

# Assessment of Technology and Construction Material Needs **in Uzbekistan**



Preliminary Findings on Existing Market  
Conditions and Needed Supply-Chain  
Enhancements for the State Programme on  
Affordable Rural Housing







MINISTRY  
OF CONSTRUCTION  
OF THE REPUBLIC  
OF UZBEKISTAN



# **Assessment of Technology and Construction Material Needs in Uzbekistan**

Preliminary Findings on Existing Market Conditions and Needed Supply-Chain Enhancements for the State Programme on Affordable Rural Housing

Market Transformation for Sustainable Rural Housing in Uzbekistan

A joint project of the Ministry of Construction of the Republic of Uzbekistan and the United Nations Development Programme (UNDP) under funding from the Global Environment Facility

Tashkent 2020





## I. Introduction

On November 14, 2018, President of the Republic of Uzbekistan Shavkat Mirziyoyev signed a Decree No. 5577 “On Additional Measures to Improve State Regulation in the Field of Construction”<sup>1</sup>. According to this decree, from January 1, 2020, housing projects must be equipped with energy-efficient and energy-saving equipment at the design and construction stages. On 24 November 2018, the President of the Republic of Uzbekistan, Shavkat Mirziy-

oyev, signed a resolution No. 4028 entitled “On Additional Measures for Expansion of Construction of Affordable Housing in Rural Areas and for Certain Categories of Citizens”<sup>2</sup>. This decree calls for the wide use of local building materials, modern equipment and technologies to reduce the cost and improve the energy efficiency of new rural housing. Specifically, the decree states that in accordance with the revised state program on expanding construction of

1 <https://www.lex.uz/docs/4060068>

2 <https://lex.uz/ru/docs/4076821>



affordable rural housing, launched in 2016 (known as the rural housing programme, or RHP), more than 53,000 affordable houses and apartments are to be built under updated standard designs, accommodating about 65,000 families.

Since 2017, the Ministry of Construction of the Republic of Uzbekistan, in partnership with the United Nations Development Programme (UNDP), under grant support from the Global Environment Facility (GEF), has been implementing a joint project entitled Market Transformation for Sustainable Rural Housing. Within this joint project, the rural-housing design institute “Qishloq Qurilish Loyiha” (QQL) has revised standard designs of affordable housing with assistance of UNDP experts. These revisions include new energy-efficient designs applying modern materials, technologies, and design, as well as “low-carbon” designs that include the energy-efficient enhancements, plus additional measures aimed at using solar energy for the production of electricity and heat.

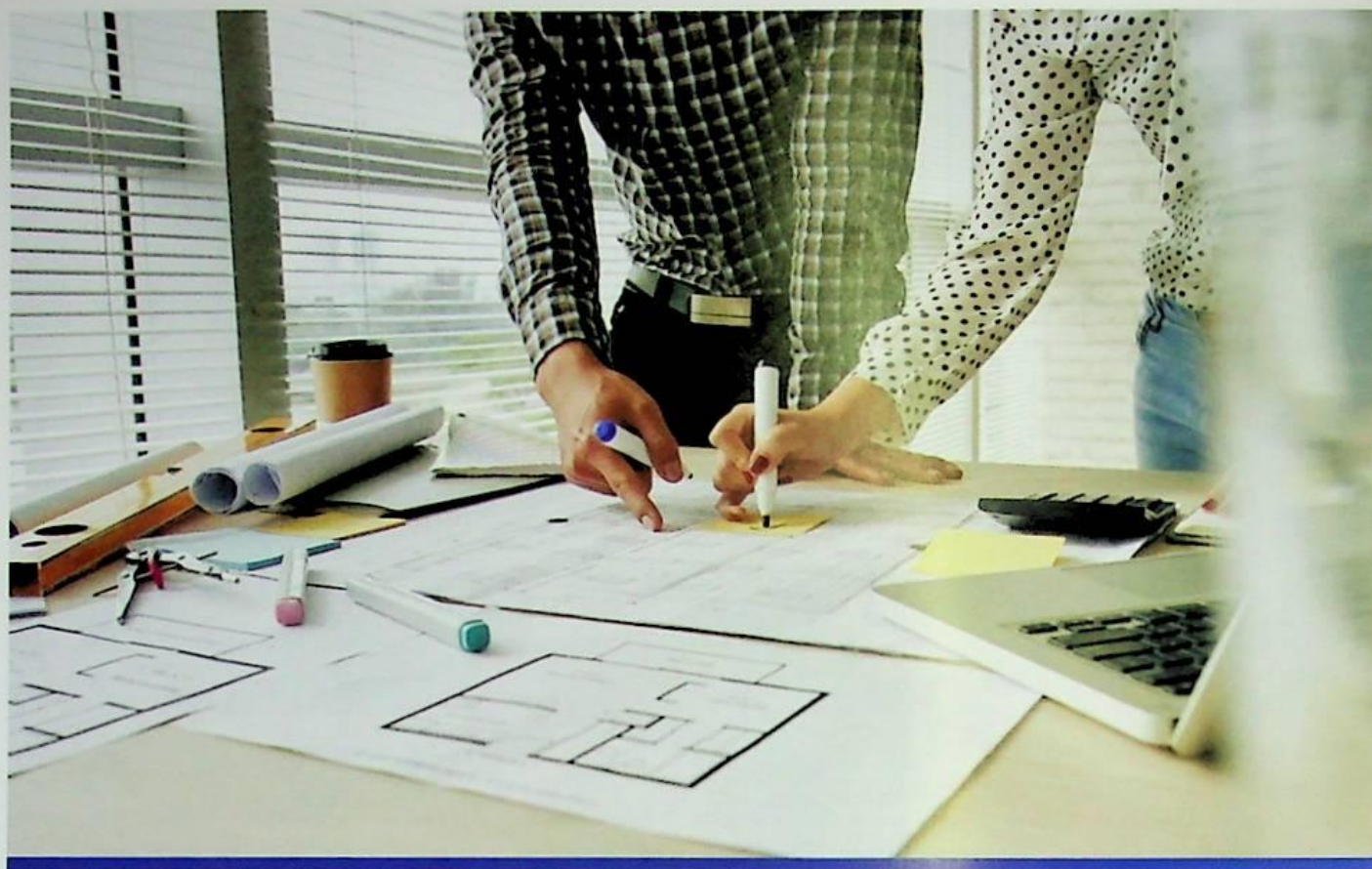
According to the RHP, 15,010 affordable housing units were to be built in 2019. 12,000 units (apartments) are planned to be

constructed in 2020. The President’s Decree No. 5577 of November 14, 2018 entered into force officially from January 2020, but new QQL designs of energy-efficient and low-carbon rural houses, approved for mass construction and developed in conjunction with the UNDP, have been tested in construction since 2019.



