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MODERN DEVELOPMENT OF THE MARKET OF CERAMIC CONSTRUCTION PRODUCTS OF UKRAINE IN THE CONTEXT OF THE EUROPEAN INTEGRATION PROCESS

Purpose. To investigate the development of the Ukrainian market for ceramic construction products and the process of its transformation. To consider the main factors that make the production of ceramic construction products attractive to investors and evaluate the impact of factors on the state of the industry as a whole.

Methodology. The authors used a set of general scientific and special methods of research, including methods of retrospective analysis, synthesis, comparison, dialectical method of cognition and graphic display of research.

Findings. It is proved that the implementation of European standards and requirements in the construction process brings Ukraine closer to becoming a competitive state. The main problems of modern brick factories in the market of construction ceramics in Ukraine are revealed; the advantages of using wall ceramics in housing construction are identified and the prospects for its development are determined.

Originality. The authors have shown that the development of the ceramic brick market over the last 28 years has been gradually transformed into premium ceramics. They have also proved that: 1) due to the use of large-format ceramic blocks, it is possible to obtain a warm wall with low thermal conductivity of 0.16–0.20 W/K, which in turn allows increasing the heat transfer resistance up to 3.3; 2) the use of ceramic clinker brick due to the wide color gamut of various textures and surfaces allows acquiring the walls of modern residential buildings of environmental friendliness, practicality and beauty.

Practical value. Development tendencies, status and prospects of further dynamics of activity of the enterprises of building ceramics, make an actual research direction in the conditions of transformation processes occurring in Ukraine, so the results will be used in practice by scientists, architects, designers of new building complexes and cottage towns, civil servants specializing in strategic planning in the construction of industrial and civil structures.

Keywords: *energy efficient construction, ceramic clinker brick, ceramic tile, brick factory*

Introduction. Construction is a sector of production, the level of development of which is influenced by the macro- and microeconomic processes in the country, as the phases of recovery and crises in them are experienced, first of all, in construction. At the same time, the rates of growth and decline in the performance indicators of the industry are most pronounced in comparison with the pace of development of other sectors of the economy. The direct relationship between the development of construction in general and the production of ceramic construction products becomes apparent.

The problems of increasing the efficiency of construction activity, in particular ceramic construction products, are the subject of attention of many domestic scientists and practitioners. This involves an analysis of the properties of ceramic clinker for paving roads of TM “BrookKeram”; determination of its substitutes and comparison of their operational and price characteristics [1]; analysis of the state of the market of building materials of Ukraine, including ceramic wall and decoration [2, 3], etc.

It should be noted that domestic manufacturers of ceramic construction products have recently improved their production and covered the results of their work in scientific publications. For example, in [4] the development of proper systems of proper fastening and insulation was published, and in the monograph [5] the peculiarities of technologies of clinker ceramic materials based on the use of domestic raw material base were indicated, technological properties of different types of mineral raw materials and industrial wastes were revealed, their peculiarities were revealed use in the technology of clinker ceramics and reserves of energy savings in their production.

Given the considerable public interest in the ceramic construction products market in Ukraine, we can state its investment attractiveness. Therefore, it is likely that in terms of market potential, this segment will be interesting for a long time.

It is worth noting that today the main facing materials of the walls of buildings and structures are ceramic construction products, the advantages of which are durability, heat-efficiency, environmentally friendly and a wide variety of products, which opens many opportunities for architects and designers. Trends of development, state and prospects of further

dynamics of activity of the enterprises of building ceramics, make an actual direction of research in the conditions of transformation processes taking place in Ukraine.

Literature review. A statistical analysis of the production of ceramic bricks is presented in the annual directories [2], published over the last 10 years. A retrospective analysis of the development trends of the ceramic brick market in Ukraine is considered in [1, 3, 6].

An analysis of the production of ceramic clinker for facade cladding and paving in Ukraine is presented in [1, 5].

Results. Today is characterized by a worldwide trend of increasing energy efficiency requirements for buildings. The need to reduce the energy consumption of buildings, which is up to 40 % of the total energy consumption, is conditioned by the conditions of reduction of organic fuel reserves and its rise in price for consumers [7]. At the same time, for Ukraine, such a development will lead not only to a decrease in energy imports, but also to an annual saving of over \$ 10 billion. USA.

