

REPORT ON THE STATE OF THE BUSINESS ENVIRONMENT IN THE ENERGY SECTOR UZBEKISTAN 2021



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ACTED Uzbekistan



**State Committee for Tourism
Development of the Republic of
Uzbekistan**



**National Association of
Microfinance Institutions**

Appreciation is expressed to representatives of The State Committee for Tourism Development of the Republic of Uzbekistan; representatives of the RE/EE and tourism sector for their consultations on clarifying the delineation of electricity, heat and biogas suppliers and other; representatives of universities and research centres for participating in the analysis and assessment of sector problems; partners from the private sector for cooperation:



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ABOUT THE PROJECT

The project "Promoting Energy Efficiency and Renewable Energy Production in the Community Based Tourism Sector in Central Asia" of the European Union under the «SWITCH Asia» programme aims to reduce the carbon footprint of the tourism sector in Kyrgyzstan, Uzbekistan and Tajikistan by creating an enabling environment for increased energy efficiency (EE) and strengthen sustainable consumption and production of renewable energy (RE) by Micro, Small, and Medium Enterprises (MSME) actors in the community-based tourism (CBT) sector.

This study will serve as an analytical foundation for the development of a roadmap and policy actions to enhance renewable energy output and consumption, as well as the general adoption of EE in the tourism sector and emissions reduction. BizExpert developed a report on the outcomes of the energy sector analysis for publication and presented it to a wide range of stakeholders, including private sector actors, the general public, government officials, decision makers, and development partners. The purpose of publishing and presenting the report and analysis is to engage parties in a country and regional discourse, where they may discuss the findings of the sector's economic difficulties and analyze the impact of the policies undertaken.

The main objective of the first phase of the project is to promote increased renewable energy generation and consumption as well as energy efficiency in the CBT sector, and to assess the current business environment while informing the public about the findings of the small-scale energy sector analysis.

The report includes background and analytical information on the energy sectors current situation. The publication presents the methodology of the study, along with the results of an economic analysis of the components of growth and development of clean energy production (generation) based on RES, the use of EE potential, and an assessment of the legal business environment to identify gaps in the implemented policies.

The Inter-Ministerial Working Group will initiate the development of a policy document (Road Map) based on the findings of the study and the results of the discussions.

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TERMS AND ABBREVIATIONS

AWP	Autumn and winter period
CBT entities	Individuals, legal entities, citizens engaged in economic activities, to provide tourism services in local areas, using their property, in order to generate entrepreneurial income (hereinafter referred to as CBT - community based tourism).
CHPP/TPP	Combined heat and power plant
CO ₂	Carbon monoxide/carbon dioxide leaves a carbon footprint and is part of greenhouse gases, chemical formula CO ₂
Consumers	Private entrepreneurs of the community-based tourism sector with the intention to use technologies, equipment, resources to generate clean energy based on RES and apply technologies and materials for energy-efficient consumption of resources
Distributed energy	Model of functioning of a unified energy system
Economic RES potential	Part of the technical potential, whose conversion into usable energy is economically feasible at a given price level for fossil fuels, heat and electricity, equipment, materials and labour, etc.
EE	Energy efficiency, rational, economical use of resources and energy, allowing to provide the necessary need at the lowest cost
Energy audit	Type of specialized activity to provide expert and consulting services, external evaluation of energy efficiency
Energy carrier	Substance in solid, liquid or gaseous state, possessing energy that can be converted into usable energy
Energy efficiency of CBT sector	Rational use (consumption) of energy resources with unchanged quality of tourist services and preservation (increase) of comfort level with observance of necessary standards, norms
Energy intensity	Actual value of consumption (use) of energy and energy resources (fuel) for the maintenance and operation of tourism facilities, infrastructure in the provision of tourism services
Energy intensity of the economy	Value for assessing the energy efficiency of a sector (ecosystem), national economy
Engineering services	Specialized services for technical support of individual activities from the design phase, the creation of a facility to the operation of the facility
ESCO	Energy service company providing a wide range of energy saving and energy efficiency services
EU	European Union
External environmental factors	Factors of direct and indirect impact on a firm, an industry (economic factors determining the economic development policies of an industry, political factors, legislative and legal norms, technological factors and patterns)
Factors of production	Economic resources used or consumed to produce goods, works, services
FGD	Focus group discussion, a form of stakeholder dialogue involving experts
Financial institutions	Interested institutions in the financial and credit sector, hereafter FCS
Fixed feed-in tariff ("green" tariff)	Tariff for the cost of electricity to support the use of RES, in which electricity grid operators receive a fixed payment for each kilowatt-hour of electricity supplied from RES-based sources
Green certificates	System of financial support for the use of RES, whereby for each kWh produced from renewable sources, "green certificates" are issued, which can be sold on the free market

HEIs	Higher education institutions
Households	Form of economic activity, for the use of property complexes that unite people by labour relations, the smallest and most massive unit of the national economy, a quite independent subject of market relations
HPP	Hydroelectric power plant
Intervention	Managerial and regulatory action by the state that changes the legal relations of the parties to achieve certain goals
JSC	Joint Stock Company
kV	kilovolt unit of measurement of voltage
kWh	kilowatt-hour unit of measurement of the amount of energy produced or consumed, which allows small energy entities to supply the produced energy to distribution companies
Local energy systems based on RES	Autonomous complexes of energy generation, transmission, storage and consumption
Micro generation	Production (generation) of electricity, heat by very small capacity facilities. (According to the WADE classification, small or micro generation is the production of electricity at or near the place of consumption, regardless of size, technology or fuel - either off-grid or in parallel with the grid)
MSME/(B)	Micro, small, medium enterprise/business
MW	Megawatt, a unit of power measurement
NLA	Regulations
NPP	Nuclear power plant
OECD	Organization for Economic Cooperation and Development
Programming	Activity of public authorities aimed at setting priorities, coordinating the implementation of economic policies subordinated to development objectives through planning
RES	Renewable energy sources used to generate (produce) clean energy
RIA/SOVAZ	Regulatory Impact Analysis of Regulatory Acts on Business Entities/Systemic Impact Assessment of Regulatory Acts
RUz	Republic of Uzbekistan
Secondary energy resources	Energy resources obtained as waste or by-products of production processes and economic activities for biogas production
SHPP	Small hydropower plant
Small-scale energy	Segment of the energy (market) sector that includes small-scale generation plants and small-scale generation complexes, including those not connected to centralized power grids, operating on the basis of traditional fuels and renewable energy sources (RES)
Solar energy (SE)	Field of energy related to the conversion of solar energy into electrical and thermal energy
Solar fuel power plant (SFPP)	Power plant that converts the energy of solar radiation and the chemical energy of fuel into electricity and heat in a single technological scheme
Solar heating	Solar energy for heating, hot water supply and technological needs of various consumers
Solar power plant (SPP)	Power plant designed to convert the energy of solar radiation into electrical energy
Suppliers	Firms, companies, organizations, individual entrepreneurs (hereinafter Entities) providers of goods, works, services
Technical RES potential	Part of the gross potential, the conversion of which into usable energy is possible at a given level of development of technical means and in

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	compliance with the requirements for environmental protection during the year
Tourism facilities	Buildings, structures and engineering infrastructure
Tourism infrastructure facilities	Engineering support systems that consume energy resources and generate, transmit and store energy
Tourism services	Entrepreneur's activity aimed at generating income and profit by meeting the needs of the tourist (citizen)
UN	United Nations
Wind energy industry	Branch of power engineering that specializes in converting the kinetic energy of air masses in the atmosphere into electrical, mechanical energy, suitable for use in the national economy. (wind generator, windmill (for conversion into mechanical energy)
Wind energy	Kinetic energy of moving air. The speed of the wind determines the amount of kinetic energy

INTRODUCTION

Uzbekistan is rich in history, architecture and natural resources. The country's varied climate, which includes deserts, glaciers, mountains and steppes, makes it ideal for ecotourism.

Uzbekistan offers a wide range of ecotourism opportunities, including eight state reserves (201,700 hectares), three national parks (598,700 hectares), a biosphere reserve (68,700 hectares), a wildlife breeding center (158,900 hectares) and ten natural monuments are among them (3,700 hectares).

Located on the ancient Silk Road, Uzbekistan boasts over 7,000 historical and architectural sites that are carefully preserved as a valuable spiritual heritage. These include ancient cities listed on UNESCO World Heritage, such as Samarkand, Bukhara, Khiva and Shakhrisabz. In addition, Uzbekistan is a country with strong Islamic roots, with more than 160 historically significant Muslim monuments, as well as dozens of historical sites associated with Sufism.

The development goals of the tourism sector of the Republic of Uzbekistan in 2019 — 2025 aim to transform the tourism sector into a strategic sector of the national economy, to achieve its targets through the diversification and improvement of the overall quality of tourism services, tourism infrastructure, and through increased foreign investment, and through effective and strategic advertising and marketing.

Outlined in the 2021 - 2025 tourism development goals, the goal is to increase the share of tourism in the country's gross domestic product by 5 percent (by the end of 2017 - 2.3%), as well as attract more than 9 million tourists by the end of 2025, including 2 million from distant abroad countries, by developing the necessary infrastructure and successfully promoting the tourism potential of the Republic of Uzbekistan in the world market.¹

Tourism makes a significant contribution to world gross domestic product and is projected to grow at 4% per year, thus outpacing many other sectors of the economy. However, the global carbon emissions associated with tourism are currently unquantifiable. Between 2013 and 2018, tourism's global carbon footprint increased from 3.9 to 4.5 Gt CO₂-eq, four times more than previously estimated and accounting for around 8% of global greenhouse gas emissions. Transport, the comfort of the tourist accommodation facilities (heating, air conditioning), shopping and food preparation have a significant negative impact on the environment.

High-income countries account for high emissions that contribute to the high carbon footprint. Rapid growth in tourism demand is evidentially outpacing the decarbonization of tourism-related technologies, projections indicate that tourism will account for an increasing share of global greenhouse gas emissions due to its high carbon intensity and continued growth.

Due to the high consumption of various types of energy, tourism has a significant financial incentive through the use of renewable energy sources in the improved efficiency, and long-term savings within tourism the tourism sector. Although the initial cost may change, data will eventually show a significantly reduced expense in RE/EE than previously employed energy sources. By measuring and tracking consumption, CBT MSMEs can become more aware of consumption management, efficiency and therefore long-term environmental impacts. Community-based tourism will thus be at the forefront of many innovative sustainable energy solutions, and the need to support local communities through energy services and related economic opportunities to help reduce carbon emissions for a more sustainable future.

The objective of this study is to identify policy gaps, and problems in the CBT sector that hinder the development of renewable energy production and consumption and the growth of energy efficiency in the sector.

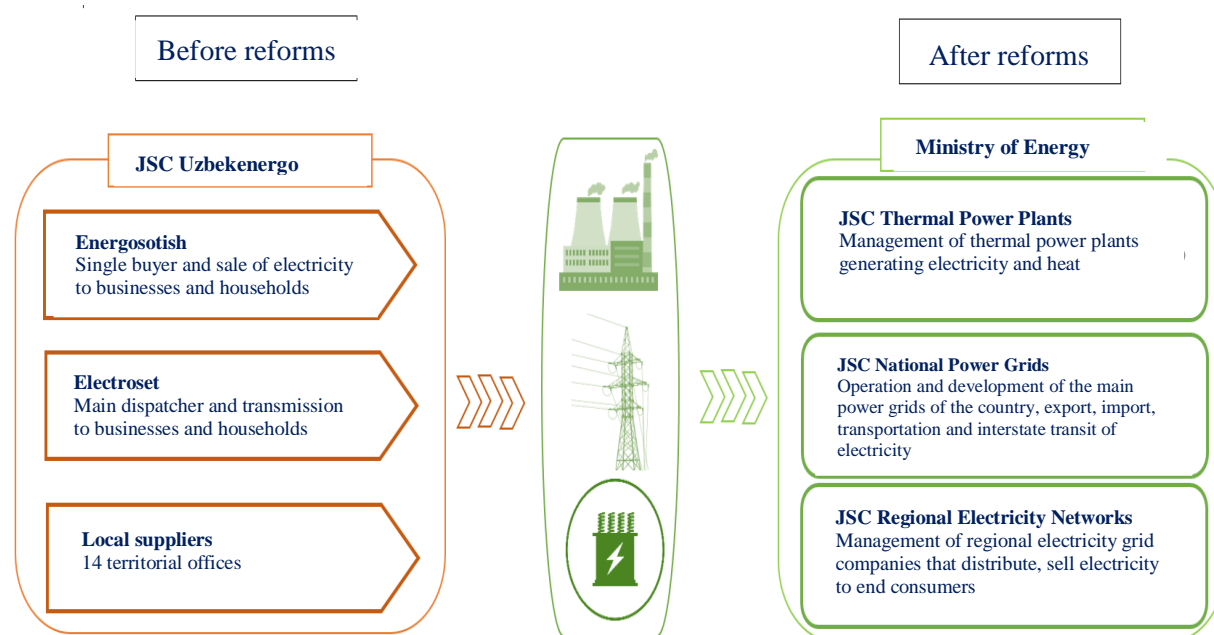
¹ Decree of the President of the Republic of Uzbekistan "On Additional Measures for the Accelerated Development of Tourism in the Republic of Uzbekistan" No. UP-5611 05.01.2019. See: <https://lex.uz/ru/docs/414318>

SECTOR PROFILE AND FACTORS AFFECTING THE DEVELOPMENT OF RENEWABLE ENERGY PRODUCTION AND USE AS WELL AS ENERGY EFFICIENCY GROWTH

Institutions for the Development of Renewable Energy Production.

Currently, in Uzbekistan, there is no institutional body that coordinates the introduction of RES in the country. The Ministry of Energy is the designated authority responsible for the development of the energy sector, while a number of other management and regulatory functions are distributed among various ministries and agencies.

On March 27, 2019 the President of Uzbekistan signed Decree PP-4249 “On the strategy for the further development and reform of the electric power industry of the Republic of Uzbekistan”, the indicated document -with a view to the practical implementation of the tasks of reforming the electric power industry and increasing its investment attractiveness - outlined a comprehensive program of reforming (restructuring) of the «Uzbekenergo» Joint Stock Company, aimed at fundamentally improving the institutional and legal framework for activities in the field of electricity generation and supply.



The ADB-funded International Solar Energy Institute was opened in Tashkent on the 1st of March 2013 in accordance with the Decree of the President of the Republic of Uzbekistan "On Establishment of the International Solar Energy Institute". The International Solar Energy Institute combines the functions of science, technology and project organization, whose tasks will include the establishment of specific solar energy project. ADB will encourage commercial and private solar energy lending and finance solar energy projects in Uzbekistan.²

Legislation, Institutions, Implementation Mechanisms

Uzbekistan has made considerable achievements in diversifying suppliers in the electricity market, increasing competition and promoting the increased use of renewable energy sources as a policy priority. However, the establishment of a legal framework defining all market rules and ensuring the rights of independent electricity producers remains a priority, it is imperative to address policy gaps which will help remove market uncertainty.

