



Reforms In The Energy Sector – As A Leading Factor Of Economic Stabilization In The New Uzbekistan

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Abstract

The paper discusses the use of wavelet transform for modal identification and damage detection. The aim is to solve an inverse problem for damage detection of engineering structures using wavelet analysis. Wavelet transform is discussed within the framework of inverse problems; critical aspects and implementation issues for modal identification and damage detection are provided. A dynamic test on a masonry wall and a short example of an eight-storey steel frame building are presented to demonstrate the potential of the approach.

Keywords: Inverse Problems; Ill-Posed Problems; Wavelet Transform; Modal Identification; Damage Detection.

Introduction

The socio-economic development of any society, the transformation of human capital as a result of practical actions are directly related to the activities of steadily growing sectors of the economy, starting, first of all, with micro-resources and small infrastructures of the same region, territory. In particular, along with such resources, today the need for sustainable development of the electric power industry, the energy sector has become a need of the time. Optimization of energy efficiency and consumption, which is safe and cost-effective, has become one of the main and urgent problems in international circles in recent years. The reason is that today, in the context of globalization, the economic and social integration of the energy industry is taking place all over the world, the need for which is rapidly increasing, as a result of which its share in the economy and the volume of consumption are also growing day by day. It is from this point of view that the wider introduction of innovative technologies into the industry, along with its further development, makes it necessary to save resources such as natural gas, oil, and coal.

Proceeding from this, consistent reforms are being carried out in our country to modernize the energy system, which is an important factor of socio-economic development, the introduction of modern technologies into the sphere, and the wider use of alternative sources. It should be noted that along with an increase in the rate of production of electric and thermal energy, a decrease

in the consumption of natural resources used in this process, the level of use of alternative energy sources is being improved.

In our republic, as a result of the development of economic sectors and the growth of the needs of the population, the need for electricity is increasing every day. If we consider this in terms of figures, then if in 2000 one household user consumed 114 kW / h of electricity per month, then in recent years this indicator has reached 200 kW/h. Today, the share of the population in the total electricity consumption in the republic reaches 26.5 percent. Although in 1990 this figure was 13.9 percent. The main part of the costs of electricity production is accounted for by natural gas, fuel oil, coal. This indicator currently stands at 43 percent, and taking into account the fact that they are becoming more expensive on the world market, its value will increase even more.

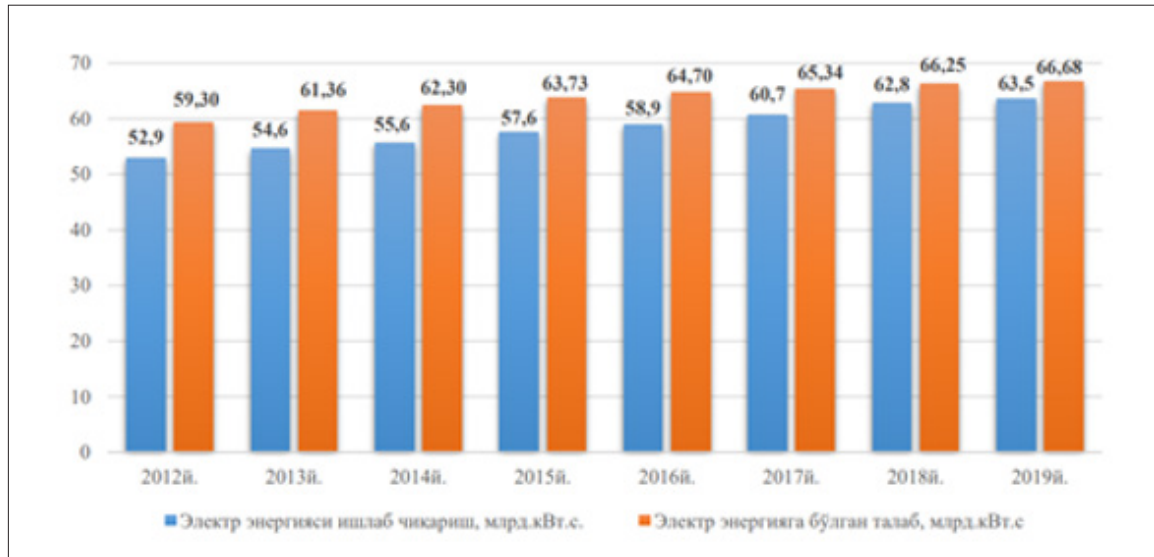
Today, 86 percent of the electricity production in our country is accounted for by thermal power plants. 17 billion US dollars per year at these thermal power plants. Consequently, m³ of natural gas is consumed, although so much gas can be used for value-added processes (production of synthetic fuel, polypropylene). This, in turn, creates opportunities for solving social problems (employment of the population, environmental protection).