According to the Law of Ukraine No. 2118-VIII “On the Energy Efficiency of Buildings” dated 22.06.2017, the construction of such houses, facilities and structures which in the course of operation will require the use of less energy for cooling, heating, ventilation, and lighting than most buildings available currently [8]. As a result, energy-efficient construction is currently aiming to reduce specific energy costs, which will reduce the consumption of natural energy, reduce carbon emissions, and thus address environmental issues.

Recently, domestic developers have been favoring new energy-efficient and economical building forms, the energy-saving potential of which is aimed at saving finances. It is revealed in the process of economic exploitation of the constructed buildings due to the high quality of construction and the possibility of future savings of end users’ money. Therefore, it is quite understandable that these types of homes have become popular in European countries, and the criterion of “home energy efficiency” is gradually becoming decisive when choosing real estate in Ukraine for potential buyers.

In order to minimize the payment of electricity bills – the main item of cost estimates for the operation of buildings and structures – it is necessary to solve the problem of production of heat-efficient environmental ceramic blocks with low coefficient of thermal conductivity (0.15–0.18 W/K,) and with a lifetime of structures of 100 years old and more.

It is well-known that today in Ukraine the main wall material in the construction of industrial and civil structures is ceramic brick. It uses different types: both solid and hollow, porous and porous-hollow ones. Also popular are hollow ceramic stones, efficient ceramic blocks and precast panels.

Analysis of the statistics showed that by 1990, there were more than 700 brick factories operating in Ukraine, producing up to 7.0 billion conventional units of ordinary ceramic brick grade 75 and 100. This is due to the presence in Ukraine of a unique raw material base of clay raw materials of different chemical and mineralogical composition.

As a result of the crisis, the output of ordinary ceramic brick in 1992 decreased to 4.5 billion units, and subsequently in 1992–1998 – to 1.162 billion units. Only in 2003–2007 the growth rate of production of construction bricks showed an increase of up to 48 %, which in absolute terms amounted to 2312 million units of conventional units of brick (Fig. 1). At the same time, the highest growth rates were recorded in 2004 – by 17 % compared to the previous year and in 2011 – by 18.7 % (Fig. 2) [2, 9].

In 2008, the production of bricks decreased by almost 6 % and amounted to 2183 million pieces of conventional bricks, and in 2009 fell almost twice to 1109 million pieces of conventional bricks with accuracy, repeating the global trends with the bottom of the economic cycle. In 2010, production fell to 1017 million pieces of conventional brick, but in 2011 due to the expansion of construction of infrastructure facilities to

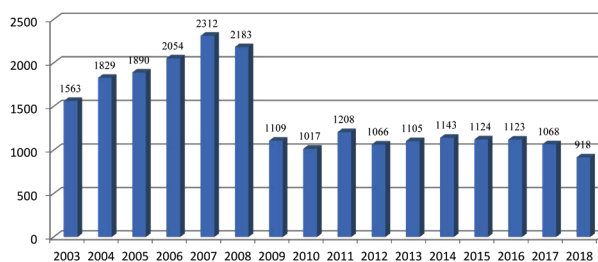


Fig. 1. Production of ceramic non-refractory building bricks for 2003–2018, million, pieces of conventional bricks [9]

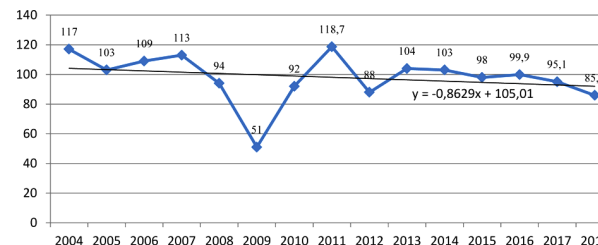


Fig. 2. Growth rate of ceramic non-refractory building brick production for 2004–2018, % [9]

Euro 2012 again increased to 1208 million pieces of conventional brick, but in 2012 it decreased to the level of 2010.

The unstable political and socio-economic situation, which began in 2013, followed by annexation of the Crimea, aggravation of hostilities in the Donbas and the deployment of an information war by Russia in 2014 led to a fall in demand for ceramic bricks and, as a consequence, reduced volumes of its production compared to the pre-crisis period. Currently, the ceramic brick production market is exactly following the trends that occur in the domestic construction market as a whole: its stagnation, which began in 2009–2011, virtually destroyed the producers of ordinary ceramic bricks with outdated technology, while not all factories survived rising energy prices in 2018 on demand of the International Monetary Fund.