This scale of new capital construction based on updated energy-efficient and low-carbon designs creates an urgent challenge — providing high-quality energy-efficient building materials in needed quantities in all regions of the country. To meet this challenge, a





number of sectoral and territorial programs are being implemented to increase production, via development of local construction industry, introduction of advanced technologies, enhancement of the capacity of contractors, and attraction of direct foreign investment.

This report summarizes the existing market for construction materials and technologies, including those needed for energy-efficient and low-carbon designs, as well as mea-

sures being taken for the implementation of the new requirements for the RHP. It discusses advances and further opportunities for reduction of energy consumption during the production of building materials. The report concludes with a list of recommendations for enhancement and optimization of the construction supply chain, in order to ensure needed quantities and quality of materials and equipment, while still assuring and indeed enhancing affordability.





## Connections with Technology Needs Assessment (TNA)

The research and analytic approaches reflected in this report are based generally on the Technology Needs Assessment (TNA) methodology developed by the United Nations Environment Programme and Technical University of Denmark (UNEP DTU) Partnership, funded by the GEF, and implemented in close collaboration with the United Nations Framework Convention on Climate Change (UNFCCC) Technol-

ogy Mechanism – including a situation analysis, identification of key technologies and barriers to their diffusion, and recommended actions. It should be noted, however, that this study is intentionally narrow in scope, with its focus on housing and rural housing in particular, and a scope specifically limited to fulfilling the goals of the RHP, but not the country's broader overall commitments under the UNFCCC and the Paris Agreement<sup>3</sup>.

<sup>3</sup> <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>



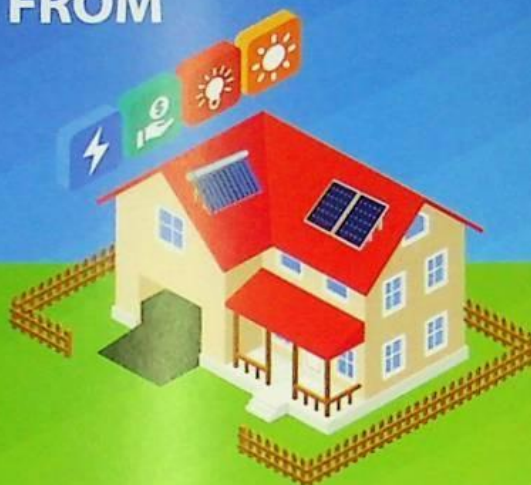


## DIFFERENCE OF A ENERGY EFFICIENT AND LOW-CARBON HOUSE FROM A STANDART HOUSE



### Heat loss reduction

Warming of a residential house : ground floor, basement, walls, attic floors, roof; installation of double-glazed windows; installation of supply and exhaust ventilation system



### Rational energy consumption

The use of energy-saving lamps at homes; meridional orientation of a residential house



### Energy saving

The acquisition of a low-carbon home will save 25-30% of electricity consumption



### Self-generated energy

To reduce the cost of operating residential premises (installation of solar photovoltaic system that generate backup electricity, as well as to illuminate the local area; the installation of solar water heaters for hot water supply)

## TYPES OF ENERGY-EFFICIENT CONSTRUCTION MATERIALS AND LOW-CARBON TECHNOLOGIES USED IN CONSTRUCTION OF RURAL AFFORDABLE HOUSING IN 2019





The study is also limited by data availability and rapidly changing realities of the country's ongoing reforms. Much of the available data involve technologies highly relevant to scale-up of housing production and associated domestic manufacturing (for example, ceramic tiles for kitchens and bathrooms), but without direct relevance to climate change. This report should therefore be considered a living document, to be updated and refined periodically based on market developments and further research. Promising areas of research are specified in the final section of the report.

All the same, while it is not a comprehensive cross-sectoral TNA in the usual sense, this study highlights new trends, needs, and options in the rapidly growing sector of construction and production of building materials in Uzbekistan, with far-reaching relevance to global climate, national commitments to reduce greenhouse gas emissions and priorities for the RHP and economic development of the country. Therefore, this document will be presented to relevant



national agencies (including Hydrometeorological Service Center (Uzhydromet) under the Cabinet of Ministers of the Republic of Uzbekistan, as the national focal point for the UNFCCC, as well as the Ministry of Construction, which implements the RHP), in the hope that it will contribute to the development of national construction policy and climate-change mitigation strategy in the years ahead and will also be presented for information of International agencies.







## II. General market conditions

### New residential construction



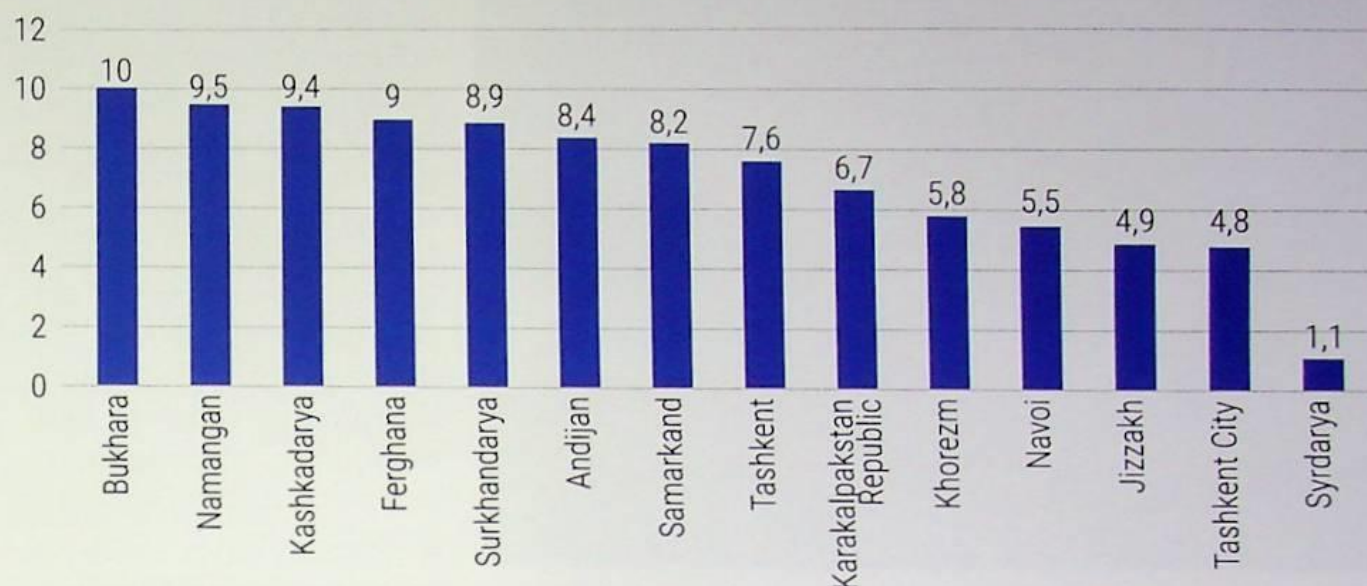
In recent years, an average of 12 million square meters of housing has been handed over annually, of which more than 8 million square meters are in rural areas. The share of the introduced residential area in rural areas was 73.4 percent in 2015, 72.5 percent in 2016, 68.4 percent in 2017, and 69.2 percent in 2018. In recent years, special attention has also been paid to the construction of new housing in

cities and urban settlements.