«Considering that our electric power system consists mainly of thermal power plants built in the last century, practically not

modernized, it is no secret that the problem of energy shortage has existed for a long time,» emphasizes Farkhod Zainiyev, deputy of the Legislative Chamber of the Oliy Majlis. – Today, the production capacity of thermal power plants is about 60% of the installed capacity. At the same time, energy consumption is steadily growing due to an increase in the number of people and business entities.» According to the data provided by the deputy, today the annual volume of electricity production in Uzbekistan is 68.5 billion kWh.

hours, and the demand-71 billion kWh. is an hour. The deficit is covered by imports from neighboring countries. He added that the situation in the energy sector has «significantly improved» over the past 3-4 years. He said that « if the electricity production in 2018 will be 62.8 billion kWh, by 2020, due to the modernization and increase in the capacity of existing systems- \$ 68.5 billion kWh. increased to hours» .

Table 1: Real dynamics of electricity production and demand in 2012-2019¹



The Head of our state, in each of his speeches or in four messages delivered to the joint chambers of the Oliy Majlis until today, focusing on the economy, directly points out the growing demand for energy resources in our country and that it is possible to carry out the necessary reforms in the oil and gas and energy sectors and timely completion of planned and initiated major projects to prevent it and solve it positively. The President of the Republic of Uzbekistan, Sh. Mirziyoyev, noted, in particular, in his speech at the solemn event dedicated to the celebration of the 30th anniversary of the state independence of the Republic of Uzbekistan, that “as a result of structural transformations carried out in the electric power, oil and gas, utilities spheres, the functions of state administration and economy were separated from each other, important steps were taken to create a competitive environment. Currently, new infrastructure networks have been built. Thousands of kilometers of new roads, electric and gas networks were built and repaired. Public transport is developing dynamically. In particular, 2 new metro stations and an almost 12-kilometer sky train line have been put into operation in Tashkent. The construction of 6.2 kilometers of the Sergeli highway has been completed. Currently, many large investment projects are being implemented in Uzbekistan. In particular, you know that the foundation of the Almalyk Mining and Metallurgical Combine was recently laid for the construction

of the copper-enriching plant No. 3 worth 2 billion US dollars. The solar power plant, commissioned yesterday in the Karmaninsky district of Navoi region at the expense of investments in the amount of \$ 110 million, was the first major step in the energy system of Uzbekistan, « he notes.

It is no coincidence that the head of state in this regard particularly focused on the development of this industry in the Navoi region.

The first major step in the energy system of Uzbekistan was the solar power plant, which was put into operation on August 30 this year in the Karmaninsky district of Navoi region at the expense of investments in the amount of \$ 110 million. Currently in a joint-stock company” Navoi Azot has commissioned two new plants- for the production of nitric acid, ammonia and urea. Thanks to these projects, the total cost of which is \$ 1.5 billion, the volume of production at Navoi Azot will increase by 3 times . Such significant events indicate the beginning of a new period in the history of our national industry. If we consider only on the scale of the Navoi region, this is confirmed by the fact that many effective practical actions in the field of energy and energy have been carried out in this area in recent years.

¹Manba: <https://minenergy.uz/uz/lists/view/77>.