It should be noted that due to characteristics such as strength, durability and bright exterior facing ceramic bricks does not lose its popularity among potential customers in the market of construction products. It is one of the most widely used materials traditionally used in the construction of buildings and structures in Ukraine. According to the logic of the explanatory dictionary, a ceramic brick is burnt clay and its mixtures.

By designation, the ceramic brick is divided into ordinary – for the erection of the walls of buildings, and front – facing facades. The latter, as a rule, is of uniform color, has two smooth and flat front surfaces and a hollow, which makes the wall of such a brick “warmer”. Moreover, the more voids are there (there can be more than 50 %), the warmer the brick is. Consequently, when using an empty brick wall, you can make a smaller thickness, and with an empty brick weight the load on the foundation will be reduced. This involves additional advantage: this was seen by the manufacturers who began to increase production of ceramic front brick during the period of independence of Ukraine.

So, in 1990, the front ceramic bricks were manufactured by 2 enterprises of Mukachevo and Artemivsk brick factories with a production volume of 17 to 27 million pieces of conventional brick per year. In 1998, the production of front ceramic bricks increased to 50–60 million conventional units per year at Artemivsk, Korchevatskyi, Mukachevo and Romensk brick factories. Since 2000, the production of front ceramic bricks has increased annually by more than 10 %. During 2009–2019, the market for construction products, which used to be the most profitable and most interesting for investors, has become one of the industries with low dynamics of development:

the big ones were stopped – factories such as Altcom (Donetsk region), Kharkiv plant No.15 (one of the company's plants "SBK") Artemivsk Ceramic Tube plant. Major changes have also taken place at the Bila Tserkva brick factory of Building Ceramics.

To date, the traditional front brick in Kyiv is represented by products of CJSC "Slobozhanska Budivelna Keramika" (Romny), LLC "Bilotserkiivski Budmaterialy" and Novorozdil brick plant – the company Euroton, located in Lviv region.

The relative lack of geographical positioning of brick factories causes the existing shortage of front ceramic bricks in the market of building materials both in the city of Kyiv and in Ukraine as a whole and the need for its transportation, which automatically increases the price of production by 10–15 %. The determining factor for manufacturers is the distance to the end consumer of the brick only after the relative saturation of the market. The fact that the production of bricks near the deposits of raw materials enables the owner to save transportation costs for the delivery of raw materials, whose share in the cost of bricks is 15–20 %. Anchoring to quarries with quality raw materials gives significant advantage to the owners of ceramic facial brick making businesses and greatly increases their efficiency.

The most valuable clays used as an additive in the production of premium ceramics are produced in Ukraine in the Donbas and Transcarpathia. In Kyiv region there are deposits of marl clay, but their use is connected with a number of technological features [5, 10]. At the Novorozdil brick factory (Lviv region), which worked on the quarries of the once powerful state-owned mining and chemical enterprise "Sulfur", it was necessary to resolve the issue of raw materials and to agree on the purchase of clay with its neighboring competitors. This necessitated the modernization of the kiln firing at Euroton LLC.

In connection with the cessation of the development of the clay quarry in the city of Romny, Sumy Region, problems arose with the supply of raw materials to CJSC Slobozhanska Budivelna Keramika.

As a result of the analysis of the peculiarities of the market of ceramic building materials of Ukraine and European countries significant differences were identified (Fig. 3). In European countries, there are no such concepts as ordinary and face brick.

As wall (ordinary) brick, large-format ceramic blocks are widely used, as well as ceramic clinker for facade cladding and hand-molded bricks.

Through the use of these building materials, homeowners are able to equip warm walls with eco-friendly materials and use durable cladding material of a wide range of colors, different texture, shapes and sizes with high performance and aesthetic properties.

Analysis of the market for the production of building ceramics in Ukraine and Europe showed the attractiveness of investing in the production of ceramic tiles, ventilated facades and sewer ceramic pipes. Unfortunately, the volume of production of such products has significantly decreased in Ukraine recently, despite the availability of raw materials and scientific bases. But the positive dynamics of development of the domestic construction industry as a whole, the gradual rise in prices for ceramics, makes brick production promising.

However, according to our estimates, business projects for small brick factories are not justified if they produce less than 30 million pieces of brick a year.

Since 2005, ceramic products such as clinker, paving stone and large-format ceramic blocks such as Winerberger (Austria), CRH Klinker, Eko KLINKER have entered the construction market of Ukraine along with Terca (Poland), ABC Klinker (Germany), Roben Group – leaders in the construction ceramics market in European countries and America.

