



Problems of Managing Engineering Projects of Housing Construction in Conditions of High Import Dependence

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Abstract: In this paper, the problems of management of engineering projects of housing construction, the formation of supply on the markets of engineering equipment for construction projects in the Russian Federation in conditions of high import dependence are considered. Examples of emerging problems are given and conclusions are drawn about the critical dependence on the import of components of engineering equipment. The process of adapting the Russian market to emerging problems by reorienting pumping equipment from European manufacturers to manufacturers from China and, to a lesser extent, Russian manufacturers is described. The paper suggests measures to solve the problems identified during the study. The authors hope that the proposed measures will reduce the degree of dependence on imports of materials and equipment in the segment of construction of housing construction facilities, as well as multiply the production of Russian pumping equipment for this market segment and increase loyalty to domestic manufacturers.


1 INTRODUCTION


The creation of city-forming investment projects requires professional engineering design. Construction projects: smart cities, commercial and industrial buildings, housing construction projects require detailed study of the architectural and structural parts, the creation of high-quality and reliable engineering systems. It is engineering systems that guarantee the convenience and comfort of operation of construction facilities, transport infrastructure and communications. The engineering design of residential construction projects includes many standard and individual solutions, interconnected and functioning in a single system. The initial level of costs and the total cost of construction of a housing construction facility, the costs of further maintenance, repair and modernization depend on the competent management

of engineering projects. In conditions of high dependence on imports, some engineering projects become unrealistic, their costs and implementation timelines increase.

2 MATERIALS AND METHODS

The methodological and informational basis of the study was the normative and technical documentation, results of parliamentary hearings of the Federation Council of the Federal Assembly of the Russian Federation, plans of the Ministry of Industry and Trade of the Russian Federation for import substitution, scientific publications in the field of economics and engineering sciences, informational materials of periodicals, data of manufacturers of engineering equipment and materials, information

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from participants of the engineering equipment and materials market.

3 RESULTS AND DISCUSSION

Let us consider this problem in the context of the formation of engineering projects for mass residential construction. We especially draw your attention to the fact that the basis of the infrastructure of any construction project is engineering systems and network communications. Requirements for the quality of engineering systems in mass housing construction are constantly growing, increasing the costs of engineering equipment and materials. The list of internal engineering systems is wide: heating and ventilation, water supply and sewerage, fire extinguishing, air conditioning, energy supply and refreshment, etc. A significant part of these engineering systems uses pumping equipment, which ensures the functioning of these systems, being a critical component. So, let's look at the example of this component of the import substitution process.

The Russian market of pumping equipment, including for mass housing construction projects, depended and currently depends on imports, like the entire market of engineering equipment and materials for mass housing construction projects. The share of imports of pumping equipment, as of April 2023, is 94% (Import substitution in the construction industry).

After February 22, 2022, with the beginning of a special military operation of the armed forces of the Russian Federation, the domestic market of engineering equipment and materials, including pumping equipment, began to experience difficulties in the supply of imported materials, equipment and components, especially from European countries. Pumping equipment for mass housing construction facilities, for the most part, was supplied by manufacturers from Germany and Denmark. Their production was partially localized in Russia: in the city of Noginsk (Moscow region) a manufacturer from Germany operated, and in the city of Istra (Moscow region) a manufacturer from Denmark operated. The Russian market of engineering equipment at the current growth rates of housing and infrastructure construction is capacious, unsaturated, extremely attractive to European manufacturers, but in modern political realities they have decided to reduce, temporarily suspend (About temporary changes in the supply of Wilo pumps) and close their business in the Russian Federation and Belarus (Grundfos closes its business in Russia and Belarus.).

Due to difficulties in the supply of pumping equipment from European manufacturers and suppliers, problems began to arise in the implementation of engineering systems projects that were designed before the current circumstances arose. The domestic supply of engineering equipment and materials does not correspond to the design characteristics or does not exist at all. The main reason for this situation was the factor of economic feasibility of the development and production of domestic pumping equipment – it was easier to buy than to develop and produce equipment in Russia. The marketing policy of European manufacturers was aimed at eliminating competition from Russian manufacturers. As a result of optimization and privatization carried out in the 90s, the process of deindustrialization of Russia was carried out, as a result, the entire potential of the domestic industrial production sector was lost (Porkhunov, 2023).