In particular, an engineer of a solar photovoltaic station in the Karmany district of the region. Sh. Erdonov noted: «in our country, by 2030, it is planned to increase the share of these sources in electricity production to 25 percent, now this figure is 10 percent. One of the important steps on this path was the first solar photovoltaic station in our country, built in the Karmany district of the Navoi region. On August 27, during a visit to the Navoi region, the Head of our State took part in a ceremony dedicated to the launch of a solar photovoltaic station, and activated a symbolic pen. Engineers and builders, Navoi youth and young people, as well as foreign investors became direct witnesses of this historic event. The visit of the President of our country to a solar photovoltaic plant, a meeting with people who have worked in a large project for almost a year, inspired us very much. Especially we, the youth, are endowed with great confidence and strength .

...We can say that hundreds of people were employed during the project, 70-80% of who were young people. Today, the development of the energy sector, in particular green energy, is becoming part of the demand of humanity. The above-mentioned solar photovoltaic plant, built on one hundred percent foreign direct investment, is also environmentally friendly. In particular, as a result of the project, the release of 160 thousand tons of evaporating gases into the atmosphere will be prevented. Interestingly, before the start of the project, that is, 6-7 months ago, it was a place where there was nothing, only sand and dust. More than 900 people took part in the intensive work carried out in a short time. Finally, a solar photovoltaic plant with a capacity of 252 million kilowatt-hours of electricity per year was built. It was connected to the unified electric grid, and the first green, environmentally friendly energy was delivered to the grid. The station has 300 thousand solar panels of the latest generation installed. The commissioning of a new, modern solar photovoltaic plant will create about 600-700 new jobs, provide electricity to more than 70 thousand households and new enterprises. Another important aspect is that the area of land under solar panels can also be used more efficiently.» In fact, even today, one of the most important sectors of the economy, the direction that it needs, is the energy sector. The more the necessary sectors of the economy develop in society, the more the need is covered, the more people's confidence in the prosperity of society, in the well-being of their own family, neighbors, and country will grow. This factor ensures not only the solution of socio-economic problems at the national level, but also the development of the country's economic balance and dynamic indicators in the army, countries, regions, as well as in the international arena. According to foreign experts, the work carried out over the past five years in the New Uzbekistan has demonstrated its role and potential in the international arena. In particular, the Prime Minister of the Republic of India, Narendra Modi, said: «India and Uzbekistan are connected by deep historical and civilizational ties. In recent years, our bilateral relations have covered several areas, starting with information technology, space, nuclear energy, Partnership for Development, healthcare, education, science and technology, and culture. This is also confirmed by the opinion that our strategic

partnership is aimed at further diversification, and kengaitirishga diversifies our multifaceted ties.»

In addition, the «Energy Forum», which was held online on June 23, 2021, will address issues of developing cooperation between Uzbekistan and Germany on new energy projects. During the Forum, presentations of existing and new projects on renewable energy sources (Cem), hydroelectric power plants, thermal power plants, oil and gas and petrochemical sectors were demonstrated to the German business community, as well as the strategy for the development of hydrogen energy in the Republic of Uzbekistan was explained. Based on the main results of this forum, Dr. Christian Bruch, Chairman of the Board of Directors of Siemens Energy AG, said: «I think that I speak on behalf of German business as a whole, we are all going through the transformation process that is taking place in Uzbekistan, that is, we are going to monitor all areas of change.» If bilateral relations in the field of energy resources develop at the international level, then issues of self-integration will also be effectively resolved in the economic sphere. For example, in recent years, on the basis of public-private partnership with foreign investors, intensive work has been carried out on the construction of 6 new power plants. Commissioning next year in the Tashkent, Navoi, Samarkand, Surkhandarya regions of new power plants with a total capacity of 760 megawatts, the start of full production in the Kashkadarya region of a complex for the production of kerosene, diesel fuel and liquefied gas for a total of \$ 3 billion 600 million per year for the production of 1.5 million tons of kerosene per year.