The front ceramic brick segment has slowly begun to transform into the premium ceramic clinker brick segment. So in 2007 in Sumy, with the support of the American investment venture fund "HorisonCapital", Kerameya LLC was created – an enterprise for the production of clinker ceramic brick for cladding of "KlinKeram" facades and paving of roads "BrookKeram". The strategy of development of Kerameya LLC is the production of the whole range of wall ceramics. Production capacity is 30 million units per year of clinker brick and 10 million pieces per year of clinker paving. In 2013, the second KlinKeram-2 production line for the production of clinker ceramic bricks was launched with a capacity of 60 million pieces per year.

The total production of premium ceramic wall ceramics at Kerameya LLC is about 100 million units. Today Kerameya produces more than 48 types of clinkers of different colors, textures and sizes. Ceramic clinker brick "Klin-Keram" is not only of high quality and a large margin of durability, but also provides a wide range of design solutions, which distinguishes it from everything created by the Ukrainian manufacturer of facade bricks.

The production of the entire TOP range of Kerameya Company uses the technology of flash firing, which allows obtaining unique "dapple" of facades and natural brightness. Ceramic clinker for facade cladding is made for 2 segments – cottage and multi-storey building.

In 2010, at the request of large construction companies for multi-storey construction, a new type of KlinKeram production was developed, with a void of 48 % (4 base colors and Magma series). This product is characterized by the fact that at clinker quality (M350) it has a competitive price. And this kind of price alignment between clinker and brick is very important for budget building in a cash-strapped environment.

At the request of architects for the construction of unique objects and the restoration, in 2011 Kerameya started production of solid brick M350 of four basic colors. In addition, the production of extruded ceramic tiles and steps was started. Kerameya is the only manufacturer of clinker ceramic pavement in Ukraine and the CIS countries. The pavement is made in 4 basic colors – Ruby, Onyx, Yantar, Pearls and the Magma paving stone. In 2014, Kerameya LLC launched the production of large format porous blocks, characterized by low thermal conductivity (0.18–0.20 W/K) and high strength (M100–150).

Large-format porous blocks manufactured under the brand name "TeploKeram" are completely consistent with their name. Between 2014 and 2017, more than 114 million units of units of 2.12 NF units were produced. In 2017, the production of ceramic blocks amounted to 47.128 million units, and in 2018 the production of blocks "TeploKeram 44" and "TeploKeram 54" was launched, which will allow building a warm single-layer wall, with a heat transfer resistance of $R = 3.3 \text{ m}^2\text{K/W}$ without the use of thermal insulation materials.

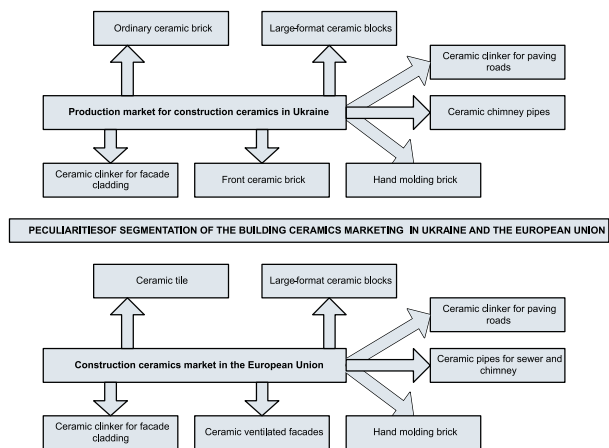


Fig. 3. Structure of production of building ceramics in Ukraine and the European Union

In turn, the segment of ordinary ceramic bricks began to transform into the production of large-format ceramic blocks. Obviously, this process is natural. Moreover, in the European market of manufacturers of building ceramics, such a concept as ordinary brick of Ukrainian production is completely absent. Since 2004–2005 Wienerberger has been available in the Ukrainian market, which is the world leader in the production of wall ceramic products known in the world under the brand name “Porotherm”, characterized by low thermal conductivity of 0.14–0.20 W/K and strength of 75–100 kg/cm².

In 2008, the production of large-format blocks “Keraterm” was mastered at the Kuzmenetsky brick factory of Kyiv region. In terms of their performance, the products are not inferior to the products of “Wienerberger” company, and the price is 25–30 % lower. One of the factories of SBK (Ozery, Kyiv region) has mastered the production of large format blocks of various sizes.