² <http://www.isei.uz>

In accordance with RUz Law No. 539 of 21.05.19 "On the Use of Renewable Energy Sources", state management of renewable energy sources is carried out by the Cabinet of Ministers of RUz, the Ministry of Energy of RUz, as well as by local state authorities.³

Specifically, the Cabinet of Ministers has the authority to:

- ensure the implementation of a unified policy on the use of RES;
- approve state programmes in this area;
- create conditions for innovative research and scientific and technical achievements in the field of RES;
- coordinate international co-operation.

In addition, the Cabinet of Ministers adopts normative acts in the field of RES, which establish rules for connecting economic entities to the unified electricity system, the procedure of state support for producers of energy from RES, pricing and tariff policy in this area, as well as the procedure for maintaining state accounting of RES resources.

In its turn, the Ministry of Energy in the field of RES implements:

- unified state policy;
- state and other programmes;
- coordination of activities of state and economic management bodies;
- development and approval of technical regulations within its competence;
- monitoring the implementation of state and other programmes;
- measures to improve the investment attractiveness;
- international cooperation;
- training, retraining and professional development.

Moreover, the Ministry of Energy:

- makes proposals to the Cabinet of Ministers on state support;
- maintains state accounting of resources;
- promotes the introduction of innovative technologies, scientific and technical developments.

In their turn, local public authorities in the field of RES:

- participate in the development of programmes, develop, approve and implement territorial programmes;
- promote creation and implementation of innovative technologies;
- cooperate with energy producers;
- make decisions on the allocation of land plots for the siting of RES installations.

In addition, self-governing bodies, non-governmental non-profit organisations and citizens themselves in the field of RES have the right to:

- participate in development and implementation of programmes;
- assist in implementation of RES activities;
- carry out public control.

Producers of energy from RES and RES installations have the right:

- to participate in the development and implementation of programmes;
- to benefit from the incentives granted;
- establish a local network;
- enter into agreements with both legal entities and individuals to sell energy.

Also, producers of energy from RES and RES installations are obliged to

- comply with legislation, norms, regulations and rules in the field of RES;
- maintain separate energy accounting.

Technology, Development and Implementation

Domestic and foreign specialized design and engineering organizations are involved in the development of pre-project and project documentation for the production, use and maintenance of small-scale renewable energy facilities, which confirms the technological and engineering and human resource dependency. Moreover, through the involvement of foreign specialists, this increases the cost of services

³ <https://azizovpartners.uz>

and attracts payment in foreign currencies and in addition to the construction of large infrastructure projects at the expense of the state budget, foreign investors are attracted to investing in and developing the sector, as well as public-private partnership agreements.

Producers of electricity from RES can connect to a unified power system on a block-station basis or on a competitive basis, the costs necessary to ensure connection to the unified power system are borne by the electricity producer. However, the costs necessary for the reconstruction of existing power plants are borne by the owner of the RES plants. Notably, the electricity producer is not authorized to arbitrarily connect the RES plants to the unified energy system. In addition, heat producers are not allowed to connect to RES installations to district heating or main heating networks. In addition, the construction of local heating networks, as well as connection to the units, is at the manufacturer's expense. Moreover, Biogas producers from biomass are not allowed to connect RES plants of the territorial and main gas networks. The construction of the local gas grid and the connection of the plants is incurred at the expense of the producer.

Incentives and Resource Involvement.

Energy producers from RES are exempt from paying property tax and land tax for a period of 10 years from the start of operation of RES installation. Producers of RES installations, in turn, are exempt from paying all types of taxes (property tax, VAT, land tax, excise tax, water use tax, taxes and special payments for subsoil users) for a period of 5 years from the date of their state registration.

In addition, there is no personal property tax for a period of 3 years on the property of owners who use RES in residential premises with complete disconnection from the existing energy resources - such owners are exempt from land tax for a period of 3 years. The basis for the benefits mentioned, is a certificate of use of renewable energy sources with complete disconnection from the existing energy networks.

Moreover, the government introduced customs privileges until the 1st of January 2022. Equipment, components, devices, spare parts, technological documentation, raw materials and materials that are not produced in the RUZ and imported as part of investment projects according to the lists approved by the Cabinet of Ministers are exempt from customs duties. The State also compensates individuals for 30% of the costs of purchasing solar photovoltaic stations, solar water heaters, and energy-efficient gas burners.

Additional compensation is provided by the State budget to cover interest costs on commercial bank loans for the purchase of RES installations, energy efficient gas burners and boilers, and other energy efficient equipment. Specifically:

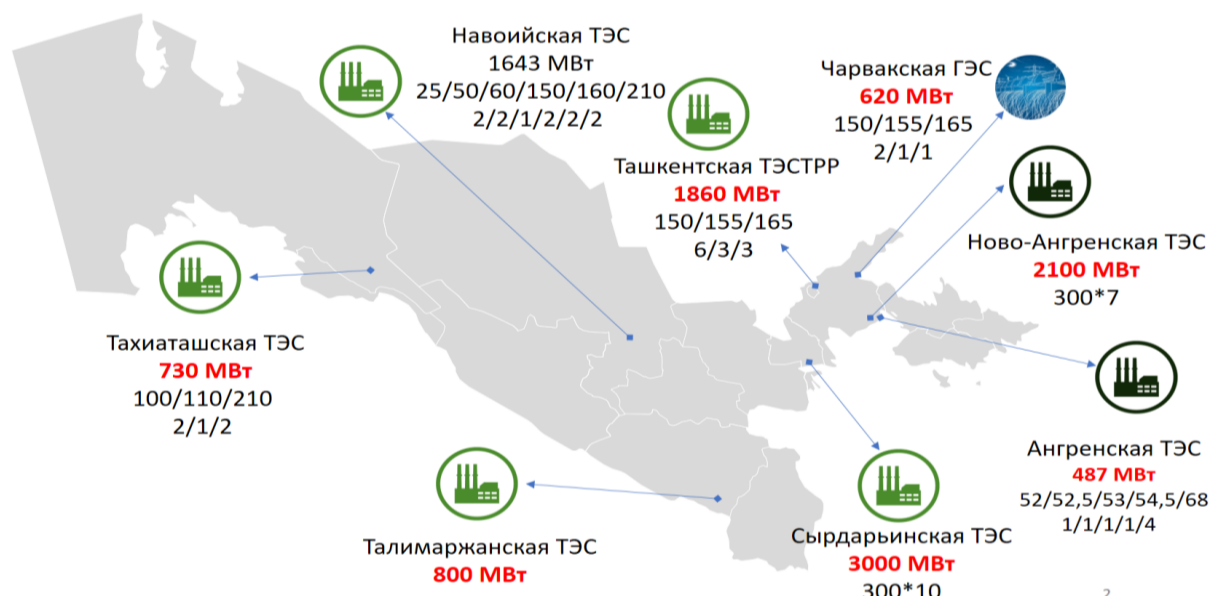
- Individuals - on credits, the amount of which does not exceed 500 million sums in part exceeding the refinancing rate of the Central Bank of the Republic of Uzbekistan, but not more than 8 % points;
- Legal entities - on credits, the amount of which does not exceed 5 billion sums in part exceeding the refinancing rate of the Central Bank of the Republic of Uzbekistan, but not more than 5 % points (Government decree of 22.08.19 no. 4422).

The state also provides support such as, customs concessions, assistance in the creation and applications for innovative technologies, and guaranteed connection of installations to the unified power system and other.⁴

Development Support Gaps

It should be noted that a number of economic incentives for the development of the renewable energy sector and EE growth have not been fully implemented, for example, measures such as grants or public investments, payments for renewable energy generation, subsidies for investments in renewable energy technologies (R&D) and others.

⁴ <https://azizovpartners.uz>

Figure 1. Power generation capacity of Uzbekistan (power plants in operation)

Investment and the Investment Climate

The investment attractiveness of Uzbekistan's energy sector remains at a relatively low level given the high cost of implementing renewable energy projects. Attracting foreign direct investment is one of the main conditions for their successful implementation, however, business relations with investors remain low. One example, is the most recent investment project, a \$1.3 billion deal to promote renewable energy initiatives in Uzbekistan with technical and economic support from external partners, that failed to implement. An agreement was signed with SkyPower Global to establish solar power generation capacity across Uzbekistan in 2018, accounting to the largest foreign direct investment deal in the country, and the first power purchase agreement of this scale for the country. In an interview with Voice of America, CEO Kerry Adler shared his concern that almost two years after entering Uzbekistan, SkyPower Global was still waiting for a payment guarantee from Tashkent and could not proceed with the intended project. Similar situations have also occurred around deals with companies such as Siemens Gamesa and Etka Co Enerji⁵.

Tariffs, Prices

Low electricity prices in the conventional energy sector are an important factor influencing investment initiatives, as the high cost of RES technologies and the non-competitive production (generation) price per unit of energy may be a deterrent to development. Thus, the average cost per kWh of electricity in Uzbekistan in 2018 was 2.4 cents, while in Kazakhstan it was 3.5 cents, Turkmenistan - 0.7 cents, Russia - 4.8 cents, China - 13 cents; in developed countries: in Germany - 33.8 cents, UK - 18.6 cents, Denmark - 33.3 cents, Belgium - 31.8 cents.

State metering of renewable energy resources and energy produced from these sources is carried out by the Ministry of Energy, the state accounting of energy produced from RES as well as of RES installations includes data on the sites of actual installations, the energy producers and the capacity of the installations and tariffs for electricity produced from RES are identified on the basis of competitive bidding.

⁵ <https://ia-centr.ru/han-tengri/opinions/farkhod-amirzhonov-vozobnovlyayemye-istochniki-energii-v-tsentrалnoy-azii-/>

Connection to the Grid for Energy Transmission, Sale of Energy

In order to connect to the networks of a unified electricity system, the producer must obtain technical conditions from the organization to whose electricity networks the connection is to be made (in some cases, technical conditions are not required) (CMD of 22.07.19 No. 610). Further, in accordance with the technical specifications, a project for connecting electrical installations to the unified power system is developed at the manufacturer's request. Connection to the unified power system is made in accordance with the commission scheme, the manufacturer's electricity metering devices are also checked and sealed.

Availability of Financial (credit) Resources

Lending and the efficiency of the banking system slows down the use of renewable energy in the tourism industry, consumers or project developers can often face difficulties in accessing available credit required for purchasing or investing in renewable energy due to low creditworthiness and unformed capital markets.

In rural areas of Uzbekistan, micro credits for renewable energy at the household and CBT level are difficult to access due to high credit risks of credit, lack of financial institutions and the lack of available finance for concessional lending. Developers of renewable energy projects face difficulties in obtaining bank financing due to the uncertainty that utilities will buy the electricity. Consequently, there is an increased uncertainty in project payback and a high risk of loan repayment. One of the main risks of lending is assessing the financial solvency of the consumer of energy supplied from RES generation sources, and their ability to purchase at a higher tariff. An alternative to a consumer loan for individuals can be a microloan, the maximum loan amount is five times smaller but microloans are available for any purpose in cash or to the applicant's bank account.

If a consumer loan can be taken out up to 500 times the minimum salary (approximately 100 million sums), then microloans can be taken out for a sum not exceeding 100 times the minimum wage (approximately 20 million sums). The average term of disbursement is up to one year, and rarely up to two to three years.

The average interest rate on microloans is 34%, the lowest 30% and the highest 40%. However, microcredit is not available from all banks in the country, and as of April 2019, only 17 out of 27 banks were willing to provide micro-loans.

In the Presidential Decree No. UP-4400 dated 23.07.2019. "On Measures to Improve the Accessibility of Microfinance Services", it outlines the increase in the accessibility of microfinance to the population. The maximum amount of a microloan was increased to 50 million sums, a microloan to 300 million sums and micro leasing to 600 million sums. The same document prohibited issuing new microcredits to individuals with outstanding debts on previous loans.

Moreover, high risks predetermine the interest rate on the loan, and the ability to justify a business plan and prove repayment based on a comparative cost advantage model is not supported in this model. The achievement of environmental benefits and the failure of preferential lending and credit sector support (raising funds from various funds for the development of sustainable green lending) is a problem as a result of a lack of engagement of major economic resource.

METHODOLOGY, AIMS AND OBJECTIVES

1. The practical theoretical and methodological basis of the study consists of publications of domestic institutions, public reports on the problems of RES, EE development.
The peculiarity of the approach is consideration of problems of development of RE, EE suppliers through assessment of influence of policies on development of production, energy consumption (energy supply of tourism objects, provision of separate tourist services at the level of CBT communities) by non-profile subjects of entrepreneurial activity.
2. The analysis used a method of economic evaluation of the main factors for the production (economic resources required) and consumption of clean energy.
3. The method of multi-factor analysis of the influence of external environment factors was applied, in particular the method of assessment of the impact of norms and regulations of legislation on certain types of entrepreneurial, investment activities, analysis of actual impact of implemented policies on growth and development of three fields of activity (small, alternative energy sector, "RE, EE suppliers", "Consumers" community-based tourism sector).
4. Statistical and mathematical method of data processing, as well as the method of expert assessments of the business environment were applied to determine the level of potential and state of the energy sector and small (alternative) energy based on RES, use of technologies, EE materials.
5. Based on a preliminary expert assessment and in line with the aims and objectives of the analysis conducted, problem identification methods based on desk review and sociological research (surveys and questionnaires), and a focus group discussion involving stakeholders, were used on the issues and problems under investigation.
6. Desk research - involved the study and analysis of the adopted sectoral policy documents, on the development of the energy sector and the development of RE, EE suppliers, Consumers (CBT sector), and experts, defined the correlation between the goals and objectives of energy sector development and sustainable tourism in the country's 2030 development strategy.
7. An expert analysis has been carried out on the compliance of the objectives of the implemented policies (Strategies, programmes) for the development of the energy sector and the activities of "Suppliers" and "Consumers" to reduce the negative environmental impacts and minimize emissions in the CBT sector.
8. Analysis and study of the legal framework and other documents regulating specific business activities and regulating the use of renewable energy and energy saving technologies allowed systematizing the areas of legislation for discussion and identification of problems.
The proposed systematization of the forms of state regulation of homogeneous business activities made it possible to systematize the areas of regulatory legislation (substantive branches of law, business law), to identify the main problems arising from regulatory practices, which in turn made it possible to assess the impact on the development of activities of three groups ("Consumers", "Suppliers": EE growth, clean energy generation and consumption).
9. In order to adjust expert opinions on the state of the business environment and to evaluate policies, analyses and reports from other organizations that address the development issues of the Renewable Energy Suppliers sector have been reviewed.
10. In order to delineate the environmental problems (market problems), an economic analysis of production factors (basic economic resources required for clean energy production based on RES and application of EE technologies and materials), on the growth and development of small, alternative energy at CBT level was carried out. Based on the desk analysis, a list of topics to be discussed and problems to be clarified was developed and preliminary questionnaires were prepared, taking into account industry specifics.
11. In line with the aims and objectives of the research enquiry, a preliminary questionnaire survey was conducted on a base of previously selected private sector actors Suppliers, Consumers and FCS. The questionnaires were designed with the necessary questions for the analysis and preparation of the FGDs in mind and the respondents were given access to the documents to be analyzed (programmes, policies, NLAs).