Indeed, today fuel and energy resources remain one of the most difficult solutions for sustainable development. The factor of energy resources has penetrated into all spheres of society and has become one of the prerequisites for the sustainable socio-economic development of countries. Efficient use and uninterrupted supply of energy resources remains a key factor in the development of society, reducing poverty, improving the well-being, cultural and spiritual development of the population. The energy policy of the Republic of Uzbekistan is aimed at ensuring the energy security of the country and the use of national energy opportunities for the social and economic development of society, sustainable provision of fuel and energy resources to the sectors of the economy and the population of the country, wide promotion and development of renewable energy sources. In recent years, the increase in production volumes in economic sectors, the increase in the population in the regions, the involvement of advanced equipment and technologies in the production also increase the need for a broad attraction of energy resources. Therefore, the systematic solution of existing problems in this area, the reduction of energy consumption and the widespread introduction of modern technologies in the economic sector remain urgent issues of state economic policy. In addition, special attention is paid to attracting resources that are leaders in the production of electricity, and the supply of alternative sources, rational and economical use of energy on the spot. The ongoing work in the field of energy conservation and regulation of the energy sector is directly related, first of all,

to the fact that the regulatory and legal bases in this industry are being developed in the context of the years of development of the industry and have practical significance. If we look at the years of independence, the widespread attraction of energy resources in our country in a short 30 years, the adoption of more than 200 legal acts in the field of energy also confirm this opinion.

In particular, the laws of the Republic of Uzbekistan No. 412-I of April 25, 1997 «on the rational use of energy», No. 150 of June 5, 2009 «On additional measures to improve the activities of the state-joint-stock company» Uzbekenergo «and strengthen the discipline of payments for consumed electricity», No. 295 of November 1, 2013 «On additional measures to improve the system of accounting and control over the consumption of electric energy», the Decree of the President of the Republic of Uzbekistan» On measures for the further development of alternative energy sources» of March 1, 2013, Resolution No. PP-2343 of May 5, 2015 «on the program of measures to reduce energy intensity, introduce energy-saving technologies in economic and social sectors for 2015-2019» gave an impetus to further revival of work in this industry. We can say that these legal acts are aimed at positive results in solving a number of tasks and problems in the field of energy consumption.

Over the past 5 years, more than 100 documents on the development of this sphere have been adopted and implemented within the framework of the action strategy for the further development of our country. In particular, the Decree of the President of the Republic of Uzbekistan No. PP-3012 dated May 26, 2017 «On the program of measures for the further development of renewable energy, improving the energy efficiency of economic and social sectors for 2017-2021» is important. The resolution provides for reducing the energy intensity of the economy, widespread introduction of energy-saving technologies into production, expanding the use of renewable energy sources, and improving labor efficiency as priority tasks for the near future.

In addition, resolutions PP-4142»on measures to organize the activities of the Ministry of Energy of the Republic of Uzbekistan» dated February 1, 2019, PP-4875 dated November 3 . There is another aspect of the issue, which is that energy security, energy efficiency and sustainable energy development are the main strategic directions of the energy industry and in the future ensure the fulfillment of tasks within the framework of the implementation of the innovative vector in the energy complex of the republic and are inextricably linked with the prospects of socio - economic development of the country. In this regard, in particular, in order to create a scientific and innovative infrastructure in energy-intensive industries, diversify the energy balance through the widespread introduction of traditional and alternative energy sources in the economy, expand cooperation with foreign scientific institutions, increase the level of highly qualified scientific personnel, on May 4, 2021, the Cabinet of Ministers will adopt resolution No. 273 «On the establishment of the Institute of Energy Problems of the Academy of Sciences of the Republic of Uzbekistan».