A necessary stage in the formation of any engineering project is the selection of pumping equipment, which is carried out according to a number of parameters: the type of structure, the pressure created, productivity, the nature of the pumped medium, estimated cost (Golovkova, Ivanov, Serochenkova, 2019). Also, to solve problems of ensuring the strength, safety and efficient operation of hydraulic engineering systems, the dynamic behavior of systems is calculated in order to determine flow rates and pressures in various parts of the system. All these tasks are solved, including taking into account the hydraulic characteristics of pumping equipment (Rusetskaya, Smirnov, 2010). These characteristics are provided for when designing an engineering system that should be put into operation in the future.

Replacement of pumping equipment previously selected and provided for by the design solution is associated with certain difficulties, and in some cases is impossible. According to LLC "Heating Quality" (Izhevsk, Udmurt Republic) and LLC "ATRI-Energo" (Izhevsk, Udmurt Republic), in the spring of 2023, the installation of engineering equipment and materials, including pumping equipment, was started at the boiler house. The project included six pumps from a German manufacturer with the following parameters: the pump capacity is 170 m³/h with a head of 5 meters of water column. In May 2023, an order was placed for this equipment, the manufacturer announced a delivery time of 12 weeks. After this period, the manufacturer refused to supply pumping equipment. As of September 2023, no solution to this problem has been found, there is no analogue of the

pumping equipment provided for by the project on the market.

As of the end of 2023, it can be concluded that the pumping equipment market is in the process of adaptation, pumping equipment is represented overwhelmingly by manufacturers from China and to a lesser extent by manufacturers from Russia. As a rule, similar pumping equipment for mass housing construction projects can be selected in compliance with all design characteristics. In some cases, this entails an increase in the estimated cost of equipment and installation work. For example, a backup pump should be provided in the design of fire pumping stations (CODE OF RULES. SP 10.13130). In the line of manufacturers from Europe, there are so-called twin pumps - these are pumping units that consist of two pumps that work independently of each other, but have a common inlet and outlet pipes. Manufacturers from China and Russia do not have such pumps. To fulfill the stipulated requirements, it is currently necessary to provide two pumps, instead of one double.

The design of engineering systems of mass housing construction facilities is currently carried out in accordance with the market offer. The projects mainly use pumping equipment from China, for example, one of the most popular types of centrifugal pumps is vertical multistage pumps, widely represented by manufacturers from China (Vertical multistage pumps CNP CDM – reliability and energy efficiency). At the moment, domestic manufacturers cannot meet the needs for pumping equipment on the Russian market of engineering equipment and materials. For example, there are no wet rotor pumps in the line of Russian manufacturers, which are very much in demand in engineering systems at mass housing construction facilities. In the industrial segment of pumping equipment, domestic manufacturers are widely represented, and in the segment of mass housing construction, Russian manufacturers of pumping equipment are beginning to expand their offer, but tangible results of this process will manifest themselves only in the long term (Russian pumping equipment – symbiosis of traditions and innovations). Import substitution in the segment under consideration is not included in the sectoral plans of the Ministry of Industry and Trade of the Russian Federation until 2024 (Federal State Autonomous Institution "Russian Foundation for Technological Development"). At the moment, there are more priority tasks for import substitution in the industrial sector of Russia.

4 CONCLUSION

To summarize, it can be argued that the Russian market of pumping equipment for mass housing construction projects is critically dependent on imports; without the presence of foreign manufacturers, the design and installation of pumping equipment for engineering systems will be difficult to implement, and in some cases completely impossible. This is a huge problem, which is the main one in the management of engineering projects in the Russian housing construction market. At the moment, it is possible to replace pumping equipment from European manufacturers with supplies from China, which allows to continue the design and installation of engineering systems at mass housing construction sites in Russia. But this is not a solution to the problem, it is postponed for future periods.

To solve this problem, it is necessary to intensify the process of import substitution both in the segment of pumping equipment and other components of engineering systems for housing construction projects. The Ministry of Industry and Trade of the Russian Federation needs to adjust and fill out sectoral import substitution plans. Domestic manufacturers need to increase the production of components of engineering systems, actively interact with design engineers, implement and improve software for designing components of engineering systems. Design engineers, when developing project documentation, need to focus primarily on the range of Russian manufacturers.

The proposed measures will allow Russian manufacturers to receive proper financing and administrative support in the process of import substitution. Active interaction with design engineers, development and improvement of software by domestic manufacturers will make it possible to actively use Russian equipment in engineering systems of housing construction projects, increase loyalty to domestic equipment and materials. In the long term, the proposed measures will significantly increase the range of domestic equipment for construction projects in Russia and solve the existing problems of supply formation in all interdependent markets.

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