12. **Qualitative research indicators:** A focus group discussion, online survey and questionnaire survey of FGD participants was conducted in order to identify the actual impact of the adopted policy documents, assess the impact of the NLAs on the growth and development of the Suppliers, and Consumers sectors, identify problems with the use of basic economic resources and further study the state and characteristics of the sectors, identify the cause-effect relationships. Based on the analysis of the composition of the participants, an additional questionnaire survey of the tourism sector actors was conducted.
13. **Sampling for the analysis of activities:** Based on the analysis of the lists of market participants, questionnaires, surveys and FGDs, no specialized group of interests is identified for the use of geothermal resources and the supply of necessary equipment, technology. General sampling allows identifying private sector representatives by interest groups, homogeneity of activities and range of problems, as well as identifying systemic problems of implemented policies. In order to study the actual need of the tourism sector for alternative small-scale energy development, firms and employees of the tourism sector have been consulted.
14. In order to clarify the problems of differentiation of electricity and heat suppliers, consultations were held with representatives of RES association. In its work with stakeholders the expert group was guided by the RIA methodology, in the methodology of development of strategic, policy documents for problem identification, scale assessment, with direct participation of stakeholders, discussions, expert consultations.
15. **Processing and reporting of data and indicators, informing:** The results of the survey of respondents, and FGD participants, were processed using software, the survey was conducted using digital platforms <https://docs.google.com/> and <https://oproso.ru>, allowing for the quantification of participants and the automatic processing of quantitative data from the answers to the questions. Tables and charts software, provides for automatic calculation and determination of %s as a comparison with the indicator to the sum of 100% ratio of the whole sector or all representatives of the homogeneous activity to the problem, question, answer.

Keywords: small energy, local energy systems based on RES, energy efficiency, energy saving, energy intensity, thermal conductivity, tourism infrastructure facilities (buildings, system facilities), small energy, renewable energy, distributed energy, CBT, households, economic resources, programming, government regulation, energy audit, engineering services.

A typology of economic and regulatory barriers:

- Policy gaps;
- Regulatory gaps;
- Financial and credit, investment barriers;
- Economic barriers to the availability of key economic resources;
- Market barriers;
- Sectoral governance and monopolism.

Limitations of the sector analysis and assessment for 2020: Virtually no statistical data and indicators reflecting the status of the MSME sector, sectoral small-scale energy and self-generation (micro-generation) and RES-based energy consumption and the status of energy efficiency of real estate, engineering systems and services in the tourism sector at local community level are available. The analysis of quantitative data determining the relevance of the issues addressed, the topics discussed, and the confirmation/disproval of expert hypotheses is supported by qualitative environmental assessment data. In cases where a clear difference or neglect of the issue by respondents and FGD participants is identified, the topic is excluded from further analysis as low sensitivity and not relevant. The methodology involves the use of indicator scoring to identify sensitivity in data assessment and analysis, the values of the highest indicators are analyzed and the lowest indicators indicate a negative impact or are equated with low sensitivity. $1 \geq 0$; an indicator equal to or close to 50% for example is considered sensitive and an indicator close to 100% is critical. The results of the questionnaire provide data but do not allow us to extrapolate to the whole country, nevertheless the results allow us to identify existing trends and confirm the validity of expert approaches in identifying sector problems and policy gaps.

The main objective of the first phase was to prepare an identified list of problems arising from the economic environment, the regulatory environment and the implementation of policies covering cross-sectoral issues.

FIELD RESEARCH, SURVEYS AND FGD RESULTS

Questionnaire Data and Qualitative Indicators on the Composition of the Participants

Policies analyzed throughout this study cover the last three years and represent the current situation of the energy sector and business environment, as one of the main objectives.

In order to obtain a factual assessment of the impact of the policies implemented, key parties were involved to participate in the discussion, questionnaire and survey. The assessment involved private actors, such as suppliers in the market of RE, EE technologies and materials, actors in the financial and credit sector, and actors in the tourism sector 'consumers'. Quantitative and qualitative indicators of the composition of FGD participants, questionnaire respondents and individual private actors were involved as stakeholders.

There were 52 participants in the focus group discussion, the 'suppliers' group was represented by 20 participants, including: - equipment and component importers - 4; equipment manufacturers - 6; developers and designers - 3; manufacturing-generation, clean energy supply - 4; service and operating organizations - 3. The "consumers" group (representatives of the tourism sector) was represented by 12 participants. The group "financial and credit sector" was represented by 6 people. Representatives of the education and research sector - 4; industry experts and specialists - 5; other participants - 5.

Diagram 1. Quantitative and qualitative indicators of the composition of FGD participants

- Representatives of the tourism sector
- Financial institutions
- Developers and planners
- Organizers and exhibitors
- Industry experts and specialists
- Education and research sector
- Production-generation, clean energy supply
- Service and maintenance organizations
- Equipment manufacturers
- Importers of equipment and components

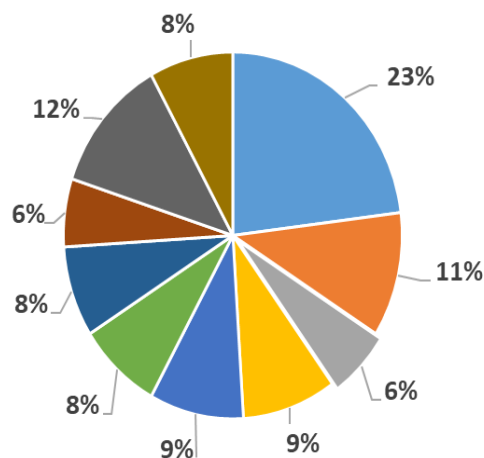
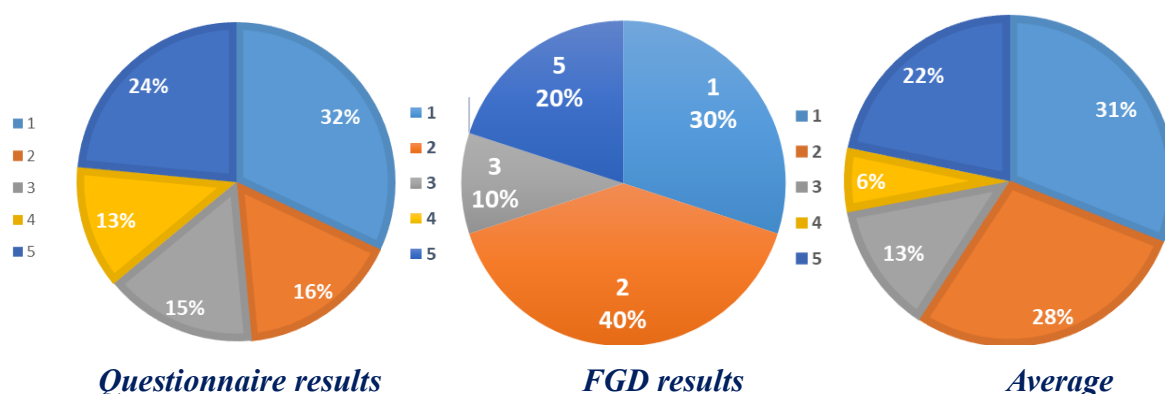
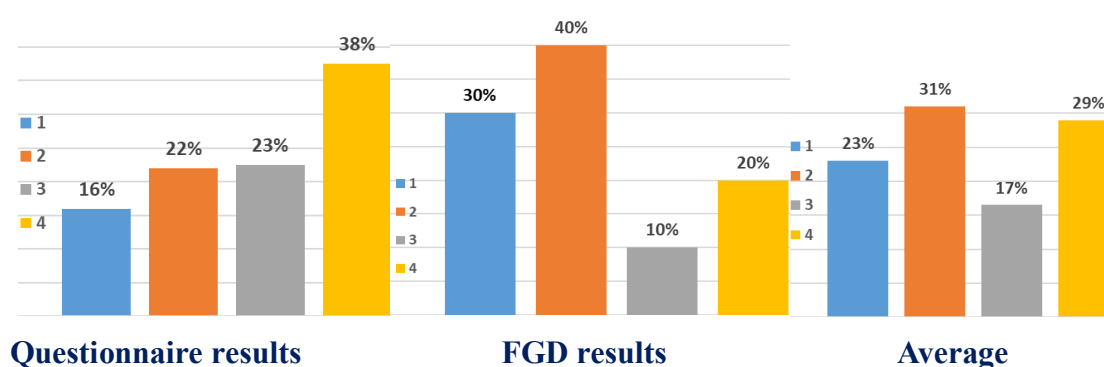


Diagram 2. To what extent is information on the use of technologies, materials, generating equipment, appliances and energy efficiency technologies available to the RES and EE supplier, producer, consumer?



1. Yes, the material obtained from the Internet and other information sources satisfies the need.
2. There is not enough economic information to make a decision on the use and application of these materials, devices, technologies, purchase of generating, accumulating, transmitting equipment.
3. Available information is advertising and does not influence the choice of technological solution (project development).
4. Information is not available.
5. To make decisions it is necessary to obtain information (consultations) from specialists.

Diagram 3: How does the application of modern RE and EE technologies affect business?



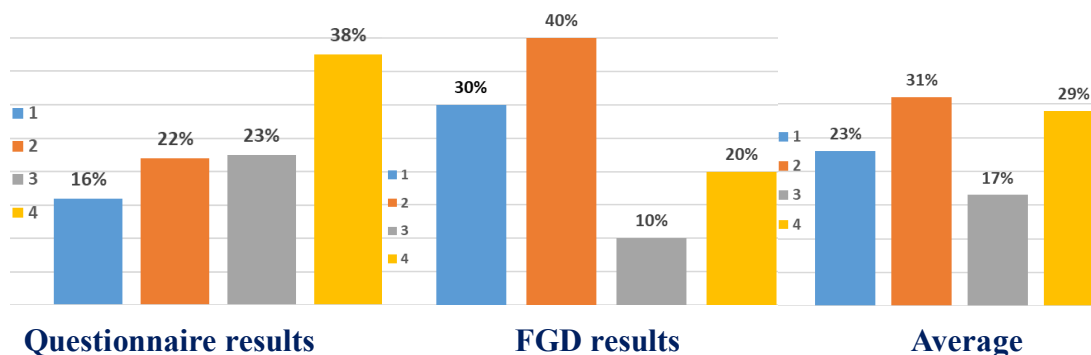
1. Energy and other inputs are used efficiently.
2. The cost of renewable energy production is significantly reduced and EE is increased.
3. Costs for purchase of high-tech equipment, materials are higher than those which are not technically and morally obsolete.
4. Acquisition of high-tech equipment allows for greater benefits and competitive cost of energy, products, and services.

Review of the FGD and Survey Results

An important conclusion from the analysis of the respondents' and survey results, is the attitude of representatives of the private sector towards this factor and highlights the economic benefits derived from the use of modern technologies and the benefits from the efficient use of other factors of production and energy resources. The discussion proves the following problems: high cost of modern energy efficient technologies and affordability for MSME enterprises and tourism sector; lack of state support of R&D

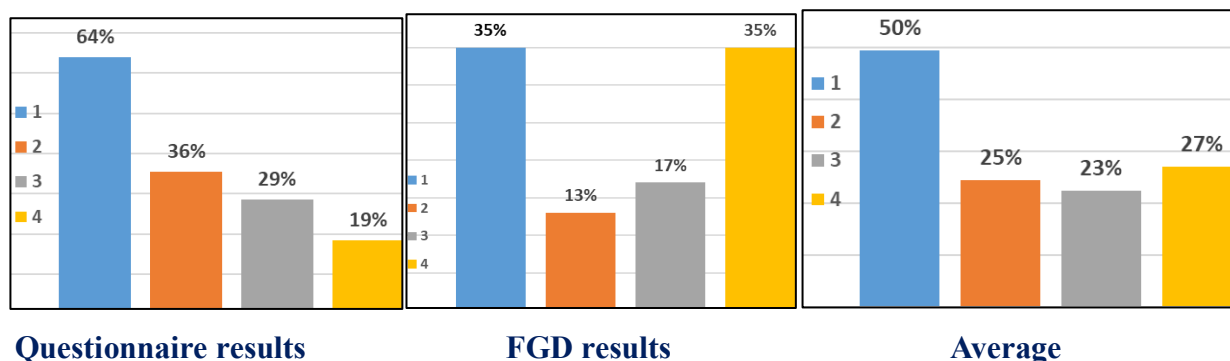
and as a result import of technologies; lack of use of scientific domestic achievements and developments, lack of established system of introducing technologies, underdeveloped market institutions that provide such services and products; investors and RE, EE suppliers are not prepared to pay the value of intellectual property as a commodity.

Diagram 4: How do the environmental requirements of renewable energy and EE legislation affect the development of your business?



1. Energy and other inputs are used efficiently.
2. The cost of renewable energy production is significantly reduced and EE is increased.
3. Costs for purchase of high-tech equipment, materials are higher than those which are not technically and morally obsolete.
4. Acquisition of high-tech equipment allows for greater benefits and competitive cost of energy, products, and services.

Diagram 5. What financial resources do you use for RES and EE development?



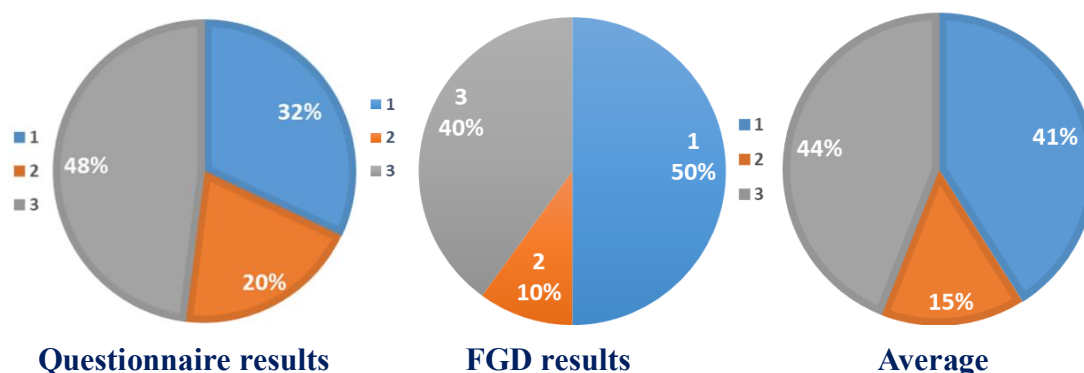
1. Own funds (fixed assets, current assets).
2. Borrowed funds (credits, loans, leasing, microcredits).
3. Grants from organizations and funds.
4. State grants and soft earmarked loans.