In 2018, about 82.5 percent of total new rural housing in Uzbekistan was individually constructed houses, while the remaining 17.5 percent was built based on standard (inefficient) designs such as those of the RHP. Distribution of new housing by regions largely reflects population density and levels of their economic development, with the highest housing construction volumes in 2015-2018 in the regions of Bukhara (10 percent of the nationwide total), Namangan (9.5 percent), Kashkadarya



Figure 1. Share of new residential construction in Uzbekistan in 2015-2018, by region (percent of total floor area)



(9.4 percent), Ferghana (9 percent), Surkhandarya (8.9 percent) and Andijan (8.4 percent). The lowest volumes of new rural housing have been built in the city of Tashkent (4.8 percent) and Syrdarya region (1.1 percent). Figure 1 above presents the full breakdown of rural construction by region.

## Construction materials

The high volume of housing construction has required a significant increase in the production of building materials that meet the modern requirements of comfort and

affordability. Various new production facilities have recently entered into operation, including but not limited to the following.

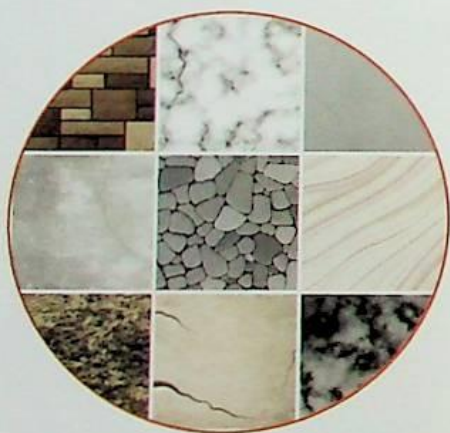
- Ceramic tiles based on modern technology (Samarkand, Tashkent and Syrdarya regions)
- Ceramic granite («Angren» free economic zone, Tashkent region)
- High-quality cement produced (Republic of Karakalpakstan, Andijan, Samarkand, Namangan and Fergana regions). Notably, the overall share of cement produced by modern dry-process technology has increased from 10 percent in 2000 to 65 percent, as compared to about 90 percent in leading

*Source: calculated based on the data of the State Statistics Committee of the Republic of Uzbekistan*





foreign countries. Cement produced by wet-process technology mainly concentrated in Tashkent and Ferghana regions in Uzbekistan.



In recent years, the growth of production of all the most important types of non-metallic mineral products for construction has had a high volatility and variability across material types. In 2017, the growth in Portland cement production was 103.3 percent for large enterprises. However, the production of marble, travertine, alabaster, and their products decreased by almost half, with production amounting to only 53.5 percent compared to 2016. The production of prefabricated structures and other products for buildings and

structures made of cement, concrete or artificial stone was only 85.8 percent of the volume of the corresponding period of the last year. The largest contribution to the growth of the gross production of the industry was made by enterprises of the cement industry, providing 34.7 percent of the total growth of the industry. Other productions, that produce concrete, mortar, tile, etc., provided only 16.0 percent of the industry's growth.

President Shavkat Mirziyoyev, in his presentation to the joint session of the Legislative Chamber and the Senate of the Oliy Majlis on 21 January 2020, set forth a target to increase the country's production volume of building materials by three times by 2025. Already within the past few years, national efforts to diversify and expand domestic production of construction materials have led to some positive results. New types of building materials are now being produced based on expanded processing of indigenous raw resources. Such materials include new gypsum board technologies, laminate, floor coverings from medium-density fibreboard, basaltic thermal insulation materials, and more. As a result, domestic demand for such types of building materials, as wall elements and sandwich



panels, has been fully met by domestic production.

Currently, the construction of affordable rural housing, including those involving standard designs, consumes a significant amount of burned (kiln-fired) bricks. In 2018, the capacity of brick plants amounted to about 3.3 billion pieces. Most of the production of burned bricks is carried out by using energy-efficient furnaces - 79.4 percent of the total. The enterprises of the Tashkent region produce the largest volume of bricks (487.3 million pieces), while operating at about 79 percent of capacity. On average, brick factories elsewhere in the country operate at about 74 percent of capacity, with the greatest available capacity reserves in the Jizzakh region (current output at about 56.7 percent of capacity) and the Bukhara region (60.2 percent).

### **Increasing prices of construction materials**

In May 2018, building materials prices increased by an average of 15.6 percent compared to December 2017, and by 26.3 percent compared to spring 2017. This increase has arisen as a result of burgeon-



ing demand throughout the country, driven by numerous major projects, including implementation of major projects in Tashkent (including new airport construction and a new metro line), Samarkand, Nurafshon, and elsewhere. Construction work includes commercial and public facilities and associated infrastructure, as well as large volumes of housing, including affordable housing in both urban and rural areas. The price increases can be further explained by the slow response of domestic producers to increased demand, as about 70 percent of the 7316 domestic manufacturers of building materials do not operate their production facilities at full capacity. Increased tariffs for gas and electricity also have had an effect on increased construction material prices.







### **III. Construction management and organizational aspects of the supply chain**

The introduction of digital technologies in the construction industry is changing the very organizational (centralized) structure of construction production, the management of supply chains of building materials and equipment, and the interaction of suppliers and customers of construction products. The main requirements for modern construc-

tion management systems are the organization of a unified platform for the rapid exchange of information, coordination relative to work schedules, the supply of materials and equipment with accompanying digital tracking, and, ultimately, linkages to financial systems by which acceptance by the contractor triggers payment.



Today, the supply of energy efficient and low-carbon building materials directly to the country's construction organizations is carried out by enterprises embedded in the construction associations' system, and only in certain cases by third-party enterprises. The delivery of these products is carried out directly to the consumer or with the participation of one intermediary in the person of marketing departments (units) of the construction organizations with a markup of not more than 20 percent. At the same time, with the supply of slate, window glass, and roofing materials, there may be as many as three intermediaries. It should be noted that the number of involved entities also depends on the location of the product manufacturer. Thus, cement from "Kyzylkumcement" JSC to consumers in the Navoi region is delivered directly without intermediaries, whereas delivery to the city of Tashkent is carried out with the participation of two intermediaries. The supply of cement and slate from enterprises located in the Tashkent region is carried out directly without the participation of intermediaries.