On the basis of this resolution, the Institute of Energy Problems

of the Academy of Sciences of the Republic of Uzbekistan was established on the basis of the Academy of Sciences and the Scientific and Technical Center of Uzbekenergo JSC of the Ministry of Energy of the Republic of Uzbekistan, whose main tasks are defined: development of a long-term strategy for sustainable energy development in the republic, participation in the preparation of programs for the development and modernization of the fuel and energy complex for the medium and long term.; conducting tests of new technologies, energy equipment and systems based on alternative (non-traditional) energy in order to study resource indicators in the climatic conditions of the republic; conducting comprehensive research and developing specific recommendations for reducing energy consumption of economic sectors; developing priority directions for the development of the digital economy in the energy sector; developing methods for the development of the theory of «intelligent networks» and its implementation in the energy sector; developing and implementing; conducting scientific research to ensure the energy security of the country, ensuring the sustainable functioning of fuel and energy complex facilities in natural and man-made emergencies; developing scientifically sound recommendations for the joint use of fuel and energy resources between neighboring states of the region; carrying out fundamental, applied and innovative research related to the use of both traditional and alternative and renewable energy in various sectors of the economy;; improving the scientific and technical level of methods for the effective use of fuel and energy resources at the stages of their formation, storage, supply and use; justification of the transfer and adaptation of modern energy technologies to the conditions of the republic in order to reduce the costs of formation, storage, supply and distribution of fuel and energy resources, participation in the development of draft regulatory legal acts related to the energy sector.; scientific and technical assistance to the development of energy engineering and the electrical industry in the country, the branches serving it; expansion of international cooperation with foreign institutions in this field, extensive use of successful experience and specific innovative models, ensuring intensive information exchange; training of scientific personnel in scientific areas and relevant specialties in the field of energy, etc .

The adoption and implementation of such regulations will allow, firstly, to reduce energy costs in economic sectors, and secondly, to provide training of specialists in these specialties and mastering modern technologies.

In addition, the adoption of the resolution of the Cabinet of Ministers of the Republic of June 18, 2021 No. 382 «On the organization of the effective use of electric grid facilities and fixed assets of organizations of the electric power industry» sets as its main goal the stable provision of high-quality electric energy to consumers of the Republic and ensuring the effective use of electric grid facilities and fixed assets of organizations of the electric power industry. Another important document was adopted by the Cabinet of Ministers of the Republic «The concept of providing the Republic of Uzbekistan with electricity in 2020-2030». In this concept, it is planned to increase electricity production from 5,900

MW to 29,200 MW by 2030, reduce the consumption of natural gas in electricity production from 16.5 billion cubic meters to 12.1 billion cubic meters and reduce losses in electricity transmission by 2.35%, and in its distribution – by 6.5%. The strategic goal of the document is to provide the population and economy of Uzbekistan with electricity on the basis of competitive prices, the development of a balanced energy sector that covers the best world practices and current trends in the global electric power industry.

The following areas are identified as priorities in the concept:

- * modernization and reconstruction of existing power plants, construction of new power plants using energy-efficient power generation technologies;

- * improvement of the electricity metering system;

- * development of renewable energy sources, especially solar; implementation of legal reform to improve tariff policy and ensure access to the wholesale market.

- ❖ The strategy also pays special attention to improving the energy supply of regions with a shortage of electricity with the development of renewable energy sources.

Today, increasing energy efficiency and further expanding the use of environmentally friendly, non-traditional and renewable energy sources are becoming increasingly important. Because of the effective use of renewable energy sources, along with saving

mineral resources, allows reducing the amount of harmful gases released into the environment. Therefore, much attention is paid to the use of alternative energy sources in various sectors of the economy all over the world. In this regard, in recent years, large-scale work has been carried out to introduce the “green economy” system into the industrial sectors of the republic, increase energy efficiency and expand the use of renewable energy sources in the social sphere, accelerate innovative development, and rational use of natural resources. In conclusion, it should be noted that over the past 5 years, problems related to the use and use of energy resources have been systematically solved, international partnerships have been intensified to attract new technologies to the country. That is, the programs of strategic reforms in this sector of the economy have begun to bear fruit.

Moreover, today there is not only the economic development of society, the development of the leading sectors of the economy, but also the achievement of positive results in social reforms, in particular, in improving the living conditions of the population and systematically solving the need for energy. This, in turn, leads to an expansion of interaction between state administration bodies and economic associations in the development of mechanisms for the widespread introduction and use of innovative technologies in the energy industry, which is the leading branch of the economy in the near future. Consequently, it is becoming the leading branch of economic reforms, as an area of constant attention of the head of our state.



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DOI: [10.32474/JOMME.2021.01.000123](https://doi.org/10.32474/JOMME.2021.01.000123)



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