Objectively, financial resources are one of the main factors in production - an economic resource necessary for the growth and development of small-scale energy, as confirmed by the survey results. At the same time, respondents indicate that they are willing to invest if economic conditions allow for profits.

The low use of borrowed funds (loans) demonstrates the status and capacity of both loan offers (products) and credit needs, which confirms a set of effective measures is necessary for the sustainable green financing of RE, EE. An objective phenomenon in all economic systems is the scarcity of available financial resources and their respective costs.

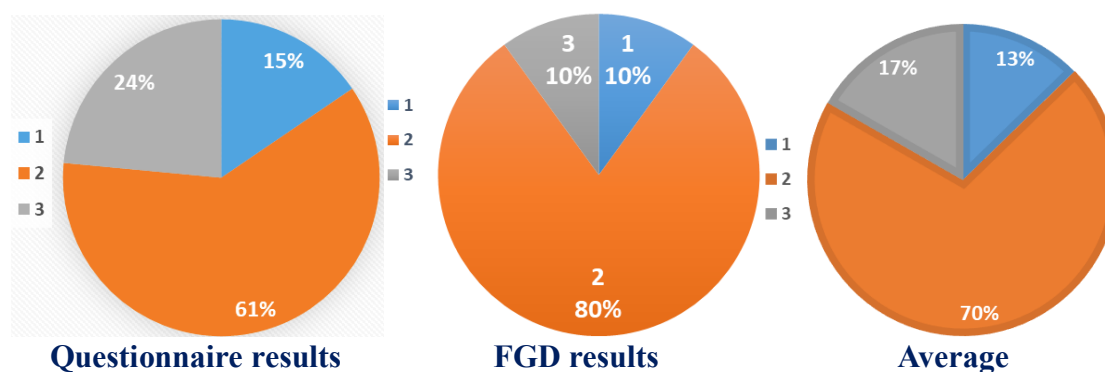
Throughout rural areas of the Uzbekistan, microcredit for renewable energy at the household level is either non-existent or difficult to access due to bureaucracy, project developers often have difficulties in obtaining bank financing due to an uncertainty that communal services will buy electricity.

Diagram 6: Will you need a plot of land to generate and transmit energy?



1. Private ownership of a plot of land.
2. Fixed-term (temporary) use of a land plots, under a lease agreement with the state owner.
3. Limited free use of the land plots for the purpose of generating, clean energy, biogas and placement of infrastructure facilities of the local energy supply of the tourism sector (CBT).

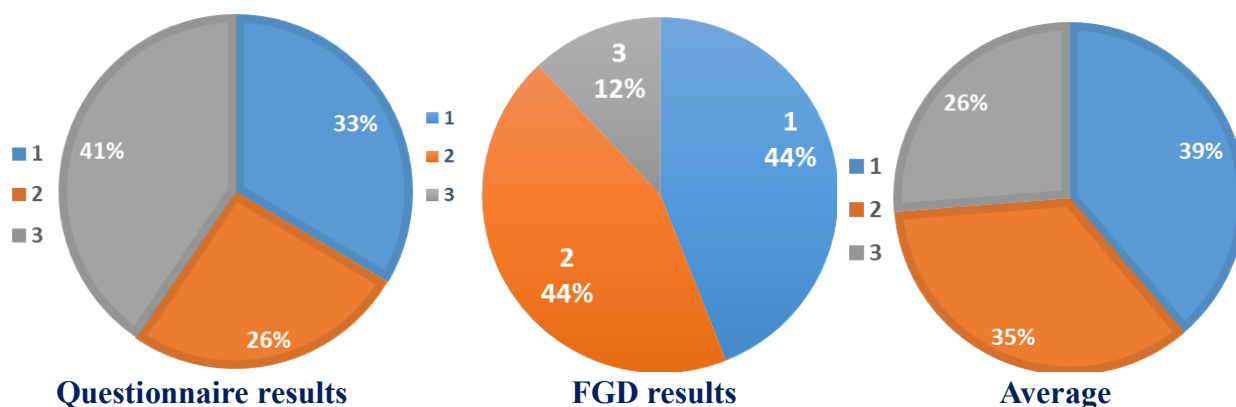
Diagram 7. How would you rate the availability of RES and EE sector specialists with the necessary competences?



1. Satisfactory.
2. Specialists are scarce and in some areas, there are no specialists at all.
3. The level of training does not correspond to the required competences.

Due to a lack of specialists, there is a evident limitation in implemented support measures stipulated by a number of adopted documents. During the FGDs, a problem was identified in the preparation of training programmes at higher education institutions, while it should be noted that addressing the problem requires a change of approach, not all private entities will be specifically trained in educational institutions.

Diagram 8: Do you engage qualified specialists for the design, business planning, construction and operation of renewable energy installations and the use of EE?

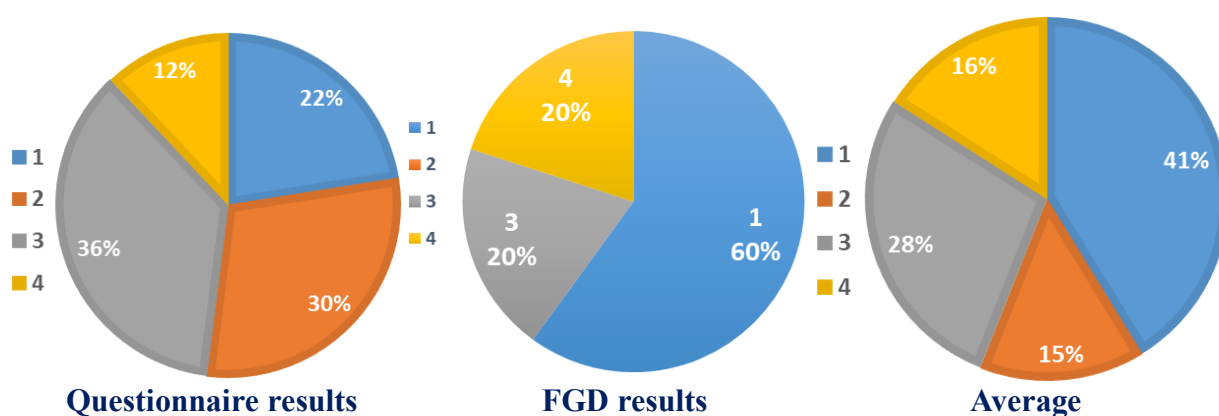


1. Yes, we do, including from other countries.
2. We have our own staff.
3. No specialists available.

On the one hand, the problem can be solved through hiring external staff, but participants 'suppliers' claim that specialists in certain areas do not exist at all (not available).

Uzbekistan lacks qualified personnel to maintain, install, operate and repair renewable energy equipment. Consumers, managers, engineers, architects, lending institutions or planning authorities lack information on the benefits of renewable energy technologies, geographical resources, operating experience, maintenance requirements, funding sources and installation services. As a result, lack of available specialists and information can increase uncertainty and hinder decision-making.

Diagram 9: Are you, your company (including the CBT community) ready to invest in the growth and development of RES and EE in the short term?



1. Willing, subject to available funds and availability of resources
2. Willing when legal and economic conditions are created to allow for additional profits
3. Willing when "cheap and long credit" is available, at a reasonable rate, as well as grants, subsidies
4. No, because consumption is limited and market institutions are not developed in this sector

Diagram 10: The emergence of entrepreneurial and investment initiatives in RES and EE is based on:

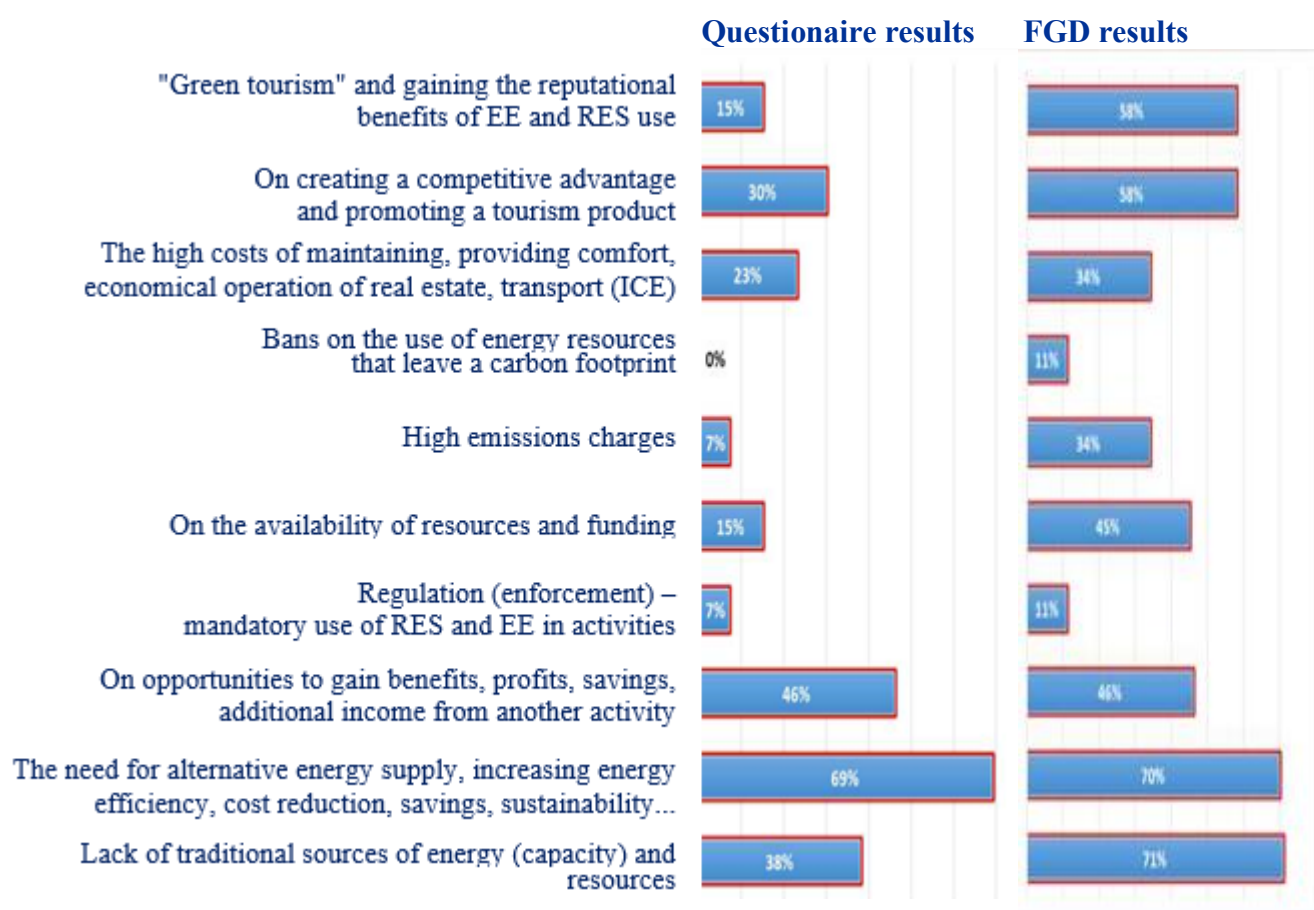
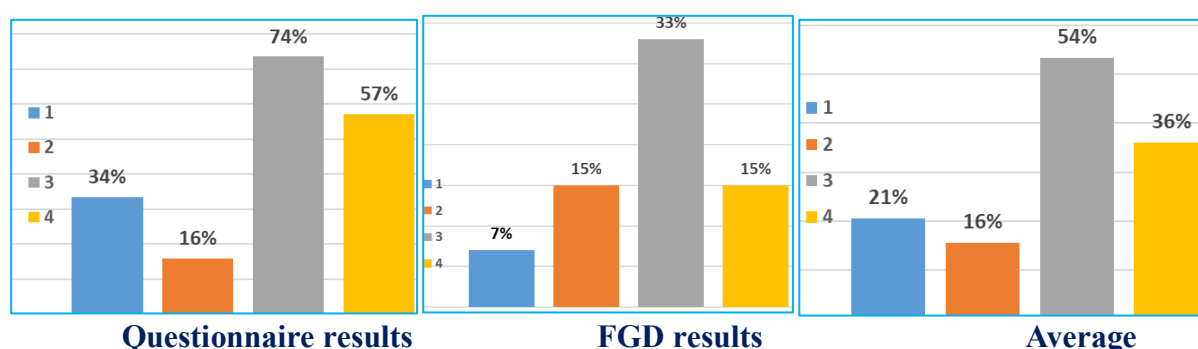


Diagram 11. What administrative barriers must be overcome in order to obtain permission to use a land plot?



1. Approve their intentions with the authorities, landowners.
2. Involvement in the process of changing the legal status of the land plot (change of designated and functional purpose of a land plot, transformation from one category to another) for subsequent use for energy production (conversion, generation), biogas, use of geothermal water resources, and placement of tourism infrastructure.
3. Approve and obtain permits from authorised authorities in the field of town planning regulation, territorial development, energy and gas authorities for the construction, erection of energy facilities and energy transmission facilities, tourism infrastructure.
4. Obtain permission and approval for water use and subsoil use from the authorised bodies before starting clean energy production and consumption activities.

Diagram 12. Are there difficulties in obtaining permits for the use of water, land, natural resources and from which authorities?