In order to ensure access for small and medium-sized enterprises to the production of building materials produced using energy-saving



and low-carbon technologies, a system of wholesale trade operates under the "Uzpromstroyaterialy" [Uzbekistan Construction Material Industry] Association. Orders are matched to appropriate locations of mass production. The sale of building materials is carried out at producer prices with a margin of 5 to 20 percent. However, lack of local onsite warehousing capacity sometimes precludes the possibility of bulk purchases of building materials, forcing contractors to turn to the retail market. In these cases, there is sometimes not enough product inventory at points of sale, because limits on permitted markups makes it unprofitable for retailers to stock certain items.







The fragmentation of the construction market in Uzbekistan makes it difficult for suppliers / manufacturers of energy-saving and low-carbon technologies to interact optimally with consumers. Many construction companies are small organizations in size and scope of work, with relatively low volumes of construction, which dramatically increases the risks and the cost of construction. Furthermore, small construction organizations lack the financial or administrative capacity to adopt modern digital procurement methods. Also, due to the underdeveloped interconnections of construction organizations in the country, there are no effective mechanisms to implement information-sharing, pooling, and other methods that would increase efficiency and reduce costs.

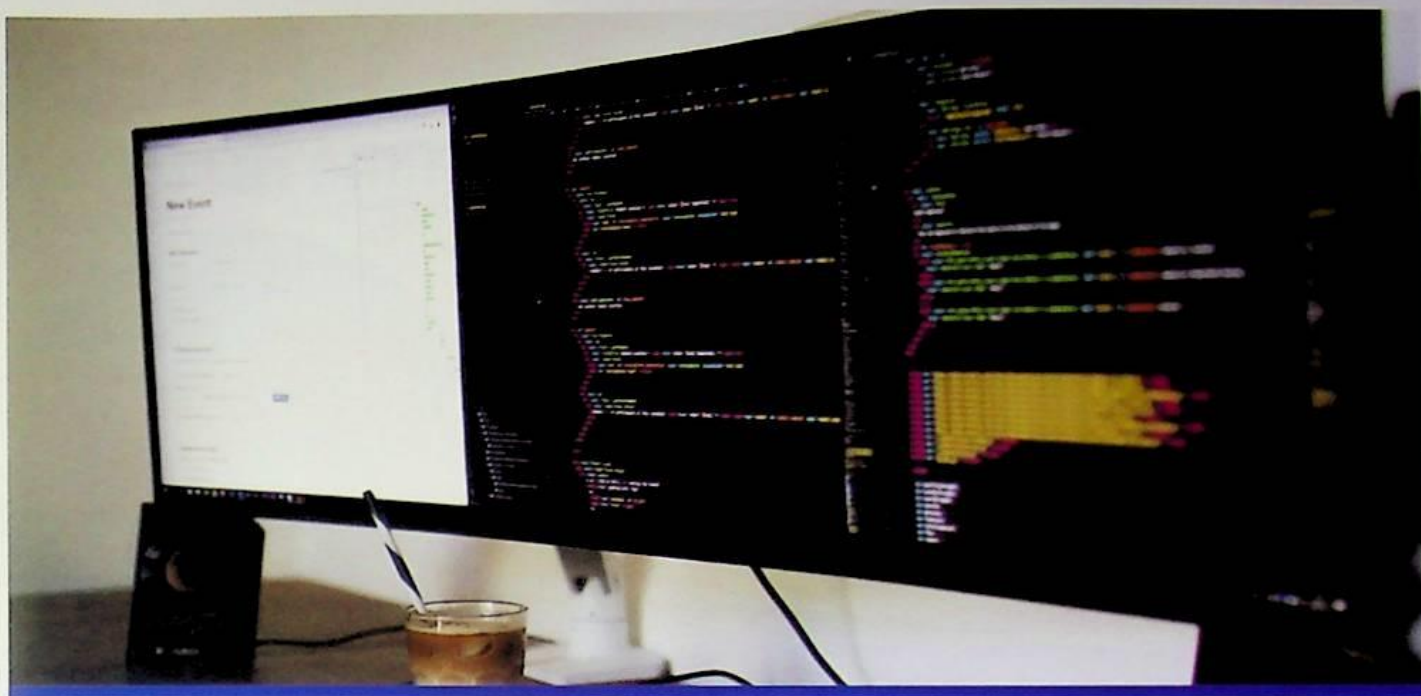


Overall, the production of energy-efficient building materials and equipment also remains underdeveloped. Expanding such industries can be facilitated by the consolidation of steady demand for products from the construction industry and other related industries, especially among large companies. It is expected that the President's decree of November 2018 will send a clear signal to the market, but there is a need to coordinate supply and demand, and to provide both producers and contractors with reliable and timely information.

Based on the fact that the state is the largest construction customer in the Republic of Uzbekistan, the Ministry of Construction, together with the Ministry of Finance, should develop official instructions for the organization of state construction orders for all state customers in the country. The instructions should reflect the following requirements for the use of non-price criteria for selecting contractors for projects financed by the state or under state guarantees:

a) the use of energy-efficient planning, design and engineering solutions and materials, which, according to the calculations of the project developer, will reduce the





energy consumption of the construction site to less than 45 kWh/m<sup>2</sup>;

*b)* the application of modern digital technologies for the organization of building materials production, design and construction;

*c)* the involvement of national staff with a proven

education and experience, including an internship in an international organization in the application of modern construction technologies;

*d)* application of advanced technology that allow buildings to be built with the lowest levels of labor inputs, materials and cost.



## MARKET TRANSFORMATION FOR SUSTAINABLE RURAL HOUSING IN UZBEKISTAN

### TODAY IN UZBEKISTAN

**40%** of the generated electricity is used for heating and lighting

**1 square meter - 400 kWh**

in the developed countries - 170 kWh

### FROM 2005 TO 2015

**34%** of primary energy consumption accounted for the residential and public buildings sector

16.4 million tonnes of oil equivalent

### POTENTIAL FOR ENERGY SAVINGS

**9-10** million tons tonnes of oil equivalent in the housing sector consumption could be reduced by **20 %**

Reducing energy consumption in these houses is also achieved through the use of high-quality energy efficient building materials, heat insulation of building enclosures, window sealing, automatic temperature control of premises

# ENERGY

## of the rural housing



### In 2019

**800** one-story 3-bedroom energy-efficient and low-carbon houses were built

### THE PROJECT INSTALLED

**300** Watt photovoltaic stations (PVS) for lighting, and **200** liter solar water heaters supply in **10** available rural standard houses in **5** pilot regions of Uzbekistan

## THE MAIN STAGES OF THE

**1**

#### preparatory phase

assessment of the scope of work, coordination of technical specifications and deadlines, formation of contracts

**2**

#### source data collection

collection of design, technical and financial documentation, carrying out instrumental measurements

