Access: 03/2017

Zaha Hadid Architects, http://www.zaha-hadid.com/architecture/lois-richard-rosenthal-center-for-contemporary-art/, Access: 03/2017

Foster+Partners, http://www.fosterandpartners.com/projects/reichstag-new-german-parliament/, Access: 03/2017

P. Davey, “Zumthor the shaman”, in: *The Architectural Review*, Vol.204, no.1220, October/1998, pp.68-74, 1998

E. Donoff, 2008 „AL Design Awards: Nelson-Atkins Museum of Art, Kansas City, Mo.”, *AL Architectural Lighting*, http://www.archlighting.com/design-awards/2008-al-design-awards-nelson-atkins-museum-of-art-kansas-city-mo_o, Access: 03/2017

Photo. Visitors Meetings: https://www.visitkc.com

Henning Larsen: http://www.henninglarsen.com/projects/0600-0699/0676-harpa---concert-hall-and-conference-centre.aspx, Access: 03/2017

Photo. Designboom: www.designboom.com

Photo. Su Shengliang