In 2011, a new powerful player of “Rusyniia” LLC (Mukachevo) entered the market for wall ceramic materials. The project of technological production of wall ceramics was made by the company “Metalcertima” using its own equipment and equipment of Italian and Spanish manufacturers. Rusyniia LLC is the first enterprise in Ukraine to introduce special thermal units of Metalcertima and can use both gas and solid and liquid fuels (coal, fuel oil, coke, wood processing wastes) as fuel, which is of particular relevance mainly because of the energy pricing policy today [11]. A wide range of wall ceramics of all sizes from single to large format is produced by Rusyniia LLC; however, its territorial location may make the products uncompetitive in the Central Ukraine market.

Conclusions. The significant impact of the permanent crisis in Ukraine, from 2008 to the present day, was manifested in the problems with financing of projects caused by the deterioration of access of borrowers to credit resources. Previously, companies had several sources of financing for construction projects – their own funds, funds from the sale of real estate during the construction phase and borrowed funds (mainly loans from banks); since 2009 the main source for further financing of works included the funds of the project owners. Later on, this source of financial resources was also exhausted. And today, in the conditions of further crisis, for the preservation of the industry, it is mainly financed by state and regional targeted programs and funds of internal investors. Accordingly, a decrease in the volume of construction work led to a decrease in demand for construction materials, which resulted in a decrease in the volume of their production.

Nevertheless, the analysis of the situation in the market of construction ceramics in Ukraine shows that today the sector of the construction ceramics industry has a rather large segment of modern wall and decoration materials – large-format porous blocks and a ceramic clinker for facade cladding. In the near future, the production capacity of large-format ceramic blocks will only increase, replacing the substandard “ordinary” brick.

But manufacturers of modern construction ceramics have faced the problem of rejection of the construction market, which is in a crisis, new materials in the volumes being produced. Up to 60–70 % of high quality clinker bricks of Ukrainian manufacturers are exported to the CIS, European Union and Asian countries. The issue that bothers all ceramics today is the need to bring back concepts such as comfort, environmental friendliness, practicality and beauty to the walls of an apartment building.

Builders have successfully built residential structures using insulation materials in combination with aerated concrete blocks, while saving little on construction. Brick walls are environmentally friendly air conditioners: winter – warm; summer – cool. Eco-friendly, chemically neutral ceramics should be a basic material for residential buildings. Manufacturers of wall ceramics, together with architects and designers of new building complexes and cottage villages, need to work on this

issue. Considering the wide range of colors, the different assortment of textures and surfaces – these brick buildings can be architectural masterpieces built for ages.

References.

1. Ogorodnik, I., Teluschenko, I., Oksamyt, T., & Gulenko, Y. (2017). Analysis of the Properties and Features of the Market of Ceramic Paving in Ukraine. *Building materials and products*, (1-2), 72-76.
2. Zakharchenko, P. (Ed.) (2018). A directory of the market for materials for interior decoration and furnishings (according to 2017). KNUBA. Kyiv: SPD Pavlenko.
3. Ovcharenko, D. (2015). State and prospects of development of the construction market of Ukraine. *Trajectory of Science*, (1), Retrieved from <https://pathofscience.org/index.php/ps/article/view/6/-Screen-Name>.
4. Nogtev, I. (2019). Comfortable houses in warm ceramics. *Construction Journal*, 3-4(139-140), 20-21.
5. Fedorenko, O., Shchukina, L., Ryshchenko, M., & Prysiachna, L. (2018). *Clinker ceramic materials on the basis of natural and man-made raw materials of Ukraine: monograph*. Kharkiv: Planet Print LLC.
6. Shevchenko, V. (2014). The state and prospects of development of the market of building materials of Ukraine. *Effective economy*, (6). Retrieved from <http://www.economy.nayka.com.ua/?op=1&z=3124>.
7. *Review of the analytical work of international energy organizations on the state and scenarios of development of the world energy sector with the forecast of investing in energy efficiency* (n.d.). Retrieved from https://ua.energy/wp-content/uploads/2018/06/2.-rozvyt_svit_energet_sferu.pdf.
8. Legislation of Ukraine (n.d.). *Law of Ukraine. No. 2118-VIII “On Energy Efficiency of Buildings” of 22.06.2017*. Retrieved from <https://zakon.rada.gov.ua/laws/show/2118-19>.
9. *The official site of State Statistics Service of Ukraine* (2019). Retrieved from <http://vvv.ukrstat.gov.ua>.
10. *Environmental Impact Assessment Report: Development of the Kopachiv Field of Loams and Marl Clays in Obukhov District of Kyiv Region* (2019) Retrieved from <http://eia.menr.gov.ua/uploads/documents/3462/reports/ec99a7cfa13f625a-492b885e42f8d6dc.pdf>.
11. Alaverdian, L., & Romanenko, O. (2019). Modern realities and prospects for development of foreign trade of Ukraine with other countries of the world. *Efektivna ekonomika*, 4. <https://doi.org/10.32702/2307-2105-2019.4.53>.