**3**

#### information processing and analysis

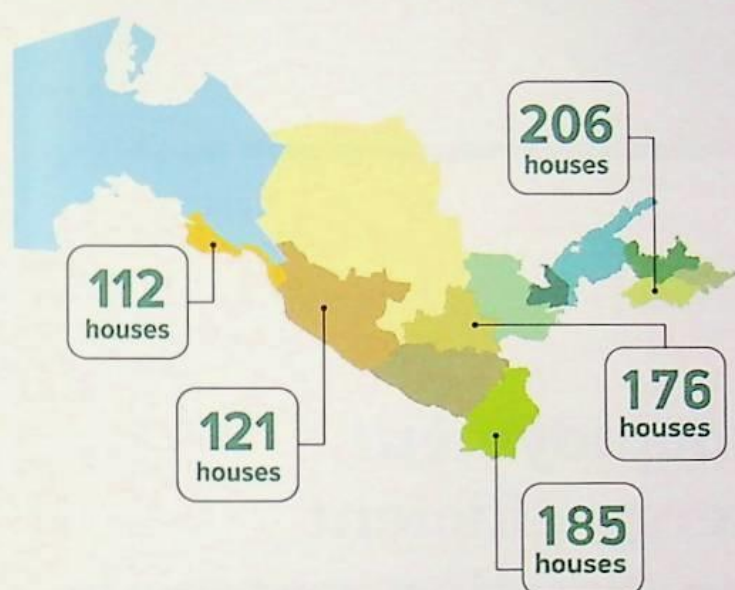
analysis of the obtained results, making energy balances, determination of the integral energy characteristics of the buildings, assessment of the energy saving potential





# AUDIT in Uzbekistan

Energy audit is the feasibility study of the systems of the energy supply, distribution and consumption by buildings and structures.



MINISTRY  
OF CONSTRUCTION



“Market Transformation for Sustainable Rural Housing in Uzbekistan” project provides for an energy audit of the constructed type houses in the years **2020-2021**.

The purpose of the energy audit is to increase energy efficiency, to identify irrational consumers, to increase the reliability of energy supply, and, finally, to ensure financial savings and improvement of the environmental performance.

The energy audit, using special equipment to reveal the actual annual consumption of heat and electricity, will be carried out with the participation of homeowners, taking about **8-10 hours** in **60** of the **800** houses of the following types:

1. Standard houses
2. Standard houses + thermal insulation
3. Standard houses + thermal insulation + PVS
4. Standard houses + thermal insulation + PVS + solar collectors for hot water supply

## ENERGY AUDIT OF BUILDINGS



4

### development of recommendations for energy saving

a feasibility study of the effectiveness of energy-saving measures, the compilation of the list of priority areas for energy conservation

5

### presentation of the results

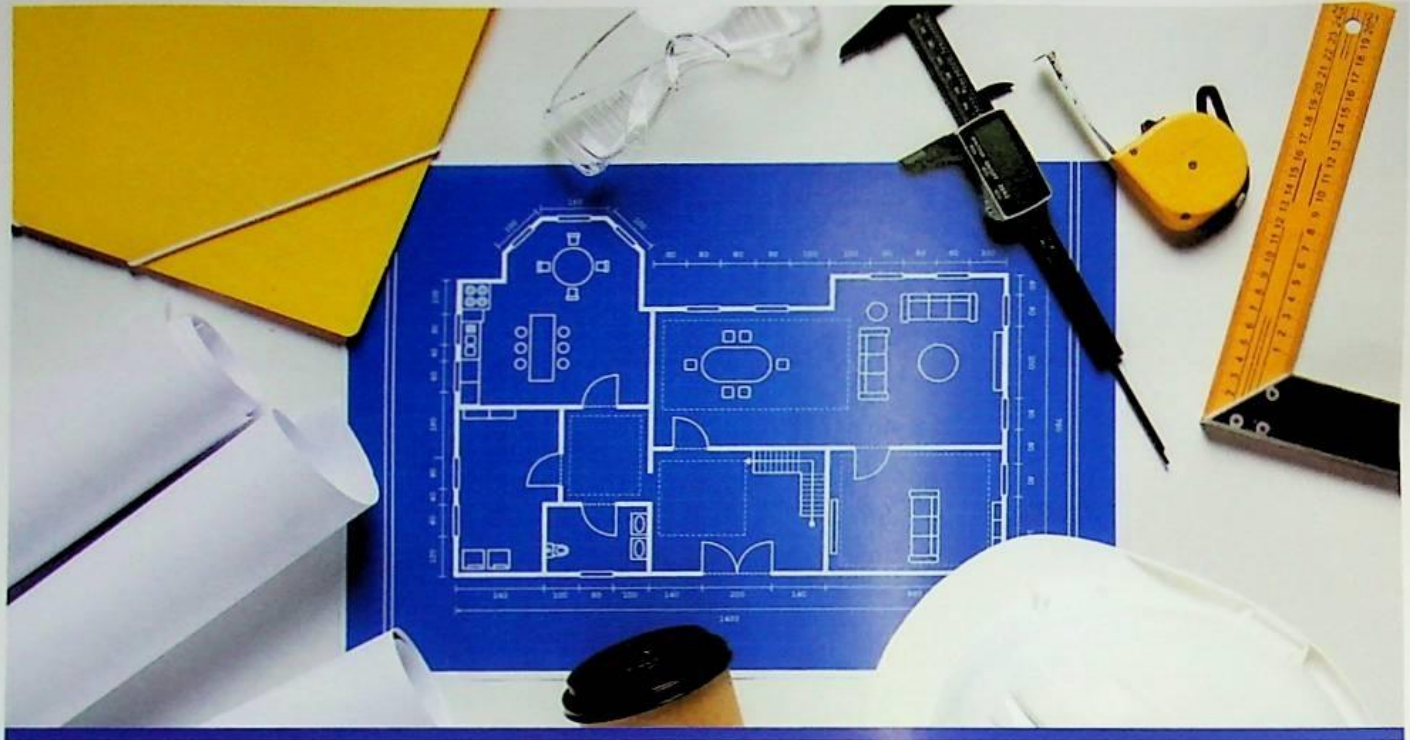
drawing up the report and the energy passport based on the results of the energy survey

6

### monitoring of the specific energy characteristics of buildings

conducting the second energy survey and analyzing the results of energy-saving measures' implementation





## IV. Barriers to the deployment and scale-up of energy-efficient and low-carbon construction materials in Uzbekistan

### Supply-side limitations

The Republic has large mineral reserves for the production of building materials in all regions. However, only half of the existing fields are currently being developed.

Despite the positive structural changes in the development of the production of non-metallic mineral products, the housing construction market still has demand for certain commodities that remains unmet by domestic production.



This is due either to the lack of enterprises producing them in the republic, or to low quality. Such commodities include various finishing materials, façade products, ceramic tiles, plumbing products and others. Even when available, the domestically produced products are largely inferior to the foreign analogues in appearance, quality and durability. These goods also have a limited range of availability, as do prefabricated reinforced concrete and concrete products and does not satisfy the demand of the population and sectors of the economy.