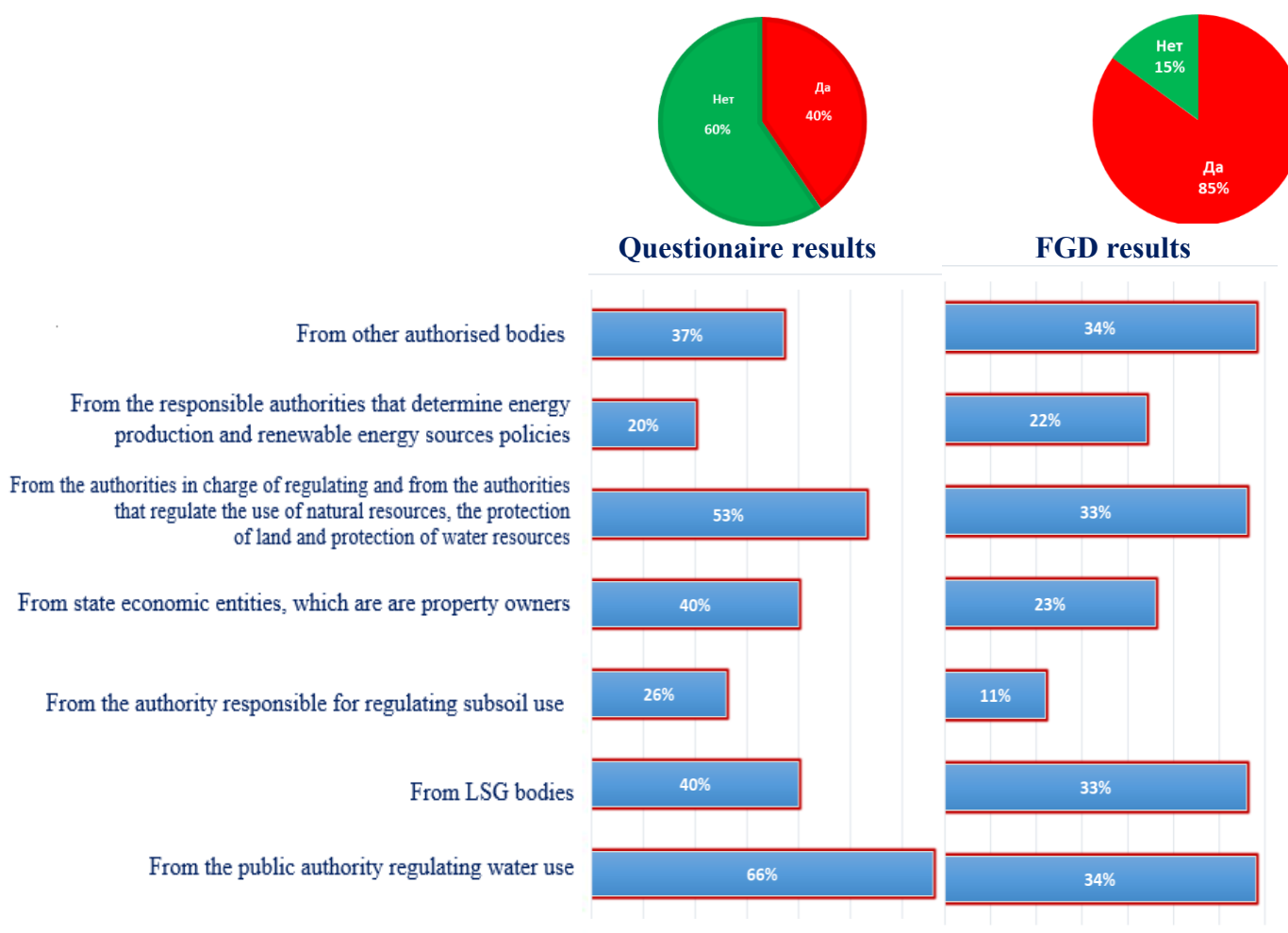
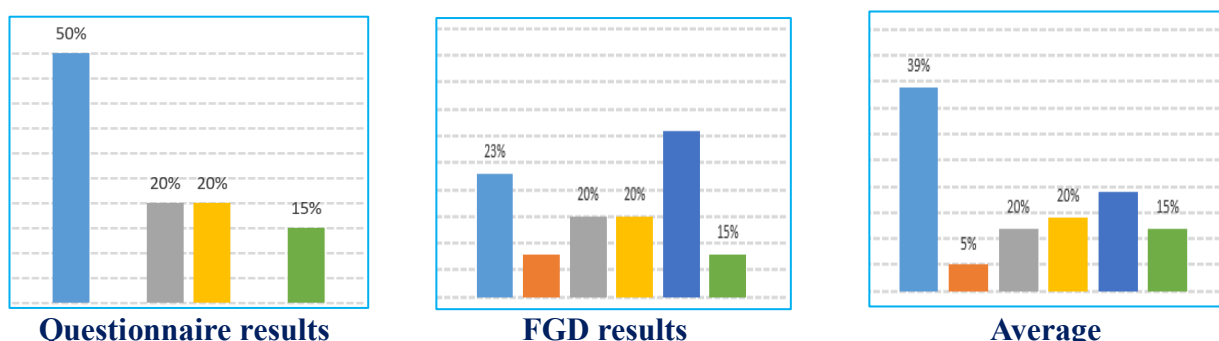


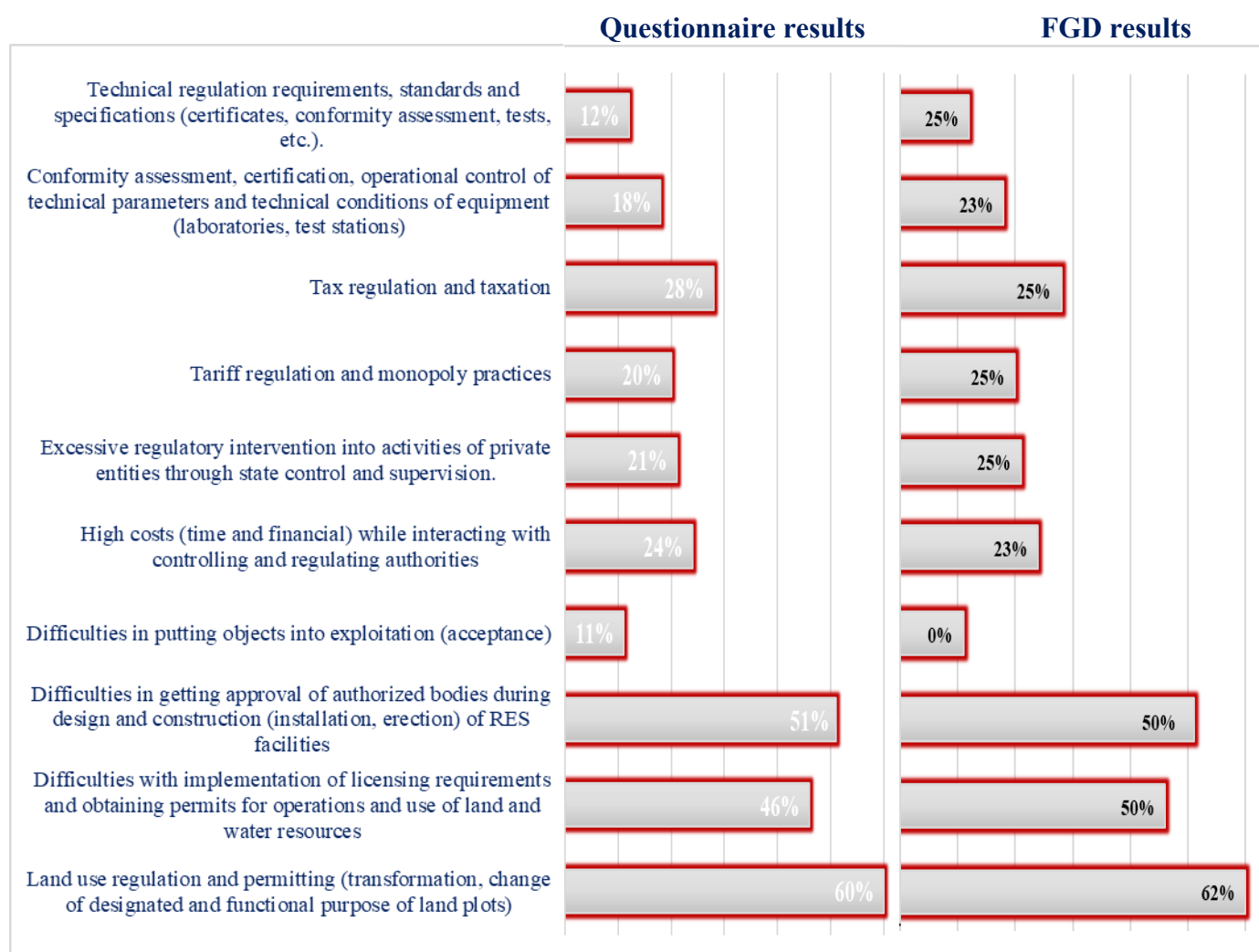
Diagram 13. Assessment of the impact of implemented state programmes, strategies on the activities of private sector actors.



1. Quality implementation of the programme measures will increase the production, supply of energy to VIZ, increase the use of EE technologies and allow the business to be maintained and expanded.
2. The approaches and policies being implemented will increase volumes, revenues and profits.
3. The documents aims to reduce environmental damage, but does not impact our operations.
4. The adopted documents and their implementation have an impact on the business environment and create economic and legal conditions for the growth of VIZ technologies, 3/3 and the development of tourism business at the CBT level through
5. local generation of production and consumption.
6. I am not aware of any such documents and their impact on activities.

7. The implemented policy documents do not aim at solving the problems of energy supply of the tourism sector at CBT level, growth and development of local micro-generation.

Diagram 12. Regulatory problems hindering the development of RE and growth of EE



In terms of future development, regulatory problems can hinder investment and entrepreneurial initiatives. The system discourages investment in the development of its own energy economy, with the centralized infrastructure lacking its own incentives and resources for technological upgrades and efficiency improvements, and consumers and suppliers, due to low levels of trust, are not willing to pay for investments in the common energy system, considering it an added cost in their core business.

ASSESSMENT OF THE BUSINESS ENVIRONMENT IN THE ENERGY SECTOR, ANALYSIS OF THE DEVELOPMENT OF RENEWABLE ENERGY GENERATION AND ENERGY EFFICIENCY GROWTH

State of the energy sector and impact of policies on renewable energy generation and EE growth

According to a survey conducted in 2013 of 150 households in Khorezm region on their perception of RES and introducing RES in the residential and municipal sector in Uzbekistan, showed the desire for individual energy independence as a main driving force behind RES, despite the relatively low cost of energy. Respondents strongly agreed that RES could replace traditional energy sources, including centralized gas and electricity supply.

Remote and rural areas experience intermittent power outages due to outdated distribution infrastructure and in areas where electricity consumption needs to be reduced. At the household level, the main barrier to the establishment of such off-grid energy systems is necessary for capital investment, as households will need more energy for heating and cooking than for lighting and appliances, as opposed to providing a range of tourism services at a modern quality standard.

In order to reduce the initial cost of RES technologies, the government needs to ensure a greater emphasis on domestic production of RES technologies. In order to increase the attractiveness of using RES equipment for CBT entities (households), incentive programmes such as green tariffs, rebates and net metering systems should be developed; for producers - tax incentives, credits for RES, and technical equipment is an urgent issue.

Technologies and technical condition of energy sector equipment and transmission systems

Most of the solid fuel based power generation and distribution equipment used today was built and commissioned before the mid-1980s and is not only environmentally unsound but also hazardous to the environment. Modern power-conversion equipment, and gas turbines in particular, convert up to 70% of potential energy into electrical energy, while the functioning, outdated turbines convert only 33-34%. Modernization of this equipment is expensive and does not pay for itself. Thus, in the Uzbek context, it is more appropriate to talk about renovation rather than modernization. It is also important to note that there has been rapid innovation in renewable energy technology, for example, semiconductor silicon solar panels have been rapidly replaced by amorphous silicon photovoltaic panels and then by flexible solar cells. Due to insufficient localization of renewable energy production, their cost, installation and maintenance remain high. The rapid development of the industry will require a transition from outdated technologies to new technologies.

Dependence on non-renewable resources, projections

The abundance of fossil fuels also presents an obstacle to the introduction of RES. Uzbekistan's proven reserves are estimated at about 1.8 trillion cubic metres of gas, 0.6 billion barrels of oil and 1.9 billion tonnes of coal, with a majority of the gas and oil reserves located in the southwestern part of the country. At current production rates, proven reserves are estimated at 31, 22 and 95 years, respectively. Total undiscovered reserves are estimated to be much larger. Since independence, there has been a long-term upward trend in natural gas production and exports. The high global market value of natural gas has made gas production and export particularly profitable for the country. As a result, majority of revenues from gas exports have been used to further increase gas production instead of investing in the development of renewable energy sources and diversifying energy production. At the same time, a shortage of hydrocarbon resources is expected to emerge, which will increase in 2020-30 and may threaten both energy security and overall economic security of the country. Under this scenario, natural gas production in Uzbekistan will stop growing after 2020, and further, based on the growth of domestic consumption, exports will also to decrease by 10 bcm in 2030 compared to 2020. After 2030, to ensure energy stability, Uzbekistan will have to substitute a minimum of 12-13 million tonnes of oil equivalent per year (approximately 21% of the current energy mix) with alternative energy sources.

Nuclear Power the Alternative and the Scale

Another factor affecting the scale of renewable energy and hindering the development of the energy sector is the development of nuclear power. Studies show that producing clean energy from renewable energy sources is about 20 times more expensive than from nuclear power plants. Experts estimate that the world's reserves of coal will last 270 years, of oil 50 years and of gas 70 years. The uranium reserves used in nuclear power plants amount to 5,718,400 tonnes. It is estimated that it will last for 2500 years. In some countries the share of nuclear power in electricity generation is high and in 12 countries this share exceeds 30%. Particularly in France - 75%, in Slovakia - 54%, in Belgium - 51%, and in Ukraine - 46% of electricity is produced by nuclear power plants.

In accordance with Presidential Decree No. DP-5484 of 19 July 2018 "On measures for the development of nuclear energy", the Uzatom Agency for the Development of Nuclear Energy was created under the Cabinet of Ministers of the Republic of Uzbekistan.⁶ The Republic plans to build a modern nuclear power plant with two VVER-1200 reactors with a total capacity of 2,400 MW, which will provide 15-18% of the country's electricity needs in 2030. A site near Lake Tuzkan in Jizzak oblast has been selected as a priority site for the construction of the plant.

Factors: Technology, Knowledge, Awareness.

An important factor is the socio-demographic prerequisites for the introduction of RES in Uzbekistan. One of the important factors for increasing the introduction of RE technologies in rural and tourist areas is investment in human capital. Thus, a study by B. Eshchanov et al. (2020), based on a sample of more than 400 households in rural areas, examines the factors that contribute to a more accelerated adoption of RES. The authors conclude that in addition to income and household growth, the quality of human capital is an important indicator that contributes to more accelerated adoption of RE tools at the micro level.

In Uzbekistan, as in many developing countries, there is a lack of public awareness of modern forms of energy, especially renewable energy. There is a lack of qualified personnel in Uzbekistan who can maintain, install, operate and repair high-tech equipment, "consumers", managers, engineers, architects, lenders or planners may not have information about the benefits of renewable energy technologies, information about the geographical location of renewable energy resources may not be available, as well as experience in operating renewable energy based micro-generation devices and equipment.

The technical requirements for equipment maintenance, energy saving technologies and materials are not used by MSMB at the household level. And the availability of advisory services to the actors is hindered by the lack of financial resources. The need for investment in human capital in rural areas will increase awareness of the population about the importance and efficiency of implementing RES, and will increase the demand for this type of technology. It is necessary to develop quality education in the field of RES in the national HEIs in the Republic.

At the present stage, few HEIs are graduating specialists in this area: Tashkent State Technical University named after I.A. Karimov, Karshi Engineering and Economic Institute, National University of Uzbekistan named after Mirzo Ulugbek, Fergana Polytechnic Institute, Namangan Engineering and Construction Institute. The Institute of Physics and Technology has a training centre "Renewable Energy Education", where the main activities of the training centre are training and retraining of staff and specialists in the field of energy, energy saving, energy auditing, design and service of traditional and alternative energy production and consumption systems.