Сучасний розвиток ринку керамічних будівельних виробів України в контексті євроінтеграційного процесу

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Мета. Дослідити розвиток українського ринку будівельних виробів з кераміки та процес його трансформації. Розглянути основні чинники, що роблять виробництво будівельних виробів з кераміки привабливим для інвесторів, оцінити вплив факторів на стан галузі в цілому.

Методика. Автори використали комплекс загальнонаукових і спеціальних методів дослідження, зокрема методи ретроспективного аналізу, синтезу, порівняння, діалектичний метод пізнання та графічного відображення дослідження.

Результати. Доведено, що впровадження в будівництво європейських стандартів і вимог наближує Україну

до її становлення як конкурентоспроможної держави. Виявлені основні проблеми сучасних цегельних заводів на ринку виробництва будівельної кераміки в Україні, зазначені переваги використання стінової кераміки в житловому будівництві й визначені перспективи її розвитку.

Наукова новизна. Автори показали, що розвиток ринку керамічної цегли за останні 28 років поступово трансформується в кераміку преміум-класу. А також довели, що: 1) за рахунок використання крупноформатних керамічних блоків можна отримати теплу стіну з низькою теплопровідністю 0,16–0,20 Вт/К, що у свою чергу дозволяє збільшити опір теплопередачі до 3,3; 2) використання керамічної клинкерної цегли за рахунок широкої кольорової гамми різної фактури й поверхні дозволяє набуту стінам сучасних житлових будинків екологічності, практичності та краси.

Практична значимість. Тенденції розвитку, стан і перспективи подальшої динаміки діяльності підприємств будівельної кераміки є актуальним напрямом дослідження в умовах трансформаційних процесів, що відбуваються в Україні, тому результати будуть використовуватися на практиці науковцями, архітекторами, проектантами нових будівельних комплексів і котеджних містечок, державними службовцями, що спеціалізуються на стратегічному плануванні у сфері будівництва промислових і цивільних споруд.

Ключові слова: *енергоефективне будівництво, керамічна клинкерна цегла, керамічна бруківка, цегельний завод*

Современное развитие рынка керамических строительных изделий Украины в контексте евроинтеграционного процесса

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Цель. Оценить развитие украинского рынка строительных изделий из керамики и процесс его трансформации. Рассмотреть основные факторы, которые делают

производство строительных изделий из керамики привлекательным для инвесторов, оценить влияние факторов на состояние отрасли в целом.

Методика. Авторы использовали комплекс общенаучных и специальных методов исследования, в частности методы ретроспективного анализа, синтеза, сравнения, диалектический метод познания и графического отображения исследования.

Результаты. Доказано, что внедрение в строительство европейских стандартов и требований приближает Украину к ее становлению как конкурентоспособного государства. Выявлены основные проблемы современных кирпичных заводов на рынке производства строительной керамики в Украине, указаны преимущества использования стеновой керамики в жилищном строительстве и определены перспективы ее развития.

Научная новизна. Авторы показали, что развитие рынка керамического кирпича за последние 28 лет постепенно трансформируется в керамику преміум-класа. А также доказали, что: 1) за счет использования крупноформатных керамических блоков можно получить теплую стену с низкой теплопроводностью 0,16–0,20 Вт/К, что в свою очередь позволяет увеличить сопротивление теплопередаче до 3,3; 2) использование керамического клинкерного кирпича за счет широкой цветовой гаммы различной фактуры и поверхности позволяет стенам современных жилых домов быть экологическими, практичными и красивыми.

Практическая значимость. Тенденции развития, состояние и перспективы дальнейшей динамики деятельности предприятий строительной керамики являются актуальным направлением исследования в условиях трансформационных процессов, происходящих в Украине, поэтому результаты будут использоваться на практике учеными, архитекторами, проектантами новых строительных комплексов и коттеджных городков, государственными служащими, специализирующимися на стратегическом планировании в сфере промышленного и гражданского строительства.

Ключевые слова: *энергоэффективное строительство, керамический клинкерный кирпич, керамическая плитка, кирпичный завод*

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