High domestic demand for cement and cement-containing products have been a driving force for the active development of domestic production. For 2015-2017, the list of various grades of cement and related products made in Uzbekistan significantly expanded, leading to a decrease in imports. Currently, cement grades such as high-quality Portland cement, hydraulic, alumina, grouting, sulfate-resistant, etc. have been mastered. At the same time, import volumes of certain types of cement are still at a high level.

Uzbekistan also has deficiencies at the level of vertical integration in the



production of cement and cement-containing products, respectively. On average in countries across the world, the ratio of domestic consumption of cement to consumption of cement-containing products is less than 30:70, whereas in Uzbekistan this ratio is reversed, or 70:30. The high share of the cement industry indicates the predominance of low-added value products, insufficient diversification of production, despite high demand for secondary products on the market, such as concrete as well as porous fillers, thermal insulation materials, etc.

Another factor that reduces the efficiency of the construction of affordable housing is the low technical competitiveness of many types of products of







medium added value. Thus, for example, the domestic production of façade products, ceramic tiles and other finishing products is of much lower quality than similar products of foreign countries, and even China. As a result, domestic manufacturers cannot cover the demand for this important building material, which

stimulates the import of these products and inflates the cost of housing.

### **Other institutional, financial, and market barriers**

Energy efficiency and renewable energy are relatively new focus areas in the construction industry in Uzbekistan. Therefore, in addition to barriers on the supply side, lagging demand and regulatory gaps have also contributed to the immaturity of the market for energy-efficient and low-carbon building technologies and materials. Specific barriers are enumerated and explained in Table 1.



Table 1. Barriers to the Implementation of Energy-Efficient and Renewable Energy Technologies

Barriers	Examples
Institutional	<ul style="list-style-type: none"> <li>• Incomplete legislative framework</li> <li>• Need for additional attraction and training of qualified personnel for consultation, plan review, monitoring, and verification of the implementation of energy-efficiency measures</li> </ul>
Financial	<ul style="list-style-type: none"> <li>• Insufficient public funding</li> <li>• Minimal interest in financing of renewable energy projects from credit and financial institutions, based on the perception of such investment as complex and risky</li> <li>• Lack of effective mechanisms for attracting private capital</li> <li>• Low incomes for rural residents, relative to the cost of alternative energy technologies, leading to an affordability gap</li> <li>• Imbalances in energy pricing arising from continued state subsidies for utility services</li> <li>• Split-incentive problems and conflicts of interest arising in investment agreements, such that the investor cannot take advantage of the profit from renewable energy systems</li> <li>• Transaction costs (as when project development costs exceed the impact of renewable energy implementation).</li> </ul>
Informational	<ul style="list-style-type: none"> <li>• Low market visibility of solar energy systems</li> <li>• Insufficient awareness of the performance and cost advantages of new energy-saving approaches and renewable energy technologies</li> <li>• Lack of automated metering of production and consumption of energy resources, which makes it difficult to consider cost optimization</li> </ul>





## V. Forecasted demand for building materials up to 2021

The demand for building materials in Uzbekistan in coming years is of course directly tied to the projected acceleration of new construction. Based on the adopted programs, it is expected that the volume of overall construction will grow from 2 to 2.2 times between 2017 and 2021. The RHP calls for annual construction volumes of about 15 thousand housing units per year from 2017 through 2020, worth from 2.1 to 3 trillion UZS.

Production by the domestic building materials industry is projected to grow by 36.1% relative between 2018 and 2021, with the production of energy-saving building materials growing even faster.

During the forecast period, a number of new enterprises of the building materials industry are planned to be established. Eighty projects valued in aggregate at over US \$1 billion will be implemented, including 54 new facilities (\$842.9 mil-



lion) and 26 modernization and reconstruction projects (\$387.1 million).

*According to the President's resolution No. 4028 of November 2018, domestic construction materials, equipment and modern wall materials should be widely used in the construction of affordable housing in order to reduce their cost and increase energy efficiency, with production of these materials to be carried out by energy-saving technologies.*

Application of renewable energy technology in the construction sector is strongly encouraged by the President's resolution # ПП-4422 dated 22.08.2019<sup>1</sup>, which sets a target to reach more than 25 percent share of renewable energy generation of the total volume of electricity generation by 2030. It also stipulates the mandatory installation of certified solar water heating systems for hot water supply, as well as energy-saving lamps during design, reconstruction and construction of all buildings and structures, except for individual housing construction. For individual housing, acquiring solar photovoltaic stations, solar water heaters, as well as energy-efficient gas burner devices is to be compensated in the amount



of 30 percent of the costs of from the state budget. Installation volumes of such technologies are to grow from year to year. Thus, it is projected that the assembly and installation capacities of photovoltaic systems for buildings will grow to at least 10.3 thousand kW by 2021, from 6.5 thousand kW in 2018. Production capacity will increase from 19.4 thousand kW in 2018 to 25 thousand kW in 2021, which will make it possible to apply these technologies in other sectors besides buildings as well.

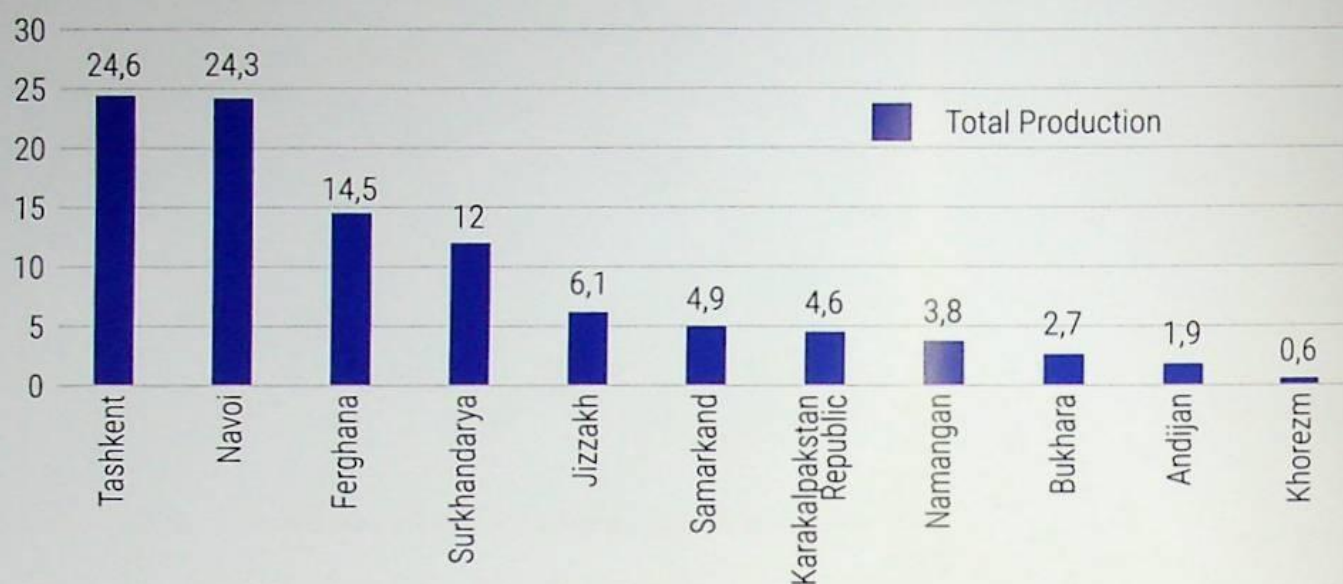
By 2020, new production of ceramic glazed and ceramic granite tiles of a wide range of colors will be introduced, including those created with the use of 3D-printing