In addition, within the field of RES, the journal *Heliotehnika* is a well-known scientific journals in the CIS in the field of solar energy (SE) and other RES in Russian and English. The main purpose of the journal is primarily to publish reports on major scientific research of high priority on various aspects of SE and a wide range of RES issues in general.

⁶ <https://uzatom.uz>



Bioreactor for biogas production at the Golden Wing poultry farm in Bostanlik district of Tashkent region established by Smart Biogaz LLC.

Lack of skills and information can only exacerbate existing uncertainties about implementing renewable energy and impede deployment. The results of the FGD show that there is a rationale for establishing joint educational programmes with foreign universities, providing a holistic system of linking processes from research in energy efficiency and renewable energy use to production.

OVERVIEW OF THE MAIN LEGAL AND REGULATORY ACTS GOVERNING THE RES/EE SECTORS IN THE REPUBLIC OF UZBEKISTAN

Laws of the Republic of Uzbekistan:

1. "On Natural Monopolies" dated 24.04.1997, No. 398-I (New edition. As amended by the Law of the Republic of Uzbekistan dated 19.08.1999, No. 815-I) // Collection of Laws of the Republic of Uzbekistan (CL RUz), 2016, No. 17, Art. 173;
2. "On Rational Use of Energy" dated 25.04.1997, No. 412-I // CL RUz, 2016, No. 3(I), Art. 32;
3. "On State Control of Activities of Economic Entities" dated 24.12.1998, No. 717-I // CL RUz, 2017, No. 1, Art. 1;
4. "On Electricity" dated 30.09.2009, No. LRU-225 // CL RUz, 2013, No. 18, Art. 233;
5. "On Competition" dated 06.01.2012, No. LRU-319 // CL RUz, 2017, No. 16, Art. 265;
6. "On Public Procurement" dated 09.04.2018, No. LRU-472 // National legislative database of the Republic of Uzbekistan (NBDZ RUz), 04.12.2019, No. 03/19/586/4106;
7. "On Public-Private Partnership" dated 10.05.2019, No. LRU-537 // NBDZ RUz, 23.01.2021, No. 03/21/669/0060;
8. "On making amendments and additions to the Law of the Republic of Uzbekistan "On the Cabinet of Ministers of the Republic of Uzbekistan"" dated 10 December 2019, No. LRU-591 // NBDZ, 04.12.2020, No. 03/20/653/1592;
9. "On the Use of Renewable Energy Sources" dated 21.05.2019, No. LRU-539 // NBDZ, 09.11.2020, No. 03/20/646/1488;

Acts of the President of the Republic of Uzbekistan:

10. "On Deepening Economic Reforms in the Energy Sector of the Republic of Uzbekistan" dated 22.02.2001, No. UP-2812 // VOM RUz, 2001, No. 1-2, Art. 47; 2012, No. 40, Art. 466;
11. "On Measures to Further Improve the Performance of Design and Surveying Organisations" dated 29.04.2008 N PP-847 // CL RUz, 2008, No. 18, Art. 147;
12. "On Programme of Measures to Support Enterprises of the Real Sector of the Economy, ensuring their Stable Operation and Increasing their Export Potential" dated 28.11.2008, No. UP-4058 // CL RUz, 2012, No. 8-9, Art. 76;
13. "On Establishment of the Working Group for Elaboration of the Alternative Energy Sources Development Program" dated 05.09.2012, No. R-3902.
14. "On establishment of the International Solar Energy Institute" dated 01.03.2013, No. PP-1929;
15. "On Measures for Further Development of Alternative Energy Sources" dated 01.03.2013, No. UP-4512 // CL RUz, 2013, No. 10, Art. 124;
16. "On additional measures for accelerated renewal of physically worn-out and obsolete equipment, and reduction of production costs of industrial enterprises" dated 22.12.2016, No. PP-2692 // NBDZ, 29.06.2020, No. 06/20/5370/0975;
17. "On the Programme of measures for further development of hydropower for 2017-2021" dated 02.05.2017. No. PP-2947 // NBDZ, 28.09.2020, No. 06/20/6075/1330;
18. "On the Programme of measures for further development of renewable energy, energy efficiency in the sectors of economy and social sphere for 2017-2021" of 26.05.2017, No. PP-3012 // NBDZ, 28.09.2020, No. 06/20/6075/1330;
19. "On measures to ensure the rational use of energy resources" dated 08.11.2017. No. PP-3379 // NBDZ, 18.06.2020, No. 06/20/6010/0776;
20. "On approval of Innovation Development Strategy of the Republic of Uzbekistan for 2019-2021" dated 21.09.2018, No. UP-5544;
21. "On measures for accelerated development and financial sustainability of the electricity sector" dated 23.10.2018, No. PP-3981;

22. "On measures to radically improve the management system of the fuel and energy industry of the Republic of Uzbekistan" dated 01.02.2019, No. UP-5646;
23. "On the strategy of further development and reform of the electric power industry of the Republic of Uzbekistan" dated 27.03.2019, No. PP-4249 // NBDZ RUz 28.03.2019, No. 07/19/4249/2840;
24. "On additional measures for accelerated development of the building materials industry" dated 23.05.2019, No. UP-4335 // NBDZ, 07.05.2020, No. 07/20/4707/0545;
25. "On accelerated measures to improve energy efficiency of sectors of economy and social sphere, introduction of energy-saving technologies and development of renewable energy sources" dated 22.08.2019, No. PP-4422;
26. "On Approval of the Strategy on Transition of the Republic of Uzbekistan to Green Economy for the period 2019-2030" dated 22.08.2019, No. PP-4477 // NBDZ, 05.10.2019, No. 07/19/4477/3867;
27. "On measures to improve the efficiency of commodity exchanges and further improve exchange trading mechanisms" dated 08.10.2019, No. PP-4484 // NBDZ, 09.10.2019, No. 07/19/4484/3883;
28. "On Additional Measures to Reduce the Dependence of Economic Sectors on Fuel and Energy Products by Improving Energy Efficiency of the Economy and Utilising Available Resources" dated 10.07.2020, No. PP-4779 // CL RUz, July 13, 2020, No. 27, Art. 309;

Acts of the Cabinet of Ministers of the Republic of Uzbekistan:

29. "On application of economic sanctions for violations in the use of fuel and energy resources" dated 09.03.1994, No. 124 // CL RUz, 2006, No. 46-47, Art. 458
30. "On the transition to contractual (free) prices for coal, natural gas and liquefied gas supplied to households" dated 08.09.1994, No. 454 // CL RUz, 1994, No. 9, Art. 44;
31. "On measures to organize the activities of the State Joint Stock Company Uzbekenergo" dated 24.02.2001, No. 93 // CL RUz, 2017, No. 38, Art. 1049;
32. "On measures to improve the structure of OJSC "Uzbekugol" and implementation of the Program of development of the coal industry of the republic for 2002-2010" dated 04.06.2002, No. 196 // CL RUz, 2004, No. 25, Art. 288, No. 43, Art. 456;
33. "On improvement of organizational activities of SJSC Uzbekenergo" dated 21.06.2004, No. 290 // CL RUz, 2017, No. 38, art. 1052;
34. "On Measures to Cardinaly Improve the Mechanism of Settlement for the Use of Electricity" dated 01.11.2004, No. 511 // NBDZ, 04.06.2020, No. 09/20/348/0716;
35. "On Additional Measures to Strengthen the System of Metering and Control over the Sale and Use of Electricity" dated 01.11.2004, No. 512 // CL RUz RU, 2004, No. 44, Art. 461;
36. "On Approval of the Rules for Conducting Energy Inspections and Expertise of Consumers of Fuel and Energy Resources" dated 07.08.2006, No. 164 // CL RUz, 2016, No. 21, Art. 239;
37. "On Additional Measures to Improve the System of Metering and Control of Electricity Consumption" dated 05.06. 2009, No. 150 // CL RUz, 2015, No. 44, Art. 562;
38. "On Approval of the Programmes - Roadmaps for Financial and Economic Recovery of Loss-making, Economically Insolvent and Low-Profit Enterprises of the Chemical Industry and Fuel and Energy Complex of the Republic" dated 06.06.2014, No. 145 // CL RUz, 16 June 2014, No. 24, Art. 286;
39. "On measures to stimulate the construction of biogas plants in livestock and poultry farms of the republic" dated 25.11.2015, N 343 // CL RUz, 2017, No. 32, Art. 817;
40. "On approval of the Regulation on the procedure for providing energy services" dated 18.07.2018, No. 551 // NBDZ, 19.07.2018, No. 09/18/551/1536;
41. "On measures to develop renewable energy sources and attract private investment to set up photovoltaic plants" dated 08.08.2018, No. 633 // NBDZ, 10.08.2018, No. 09/18/633/1682;
42. "On measures to organise the activities of the Petroleum Products and Gas Control Inspectorate under the Ministry of Energy and the activities of the Electricity Control Inspectorate under the Ministry of Energy" dated 24.06.2019, No. 520 // NBDZ, 04.06.2020, No. 09/20/348/0716;

43. "On measures to expand the production and implementation of biogas plants in the republic in the period 2017-2019" dated 01.06.2017. No. 338 // NBDZ, 25.06.2019, No. 09/19/520/3332;
44. "On approval of regulations for connection to the unified power system of business entities generating electricity, including from renewable energy sources" dated 22.07.2019, No. 610 // NBDZ, 22.07.2019, No. 09/19/610/345;
45. "On approval of the Regulation on the mechanism for identification of an organisation as a specialized renewable energy generation facility" dated 13.11.2017. No. 908 // NBDZ, 04.06.2020, No. 09/20/348/0716.

The following conclusions can be drawn from the analysis of the provisions of the legal acts in force affecting legal relations in the field of RES/ES:

Potential consumers, producers (suppliers) developers of RES projects, who install a micro-generation facility (e.g. solar panel or mini hydro, windmill) for their own needs and for selling excess capacity, will face administrative gaps due to destructive legal regulation or in certain aspects the lack of such regulation. The present object of legal regulation, micro-generation relations, is not identified by the legislation of the Republic of Uzbekistan, as the term "microgeneration" is missing.

The legislation of the Russian Federation defines micro-generation as the - facility for production of electricity, owned by or otherwise legally owned by the consumer of electricity, which power receiving devices are technologically connected to the power grid facilities with voltage level to 1000 volts, functioning including the use of renewable energy sources and used by the specified consumer for electricity generation to satisfy the needs of consumers of electricity, and for the purposes of sale in accordance with the legislation of the Russian Federation. Electric power is supplied to the grid by an electric power generating facility not exceeding the maximum connected capacity of power receivers of the consumer and not exceeding 15 kW, and if the electric power of such facility is not supplied to the grid by the electric equipment intended for servicing more than one premise, as well as for sale pursuant to the procedure established by the basic provisions for operation of the retail markets.

"Mini- and micro-generation technology belongs to the field of Decentralized Energy (DE), more specifically to the field of distributed energy. According to the WADE (World Alliance for Decentralized Energy) classification, small or micro-generation is the production of electricity at or near the place of consumption, regardless of size, technology or fuel - both off-grid and in parallel with the grid."

Modern approaches to policy development and policy definition are essentially based on the technology of "own power plants", at the household or business group level, which solves various issues for both for the end user and for the energy sector as a whole. Mini and micro power plants with small amounts of energy produced are used when:

- it is necessary to provide an uninterrupted supply of electricity to a local facility, such as a micro-hotel (guest house);
- inaccessible settlements for individual, complex households (microclusters) which cannot be connected to the centralized grid, particularly for economic reasons, need to be supplied with electricity;

In addition, various renewable energy sources are used for micro-generation, which makes it possible to significantly reduce electricity costs for an individual CBT entity and households, as well as to preserve the environment. Mini and micro power plants reduce transmission losses that are present in centralized distribution networks.

Future development requires a programmatic approach that combines development policy objectives of several sectors of the economy, and the process of transition from centralized energy to distributed grid smart energy, local or decentralized, requires an improved effort in coordination of functional activities of authorities and institutions. To date, there is not an institutional body in Uzbekistan that coordinates the implementation of RES and EE and the distribution of regulatory functions between the executive authorities and state-owned companies.

With the adoption of the Law of the Republic of Uzbekistan "On the Cabinet of Ministers of the Republic of Uzbekistan" in its new edition of 30 September 2019, the Cabinet of Ministers acquired new

general functions in the development of energy saving technologies and in the use of renewable energy sources and thus became the central regulatory authority.

Establishment of a vertically integrated Ministry of Energy of the Republic of Uzbekistan (specially authorized state body) in accordance with the Decree of the President of the Republic of Uzbekistan No. UP-5646 dated the 1st of February 2019 "On measures to radically improve the management system of the fuel and energy sector of the Republic of Uzbekistan", implement a unified state policy in the use of renewable energy sources, and with Article 7 of the Law dated 21.05.2019 No. LRU-539 "On the use of renewable energy sources", was transferred to

State control and supervision of compliance with energy efficiency and energy quality indicators in accordance with the Law of the Republic of Uzbekistan dated 25.04.1997, No. 412-I "On Rational Use of Energy", is assigned to the Uzbek Agency for Standardization, Metrology and Certification and other bodies in the manner prescribed by law.

Based on the Decree of the Cabinet of Ministers "On measures to organize the activities of the Inspectorate for Control of Petroleum Products and Gas Use under the Ministry of Energy of the Republic of Uzbekistan and the activities of the Inspectorate for Control of Electricity under the Ministry of Energy of the Republic of Uzbekistan" dated 24.06.2019. №520. It monitors the compliance of enterprises (suppliers of RES) producing electricity with the relevant regulations, state standards in the electricity sector.

The Commission under the Ministry of Finance regulates and sets tariffs for the sale of electricity (generated by RES).

The current Law of the Republic of Uzbekistan "On Electricity" defines the status of JSC National Electric Networks of Uzbekistan as a state economic management body performing "the functions of a single state purchaser of electricity" from electricity generating enterprises, including from RES suppliers. In addition, JSC "NEU" is authorized to regulate the provision of services: for purchase and sale; for transmission of electricity through the unified power grid system; as well as for operational dispatch management.

Thus, according to the current administrative and legal mechanism, the regulation is limited to JSC "NEU", a natural monopoly. This administrative mechanism does not have a unified framework, a conceptual legal act. The institutional component of this mechanism involves a large number of public administration bodies and state economic management organizations, and this is a determining factor for the promptness and timeliness of the regulation has certain shortcomings.

Of significance, various legal issues in the establishment of a public easement for the use of land plots for the exploitation of energy facilities (RES); this issue is not regulated in the legislation of the Republic of Uzbekistan.

- There are no norms in establishing parameters and procedures for issuing capacity, surplus electricity received from micro-generation to the unified power transmission system (hereinafter - UPTS);
- No procedure for interaction of owners and other legal owners of micro-generation facilities (who sell electricity generated at micro-generation facilities) with suppliers and retail markets entities;
- No procedure for determining the price of electricity which is produced at microgeneration facilities and purchased by suppliers, and no specifics of commercial accounting of electricity (capacity) produced at microgeneration facilities.