1 <https://lex.uz/ru/docs/4486127>



Figure 2. Territorial structure of the forecast of cement production for 2021, (in %)



Source: calculations based on the data of the Ministry of Economy and Industrial Development of the Republic of Uzbekistan.

technology with a volume of 4.8 million m<sup>2</sup>. Production lines for window glass will be introduced based on energy and heat-saving float technology, with output in the range of 1.5 million m<sup>2</sup>. High-quality and specialized kinds of cement based on energy-saving technologies will amount to more than 5 million tons. The production of glass crystallite (80 thousand m<sup>2</sup>), composite reinforcing materials based on mineral fibers and polymer resins (1,460 tons), eco-friendly heat-saving «sandwich» panels based on basalt and other mineral-fiber insulation (50 thousand linear meters), steel pipes, reinforcement and rolled metal products (80 thousand tons) has already begun.

In 2021, the capacity of cement production in the republic is expected to increase to almost 18.9 million tons, and production will approach 16.5 million tons. Almost in all regions of the country cement production is expected to increase to meet growing local demands and that will ease supply chain to the final destinations in terms of time and cost.

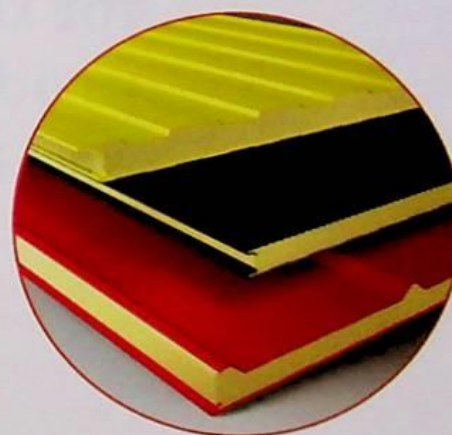
About 80 percent of the production of burned bricks is carried out using energy-efficient furnaces. By 2021 this figure will rise to almost 84 percent. The production volumes of this most important building material, widely used in the construction of housing, will grow to more than 2.7 billion pieces in





2020. However, starting in 2021, expansion of production and widespread use of more energy-efficient concrete blocks and foam concrete are planned in the

construction of modern housing, including in rural areas. This trend will reduce the need for brick to 2.6 billion pieces per year.







## **VI. Recommended measures for the expansion of domestic production of energy-efficient and low-carbon building materials**

In order to achieve these forecasted growth targets, and also to ensure quality and affordability, the government and the construction industry of Uzbekistan need to create a profound structural transformation in production of building materials and in the construction industry on the whole.

- The republic should continue to prioritize the accelerated development of value-added processing, thus leading to a full range of vertically integrated production from raw materials to finished products, especially with regard to the cement industry. The growth potential for such



secondary and tertiary processed products derived from domestic raw materials is high and achievable. A reasonable target is to decrease the share of raw unfinished products down to 55 percent, with corresponding growth in the production of medium and highly processed products up to 45 percent, which will be in line with global benchmarks.

- The government should create a system of norms, rules and standards contributing to the development of the production of modern types of building materials, products and structures, taking into account the conditions, climate and national preferences in construction.
- The prospect of rational use of domestic mineral deposits should be implemented, taking into account the satisfaction of domestic demand in building materials and import substitution. This would require:
  - Input into the production process of previously unexploited mineral raw materials, such as sodium sulfate; vein quartz; barite (Navoi and Jizzakh regions); high alumina raw materials; and dolomite for mineral wool;
  - Complete involvement and effective use of under processed materials including quartz sand, gypsum, bentonite, clay for expanded clay, fine rocks, marble, granite, which will expand the range of construction products and create new industries in the Republic of Karakalpakstan, and the Navoi, Tashkent, Samarkand, Surkhandarya, Kashkadarya and Jizzakh regions;
  - The use of vermiculite and basalt (Republic of Karakalpakstan, Surkhandarya region) for the production of min-







eral fiber, wollastonite (Jizzakh region) as a substitute for asbestos, gypsum-magnesite rock and magnesite (Navoi region) to obtain raw materials for porcelain production.

- Incentive measures should be taken to promote the development and placement of small private building materials enterprises (especially wall, ceramic construction tiles, soft roofing materials, dry mixtures, etc.) in the regions of the country, on the basis of the balance between the mineral and raw materials base and the labor force.
- The development of the resource base should be carried out by expanding geological exploration work on building materials in all regions, since Uzbekistan is the richest country in the Central Asia region in terms of reserves and allocation of non-metallic mineral building resources.
- It is necessary to strengthen measures for the rational, sustainable, and environmentally friendly use of mineral resources, with engagement of various industries (for example, chemical industries, etc.) experienced in the mitigation of industrial wastes.
- In the future, the successful development of the building materials industry will depend on the effectiveness of the implementation of measures to increase intersectoral cooperation and diversification of the sectoral structure. In the near future, great opportunities will arise for expanding the inter-sectoral cooperation of enterprises of the building materials industry with enterprises of the chemical, metallurgical, and coal industries. The acceleration of these processes will make it possible in the long term to significantly diversify the commodity structure of the building materials industry.
- New technologies should be applied, especially in the creation of new levels of materials processing and vertical integration.
- Reorientation of industrial policy priorities requires improvement of the whole production management systems of building materials, involving the introduction, first of all, more effective economic management methods. This requires changes in credit, tax and customs policies

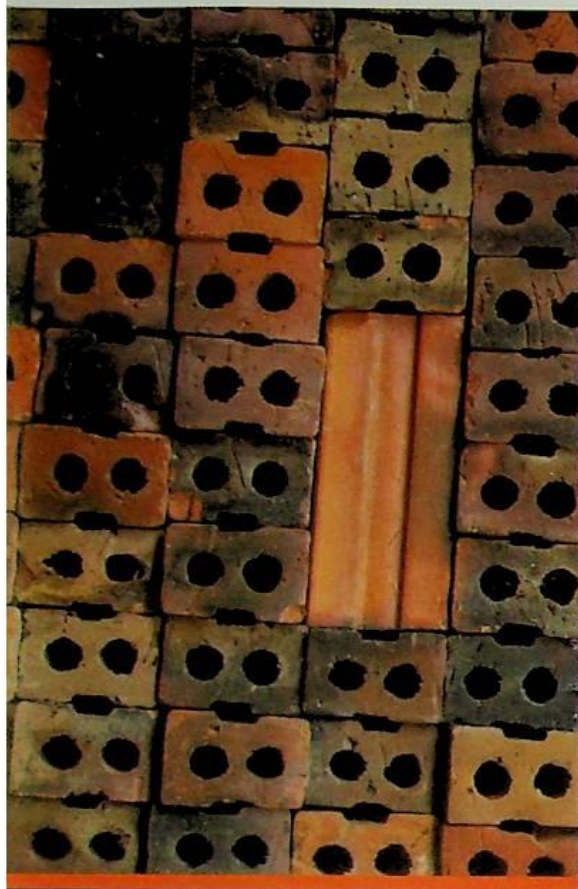


(providing for the almost complete elimination of inefficient tax benefits, optimization of a system of soft loans for new industries as well as for existing industrial enterprises).

- Reforms should be carried out in the field of tax administration, anti-monopoly policy, liberalization of the foreign exchange and credit markets, development of competition, and foreign economic integration, all toward enhancing the financial and administrative conditions for the development of industrial enterprises.
- Quality management and environmental management should be introduced into the activity of all enterprises of the building materials industry, in accordance with international standards ISO 9001: 2000 (quality management) and ISO 14001 – (environmental management). This will ensure effective quality management at the level of international standards, and will minimize negative environmental impacts of building materials production.
- It is necessary to develop a monitoring system for achieving growth targets and the quality of structural changes. This involves the development of criteria for assessing the effectiveness of the implementation of industry projects and assessing the multiplier effects of their implementation (minimizing production costs and maximizing profit), which is especially important in the context of the transition to a resource-saving model of economic development.
- Technological and procedural measures should be developed and applied to reduce resource consumption, energy and labor costs to produce building materials, thereby increasing both their sustainability and their competitiveness. Possibilities include the use of alternative fuels in the production of Portland cement clinker in order to save natural gas, as well as the selective use of municipal solid waste as fuel.
- It is important to create convenient and efficient transport and logistics infrastructure in support of building materials production. The Ministry of Transport of the Republic of Uzbekistan and “Uzbekistan Temir Yollari” (Uzbekistan Railways) JSC, at the request of investment project initiators should provide:



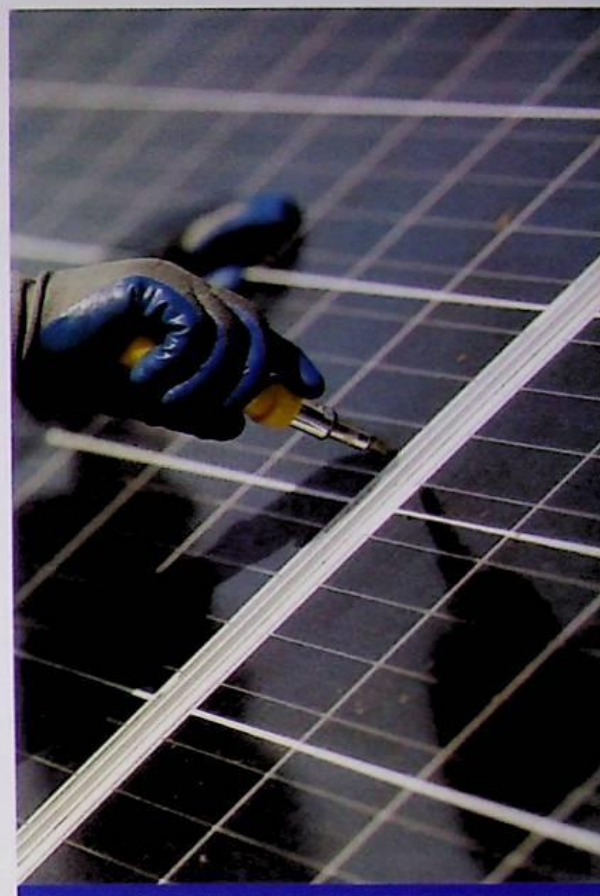




- Assistance in design of convenient and efficient transport and logistics infrastructure for newly built cement plants
- Connection of railway access roads of new cement plants to the existing railway infrastructure, or in case of its absence, construction of a railway line to the cement plant at its own expense;
- An increase in the number of railway wagons, including specialized cement cars, to meet the significantly growing needs for transportation of raw materials and cement products to consumers, including for export.
- In the medium term, new institutions should be established to support the accelerated but orderly growth of leading industries, including specialized credit institutions, a network of certification centers for assessing the quality of raw materials processing, engineering and technology companies to promote modern equipment for processing raw materials, logistics and marketing companies, etc.
- Measures should be developed for the widespread introduction of logistics methods in the production and sale of construction products in commodity markets, providing for the optimization of costs associated with the supply of raw and other materials, production and transportation of products to consumers.
- To achieve the forecasted parameters for the development of the building materials industry, an integrated approach is needed to support the innovative orientation of the industry development, which is ensured through various regulatory measures by the state:
  - Redistribution of state budget funds for research and development toward the implementation of work of practical importance, taking ideas and turning them into deployable, marketable products and services;
  - Development of interaction between scientific and educational organizations, representatives of the business community, and the creation of emerging specialized technology platforms and innovative territorial clusters.



- 3-D printing technologies should be developed to produce building materials – for example, ceramic tiles, porcelain stoneware, and other products.
- Expansion of the production of modern types of plumbing products, drywall products, dry finishing materials and mixtures, environmentally friendly heat-insulating materials from basalt fiber, building materials using polymeric raw materials, sandwich panels and other types of non-metallic mineral production is required.
- The UNDP-GEF project and the Ministry of Construction should carry out expanded future research on technology needs with specific regard to energy-efficient technologies and the RHP, ideally to be completed by the end of 2021, including the following:
  - An updated region-by-region assessment of insulation needs for energy-efficient housing (projected needed volumes of mineral wool and polystyrene) in compliance with applicable building codes and the President's resolution No. 4028 of November 24, 2018, as well as insulation manufacturing and distribution, with recommendations on supply-chain enhancements, local production, and inter-regional shipping
- An assessment of market availability, gaps, and remedies for other key building technologies not fully addressed in this report, including energy-efficient windows and heating equipment
- Further assessment of existing and forecasted market demand for renewable energy technology for low-carbon housing developed by the UNDP-GEF project, with recommendations on supply-chain enhancements if needed
- Field assessment of energy performance improvements resulting from the implementation of energy-efficient and low-carbon designs, and drawing of linkages between such performance assessment and ongoing technology needs assessment. The UNDP-GEF project already has plans to conduct these studies over a 12-month period in 2020 and 2021.





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