Theoretically, an electricity producer (RES supplier) can produce electricity in unlimited quantities and sell it to a single electricity purchaser, JSC "NEU", and for transmission can use a single system of transmission lines and be maintained also by the system operator, JSC "NEU". Thus, in order to implement this scheme, the producer must be connected to the UPTS lines. In order to exercise the right to sell electricity, the micro-generation facility must be technically connected to the local grid and a purchase and sale agreement must be concluded with the supplier whose area of coverage includes the mini power plant.

The procedure for technically connecting a producer to the UPTS is stipulated in the regulation on 'connecting to the unified electricity system', approved by Cabinet of Ministers Decree no. 610 dated 22 July 2019. According to the regulation, an entrepreneur intending to organize his/her own electricity

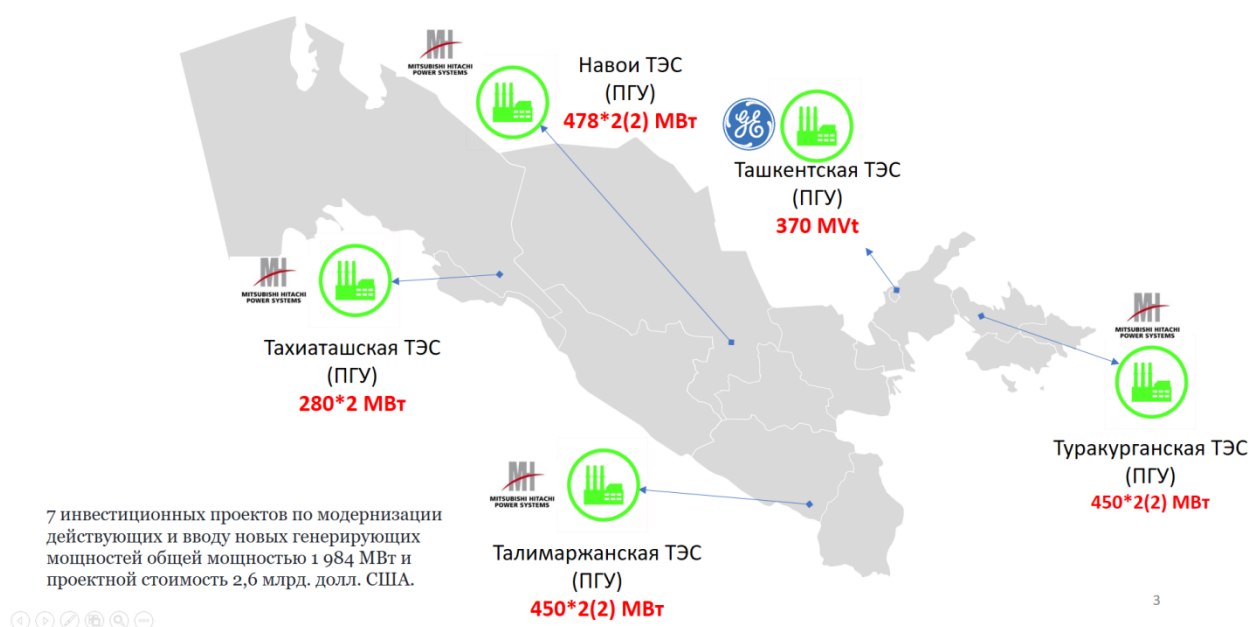
(capacity) production shall be connected to the optimal point of the UPTS. In order to connect their electrical installations, a producer must obtain a document which lists the necessary technical requirements for connecting a certain capacity to a certain point of the electricity network - technical conditions (hereinafter - TC). TC are issued at the producer's request when connecting to: main power grids; territorial power grids; consumer power grids; and power grids of power generation companies - by the respective power generation company.

RES suppliers and network undertakings that have allocated a private transmission line are obliged, at the request of the JSC "NEU" to connect the electricity installations of other producers to their electricity networks if they have established technical capacity. Thus, this provision makes it possible to define a dependent position of private transmission line owners in contractual relations with JSC "NEU", giving the latter a dominant position as one of the parties to the connection contract. In the process of mandating the use of a private line to a third party, the owner-producer for the use of his property, the legislation does not provide for conditions indicating the remuneration of such provision.

Governance Policies and Legislation

Over the last few years, there have been significant changes in Uzbekistan's legislation, aimed both at improving the efficiency of the energy sector and increasing the investment attractiveness of the sector as a whole.

Figure 2. New and commissioned power plants with Combined Cycle Gas Turbine (CCGT) technology with foreign investment.



In order to improve the efficiency of the industry, it is necessary to involve private investors, but in order to attract investors, the enterprise must be efficient and attractive in terms of profitability and return on investment. The Government of Uzbekistan is currently taking all necessary steps to introduce international practices in the management of energy enterprises to ensure it is more attractive to foreign investors, as outlines in the Cabinet of Ministers Decree No. 515 dated 6 July 2018 "On Measures to Ensure the Financial Recovery and Effective Use of Assets of Uzbekenergo JSC".

In addition, as part of this Decree, a Roadmap for the financial recovery and efficiency of Uzbekenergo JSC organisations was approved, which provided the introduction of a modern IMS accounting system for the operational management of the full production and financial cycle in all enterprises of the joint stock company; preparation and publication of annual financial statements of Uzbekenergo and all its constituent companies; privatisation of 72 assets across the country that belonged to Uzbekenergo.

Also in this context, Presidential Decree No. PP-3981 dated 23 October 2018 "On Measures for Accelerated Development and Financial Sustainability of the Electricity Sector" was adopted, which provides for the adoption of a Road Map for 2018-2022, which includes the following steps:

- Implementation of 7 investment projects to upgrade existing and commission new generating capacity with a total capacity of 1,984 MW and a projected value of USD 2.6 billion.
- Annual reconstruction of existing and construction of new power networks with a total length of 7,100 km, installation and rehabilitation of 2,500 transformer stations using attracted loans and Uzbekenergo's own funds;
- Connection of 7 mln. consumers to Automated System for Control and Metering of electricity (hereafter - AMCS), with bringing the share of coverage of AMCS to 100% of total subscribers by the end of 2021;
- Disbursement of USD 1.8 billion in long-term loans agreed upon with the Government. The Company is also planning to use long-term loans totalling USD 1.8 billion, which have been agreed with the World Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and other international financial institutions.

The decree instructs the State Committee on Investments (now the Ministry of Investment and Foreign Trade) together with Uzbekenergo JSC and the Agency for Development of Public Private Partnership under the Ministry of Finance to launch a pilot project to build a 100 MW solar photovoltaic power plant in Navoi region from 2019. This provides strong reasoning for the state in the development of alternative energy sources. Several meetings have been organized between representatives of the organizations responsible for the project, during which preliminary tender documents were reviewed and further joint steps agreed, investor conferences within the scope of the project have also been organized.

The Decree approved a plan of practical measures to reform the electricity sector, according to which the responsible authorities were tasked with analyzing the current structure of the electricity system, identifying the main problems in sector management, the regulatory framework along the entire electricity supply chain (generation, transmission and distribution), and tasked with developing a model for reform (restructuring) of the electricity sector. In the Presidential Decree No. PP-4249 of 27 March 2019. "On the strategy for further development and reform of the electricity sector of the Republic of Uzbekistan" approved the proposal of the Ministry of Energy, Ministry of Economy and Industry, Ministry of Finance, State Assets Management Agency to reorganize Uzbekenergo JSC in accordance with modern methods of organization of production, transportation, distribution and sales of electricity by:

- Creation of a joint-stock company "Thermal Power Stations" to manage thermal power plants and power plants generating electric and thermal energy;
- Establishment of the Joint-Stock Company "National Electric Networks of Uzbekistan" on the basis of Uzelectroset UE and Energosotish branch of Uzbekenergo JSC, which will carry out transportation of electric energy through the main electric networks of the country and interstate transit, export and import of electric energy, functions of a single buyer of electric energy from enterprises-producers of electric energy, and sale of electric energy to regional electric network enterprises;
- Establishment of the joint-stock company Regional Electricity Networks, which manages the enterprises of territorial electricity networks that distribute and sell electricity to end consumers.

This decree approved a list of 40 non-core and unused assets and shares of Uzbekenergo JSC and its constituent entities to be transferred to the State Assets Management Agency of Uzbekistan for their subsequent privatization in the prescribed manner during 2019-2021.

As part of government policy to improve the investment climate in the country, Presidential Decree No. PP-4300 dated 29 April 2019 "On measures to further improve the mechanisms of attracting foreign direct investment in the economy of the country" approved the list of state blocks of shares (stakes) in the authorized capital of economic companies offered for sale to investors, including foreign ones, such companies in the electricity sector as JSC Angren TPP, JSC Novo-Angren TPP. Speaking at the 20th plenary session of the Senate of the Oliy Majlis, the President of Uzbekistan noted that the only way to

attract foreign investors to the energy sector was to liberalize electricity prices and raise them to market levels.

One main area of underdevelopment in the country's energy sector is the development of energy-saving technologies and renewable energy sources. In view of this, Presidential Decree No. 4422 of 22 August 2019 was approved. "On Accelerated Measures for Increasing Energy Efficiency of Economic Sectors and the Social Sphere, Introduction of Energy Saving Technologies and Development of Renewable Energy Sources". This decree states that "renewable energy, mainly generated by hydropower plants, currently accounts for only 10 per cent of total electricity generation in the country. Despite the huge potential available, the potential of renewable energy sources such as solar and wind is not being fully exploited".

Policies to support RES sector development

The Law of the Republic of Uzbekistan on the Use of Renewable Energy Sources provides for incentives and preferences in the use of renewable energy sources, including exemption from payment of:

- 1) all types of taxes for a period of five years from the date of state registration of producers of renewable energy installations;
- 2) property tax for renewable energy sources installations and land tax for land plots occupied by such installations (rated capacity of 0.1 MW and more) for a period of ten years from the date of commissioning;
- 3) land tax by persons using renewable energy sources in residential areas with complete disconnection from existing energy networks, for a period of three years starting from the month of using renewable energy sources.

Today, one of the main concerns regarding the energy sector of Uzbekistan are: environmental (economic) problems, legal regulation as well as development policy. The reviewed legislative acts aimed at the development and growth of the energy sector, but are not the final solution. These changes within the country's legislation show that the government has a clear understanding of the need and readiness to take decisive measures to improve the energy efficiency of the economy and to achieve the planned long-term development goals. Accordingly, it can be claimed that economic energy efficiency can be defined as the objective of efficient use of energy, a RES resource.

UZBEKISTAN'S ENERGY MARKET AND SHARE OF RES

The energy market in Uzbekistan has traditionally been a sector entirely under state control, today, almost all enterprises related to energy production, transportation and distribution are on the balance sheet of the state. A majority of these companies are running deficit, and require the reoccurring need of state subsidies. As a result of the economic liberalization reforms that began in 2016, attracting private investment in the energy sector and privatizing energy generating facilities, became a key priority in order to effectively manage these companies.

In order to ensure market attractiveness, it is necessary to relinquish state control and establish market-based mechanisms for regulating electricity prices, as stated by the president of Uzbekistan at the 20th plenary session of the Senate of the Oliy Majlis on the 21st of June 2019. It is expected that a legislative act will be adopted to establish market mechanisms for electricity pricing.

According to British Petroleum, natural gas accounts for 36.6 million tonnes oil equivalent (Mtoe) of Uzbekistan's primary energy mix (83.4%). The remaining sources, such as oil, coal and hydropower, together accounted for 7.3 Mtoe (5.9%, 7.1% and 3.6%, respectively). It is worth noting that in the total primary energy production structure, hydro power is the only renewable source, accounting for only 3.6% of the total.

This balance is expected to change in favor of renewable energy in the near future, as the government is taking all necessary measures and more and more investors are aware of the country's large untapped potential in this area.

The signing in December 2017 of an agreement between the Uzbek government and Rosatom to build a nuclear power plant in Uzbekistan sends a positive signal in the development of Uzbekistan's energy sector. As a logical continuation of this agreement, on February 7, 2019, Decree No. PP-4165 of the President of Uzbekistan "On Approval of the Concept of Nuclear Power Development in the Republic of Uzbekistan for the period 2019-2029" was adopted, which provides for "the construction of a modern and safe reference generation III+ NPP in the Republic of Uzbekistan consisting of two power units of 1.2 GW installed capacity each".

This decree also approved the following stages in the implementation of the NPP construction project:

- site selection and licensing of the NPP location (2019-2020);
- design of the NPP and its external infrastructure facilities (2020-2022);
- construction and commissioning of the NPP (2022-2030).

According to data in 2017, the Uzbek electricity market amounted to USD 1.02 billion. By 2030, Uzbekistan's electricity market is projected to nearly double in size. In terms of market growth rate, Uzbekistan's electricity production has increased by 24% over the last 10 years, from 50.2 terawatt-hours in 2008 to 62.4 TWh in 2018, and compared to 2017, production has increased by 3.6%. Of the total electricity generated in 2018, 60.7 terawatt hours of electricity were supplied to subscribers, i.e. 97%. At the same time, the need of Uzbekistan's economy is estimated by experts to be 69 TWh, the electricity deficit is equal to 14%, resulting in a large part of the country's population experiencing a shortage of electricity.

In comparison, countries with roughly the same population such as Malaysia (32.6 million), Saudi Arabia (34.2 million) and Canada (37.7 million) generated 168.4 terawatt hours, 383.8 terawatt hours and 654.4 terawatt hours of electricity respectively in 2018. In 2018, per capita electricity production in Uzbekistan was 1.9 megawatt-hours, in Malaysia 5 megawatt-hours, in Saudi Arabia 11 megawatt-hours and in Canada 17 megawatt-hours, similar figures were projected for Germany per capita were 7.8 megawatts per hour, France 8.3 megawatts per hour, and the United Kingdom 5 megawatts per hour. Uzbekistan has a significant potential for growth in electricity production, and in order to reach the level of developed countries, the country needs to increase its electricity production four to five times.

However, this growth, in particular, the modernization of power generating facilities in the country, equipment and machinery that installed during the USSR, shows that efficiency is significantly low compared to international standards. Equipment needs to be upgraded at all levels, in particular equipment in the generation, transmission and distribution plants, which requires private investment and privatization of the relevant companies.

In terms of global figures, total global electricity production has increased by 30% over the last 10 years, from 20,433.3 terawatt hours in 2008 to 26,614.8 terawatt hours in 2018. And compared to 2017, electricity production in 2018 increased by 3.7%. This indicates that electricity production in Uzbekistan is growing in line with global volumes, which sends a positive signal to potential investors and, should electricity prices be liberalized, a significant increase in investor interest and willingness to start production in the local market can be expected.

Due to its geographical characteristics, Uzbekistan has a high potential for the implementation of renewable energy projects. Taking into account the duration of sunny days in the country, the gross potential for solar power generation is estimated at approximately 525 terawatt-hours to 760 terawatt-hours per year, while the forecasted capacity of wind energy is over 520 gigawatts with an annual production of over 1,000 terawatt-hours of electricity.

Over the past few years, there has been a great increase in the popularity of alternative energy sources in Uzbekistan, with many reports from government agencies and private individuals on new measures to implement green energy transition plans.

For example, on 8 November 2017, Presidential Decree No. PP-3379 "On Measures to Ensure Rational Use of Energy Resources" was adopted to make it mandatory to equip all new buildings and structures, except for individual housing construction, with certified solar water heating units for hot water supply from 1 January 2018.

The document stipulates that in old buildings and structures such installations will appear during reconstruction, and that in the future all buildings and structures will be designed, built and reconstructed taking into account the application of energy efficient and energy saving technologies. In addition, a memorandum was signed on implementation of a 100 MW wind power project between then Uzbekenergo JSC, National Energy Saving Company JSC and Siemens Gamesa, one of the world's largest manufacturers of wind turbines. The construction of the wind farm is envisaged in Zarafshan, Navoi region. The project will last from 2019-2020, at an estimated \$100 million.

During President Shavkat Mirziyoyev's visit to the Republic of Korea in November 2017, an agreement was signed between then State Investment Committee Chairman Azim Akhmadkhojaev and POSCO Daewoo President Joung Sang Kim.

The parties agreed that South Korea's POSCO Daewoo would produce modules for solar panels and build several solar photovoltaic stations with a capacity of 2 GW under a public-private partnership model. The total cost of the project is estimated at \$637.5 million, of which \$127.5 million will be foreign direct investment. The plant is planned to be built and run by 2035.

Investors may find useful the fact that Presidential Decree No. PP-3012 dated 26 May 2017. "On the programme of measures for further development of renewable energy, energy efficiency in sectors of the economy and the social sphere for 2017 - 2021" provides a list of 810 investment projects in renewable energy sources (RES) with a total value of USD 5.3 billion.⁷

⁷ <https://www.rbasia.uz/rynok-energetiki-uzbekistan>

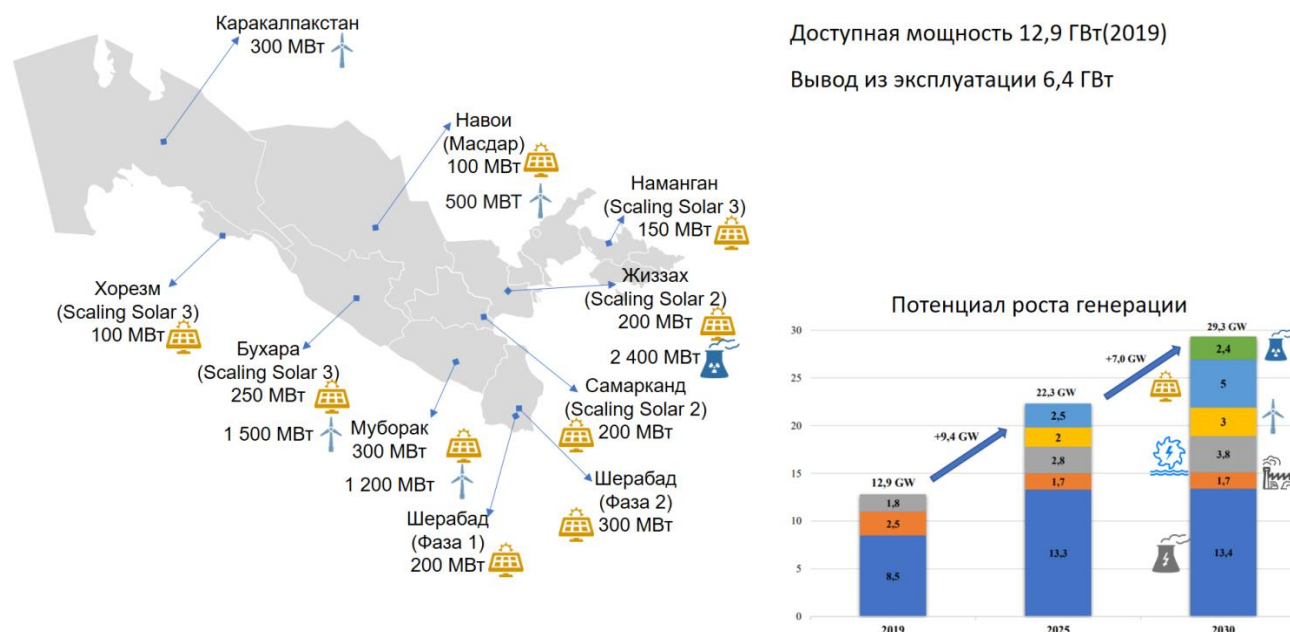


Figure 3. Projected RES and NPP capacity in Uzbekistan (solar, wind, nuclear).

In addition, during the Renewable Energy Policy Development Workshop organized jointly by the Government of Uzbekistan and the World Bank Group in partnership with the International Renewable Energy Agency (IRENA), it was announced that "The World Bank supports the Uzbek government's efforts to increase the share of renewable energy in the country's energy mix from 12.7% in 2016 to 19.7% by 2025".

On 30 January 2018, the World Bank Board of Directors approved the project "Improving Energy Efficiency in Industrial Enterprises. Phase 3", under which the World Bank Group is allocating \$200 million to improve the energy efficiency and productivity of small, medium and large enterprises in Uzbekistan.

On 9 October 2018, a financial contract was signed between the Republic of Uzbekistan and the European Investment Bank for a loan of EUR 100 million and technical assistance funds of up to EUR 2 million for joint implementation of sub-projects on energy efficiency improvement implemented under the project "Improvement of energy efficiency of industrial enterprises" with the World Bank loans, and the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan of 2 October 2018 No 785 "On additional measures to implement the project "Improvement of energy In October 2018, the Cabinet of Ministers of the Republic of Uzbekistan announced an amount of US\$ 1.5 billion for financing sub-projects by industrial enterprises to improve energy efficiency and accelerate the introduction of energy-saving equipment and technologies.

In October 2018, a new project was announced for the construction of a 600 MW wind farm by ETKO CO ENERJI A.S. of Turkey under the Surkhandarya Region Development Concept 2019-2030, to be commissioned by 2020.

In October 2018, during the official visit of the President of Uzbekistan to the French Republic, an agreement was signed between the Uzbek government and TOTAL Eren on the construction of photovoltaic power plants in Uzbekistan, for which the company will invest 150 million euros. On 13 September 2019, a 25-year power purchase agreement and state support agreement was signed at the Ministry of Investment and Foreign Trade between National Electric Networks of Uzbekistan JSC and TOTAL Eren. The 100 MW photovoltaic power plant will be located in Samarkand region.

On 24 September 2019, MFA RUz announced that an investment project to build a wind farm in Bukhara region was officially launched on the 22nd of September 2019. The project, with a generation

capacity of up to 1.5 GW of electricity at a cost of \$1.8 billion, is being implemented by China's Lokhtar Corporation. The project is being implemented by China's Lioaning Lide Corporation.

Another significant event in Uzbekistan's energy sector was the First Regional Dialogue of Energy Ministers of Central Asia Regional Economic Cooperation (CAREC) and Energy Investment Forum 2019 held in Tashkent on 20 - 21 September 2019. Energy Ministers of Uzbekistan, Afghanistan, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan participated in the First Regional Dialogue of Energy Ministers of Central Asia Regional Energy Cooperation Countries. The Energy Minister of Turkey participated as an observer. During the dialogue the participants noted that due to the accelerated development of the countries in the region and the growing demand for energy, the region will need to double its energy capacity by 2030.

In addition, the ministers signed a joint declaration during the meeting that calls for the development and implementation of a common energy strategy CAREC-2030, as well as cooperation in achieving the United Nations Sustainable Development Goal number seven, which refers to "affordable and clean energy". The parties also pledged to double electricity generation from solar and wind energy by 2023. Moreover, the Uzbek Energy Minister Alisher Sultanov proposed the creation of a single dispatch centre for natural gas distribution for Central Asian countries in Tashkent. The Minister stressed that these countries are historically in a single gas transmission system and that Tashkent currently has a coordination and dispatch centre as part of the united energy system of the region.

Following the ministerial dialogue, the delegations participated in the 4th Energy Investment Forum. During this forum, the Ministry of Energy of Uzbekistan and ACWA Power (Saudi Arabia) signed an agreement envisaging construction of two power plants with total capacity of 2 250 MW on the basis of public-private partnership: one thermal power plant with capacity of 1250 MW and one wind power plant with capacity up to 1000 MW.

The events also included the signing of a ten-year contract between the National Power Grid enterprise and the energy company Da Afghanistan Breshna Sherkat for the supply of electricity. According to Deputy Minister of Energy of Uzbekistan Sherzod Hodjaev, this contract is not seasonal, and is designed for year-round supply. The initial volume of 4.2 terawatt hours will gradually increase to 6 terawatt hours. In reference to state guarantees, Sherzod Khojaev specified that the state will guarantee the purchase of 100% of electricity produced by private companies from renewable energy sources, and that the state guarantees the security of foreign investments.

Georgy Chikovani, former Deputy Minister of Economy and Sustainable Development of Georgia, said during the forum that liberalization of electricity prices may have a negative impact on household income in the short term, but it will create attractive conditions for investors, which will subsequently lead to an increase in private electricity producers from RES and consequently lead to price stabilization. The share of hydropower, in general, is less than 12% of total electricity generation, with the share of SHPPs equal to only 1.5% of all hydropower or approximately 0.15% of total energy production.

Uzbekistan's technical potential for hydropower generation is large, despite its dry climate and confined continental location, it is estimated at 27.4 billion kWh per year - of which only a quarter is currently used. Approximately one-third of the unused potential is in agricultural infrastructure, where small hydropower plants could be a suitable solution. The remaining potential is concentrated in natural rivers and water flows. Small hydropower potential includes suitable locations on about 1100 small rivers, 42 reservoirs, and 98 main irrigation canals⁸.

Tajikistan's Energy Minister said that the CASA-1000 project, which will supply surplus electricity from Tajikistan and Kyrgyzstan to Afghanistan and Pakistan, will start operating in the near future. For his part, Uzbek Foreign Minister Abdulaziz Kamilov said on 28 November 2018 during the International Conference on Afghanistan in Geneva, Switzerland, that "the construction of the Surkhan-Puli-Khumri power transmission line will increase electricity supplies from Uzbekistan to Afghanistan by 70% to 6 billion kWh per year and that this line will connect Kabul to the unified energy system of Central Asia. Moreover, the Surkhan-Puli-Khumri transmission line could become an integral part of the CASA-1000 project".

⁸ <https://www.adb.org>

KEY REGULATORY BARRIERS

Uzbekistan, with its enormous renewable energy potential, can meet all of the country's energy needs through renewable energy alone. However, Uzbekistan is still unable to exploit its potential because it is heavily dependent on fossil fuels for its energy sources. An overview of the main barriers that have led Uzbekistan to lag behind its peers in terms of renewable energy sector development. Recent measures to improve the situation and plans and prospects for future development are then presented.

Uzbekistan is aware of the need for urgent action to remove barriers that impede the development of the renewable energy sector. It can be said that the first steps have already been taken, as a market regulator (Ministry of Energy) has been established and the energy sector has been reorganized into electricity generation, transmission and distribution. Recent presidential decrees and resolutions on Uzbekistan's future plans for the renewable energy sector could be a good reference for future investors and set the right direction, making the market stable.

Conclusions

Investment barriers. There is a lack of experience with direct project financing, other forms of investment such as "build-own-transfer" or "design-build-finance-commissioning" contracts using these mechanisms in energy generation, and an appropriate legal and regulatory infrastructure can be used. This barrier can be removed through the involvement of private capital in the RES/EE development process.

The regulator should establish a legislative mechanism specifying all market rules and protecting the rights of independent power producers. This, in turn, would remove all market instability. Public-private partnerships could be used to attract foreign investors, instead of building large infrastructure at the expense of the state budget,

Economic barriers. Intersectoral tariffs vary for each generation and transmission company. The system is complex and non-transparent, and involves various kinds of cross-subsidies. Moreover, the existing tariffs for renewable energy generation do not fully take into account the costs of producing, operating and maintaining renewable energy, and do not create the preconditions for attracting new investment for own recovery. These barriers create the need to provide favorable conditions for RES with such means as feed-in tariffs, planned tax rate reductions or special incentives for importing the necessary equipment.

Regulatory and functional barriers. Investor guarantees can be secured through power purchase agreements that include mandatory off-take clauses. Alternatively, special dispatch procedures can be used to ensure transparency and control, which will serve as a basis for business planning. The regulator should create incentive programmes for both households (feed-in tariffs, net metering, rebates) and large power producers (tax incentives, credits for renewable energy generation) to make the project more attractive.

Financial barriers. Due to insufficient budgetary resources and the growing need for public financing, access to credit and capital from domestic and international sources is necessary for RES/EE projects in the CBT sector. However, this access is limited. In addition to the removal of regulatory barriers, other steps are needed to improve the investment climate and facilitate access to capital, including simplifying institutional steps and procedures for obtaining permits and providing specific guarantees to investors. To reduce the upfront cost of technology, the government should pay more attention to domestic technology production, as Uzbekistan has all the necessary renewable energy technology components.

Educational barriers. Educational institutions involved in RES/EE development consistently point to a shortage of qualified, experienced personnel - designers, project developers, managers and operators. Most of the experienced specialists have left and new specialists in the field are rare, as young specialists choose the more prestigious branches of the energy sector. The number of specialists required is too high, and they will need to expand their experience in designing and operating modern facilities, working alongside the best experts. Technical assistance, training and workshops can be organized with

highly qualified specialists, in cooperation with international organizations, to improve the skills of specialists.

Information barriers. In order to develop RE/EE in the CBT sector, a reliable technical and information component is needed. A full analysis of the RES potential was carried out in 2007. As both anthropological factors (economic and technical) and natural factors (climatic or hydropower) have changed in the last 15 years, this analysis needs to be adjusted and updated. Also, a new atlas for potential RES needs to be developed.

The implementation of energy efficiency and renewable energy production in the tourism sector will result in the following positive results:

- reduction of local air pollutant emissions and a corresponding reduction of negative impacts on human health;
- improved energy security of CBT;
- improved quality, sustainability and functional flexibility of CBT energy supply;
- growth of the CBT sector as a result of a more stable energy supply;
- creation of new jobs and reduction of local unemployment;
- improving the technical skills of local CBT developers and operators;
- maximizing the use of domestic CBT resources and workforce and minimizing the dependence on imports increasing the income and quality of life of the local population.



Photo: <https://eenergy.media/2019/10/20/solnechnaya-energetika-uzbekistana-rekordnye-tseny/>