

**SECTION 31. Economic studies, Finance,
innovation, risk management.**

ANNOTATION OF EXPERT ASSESSMENTS OF ISSUES RELATED TO THE UTILIZATION OF ENERGY RESOURCES IN AZERBAIJAN 1920- 1930

Abstract: *This article introduces the annotation of expert assessments related to the development opportunities of energy sector in the republic in the 20-30s of the 20th century. The researchers-engineers who deal with the investigation of problems in the energy economy sector drew up a plan of division of the territory of the republic into districts related to the production opportunities of the electricity. At the same time the utilization of renewable energy sources was especially brought up to the agenda. The issue of utilization of renewable energy sources maintains its urgency up to now.*

Key words: *energy, power engineering, energy resources, electric stations.*

Language: *English*

Citation: [Samandarov SS \(2015\) ANNOTATION OF EXPERT ASSESSMENTS OF ISSUES RELATED TO THE UTILIZATION OF ENERGY RESOURCES IN AZERBAIJAN 1920-1930. ISJ Theoretical & Applied Science 05 \(25\): 189-195.](#)

Soi: [http://s-o-i.org/1.1/TAS*05\(25\)37](http://s-o-i.org/1.1/TAS*05(25)37) **Doi:**  <http://dx.doi.org/10.15863/TAS.2015.05.25.37>

Introduction

Power engineering draws the attention in the world economy as one of the most dynamically developing spheres in the 20th century. In many cases development indicators of the following sphere are much higher than the indicators of other spheres. The utilization of the big variety of energy sources has become possible because of using the scientific and technical achievements and the expansion of the world economy ties in modern times. Realization of the opportunities to use the various energy sources, conventional and unconventional sources resulted in the progress in power engineering. The analyzing of the expert opinions in the article, related to the perspectives for the development of energy sphere in the Republic of Azerbaijan in the 20-30s of the 20th century assumes special importance for the defining of realized or unrealized potential opportunities in the context of development of the mentioned sphere. It should be noted that the power engineering is one of the main spheres of agriculture of any country. According to the development level of the mentioned sphere and potential opportunities, it is possible to make judgments about the country's economy power. The energy situation is one of the main factors affected seriously to the events and processes all over

the world. For this reason, the problem of rational use of energy resources by applying the advanced technologies is one of the serious problems engage economic thinking together with technical thinking. High level economic growth of the country and development of the country's industry are accompanied by incessantly increasing of energy consumption.

The development features of power engineering in Azerbaijan at the end of the 19th and the 20-30s of the 20th century:

Along with countries such as the USA, England, Germany, the electricity was used in Azerbaijan too in the 80s of XIX century. The innovative innovation of the century found its practical application in Azerbaijan, especially in Baku along with Moscow, Petersburg cities of Russia. As noted, the electricity was used for only lighting purposes in the limited areas. [2, No 6, p. 3, 1959]. But after a short period of time the application spheres of the electricity increased. It should be noted that associated with the realities of Azerbaijan, since the end of the 20th century, oil fields, factories and a port were lightened with electric power in Baku. To supply Baku oil region with electric power, the electric station with a capacity of 500 kW was built up by "Nobel brothers' company" in 1897, thus the electric power began to

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be used in the industry. The joint-stock company “Električeskaya sila” was established in 1899. Electric station with a capacity of 2000 horse-power built and utilized by the company, put into operation in Bibi Heybat in 1901. The power of this station was 10.800 kW hours in 1920. Another electric station with a capacity of 6000 horse-power was installed in the White city in 1902. The power of this station was 35 thousand kW in 1920. According to their power, Baku electric stations were in the 3rd place in the empire after Moscow and Petersburg cities in 1913. [1, p. 5-6].

The development of power engineering in the country was defined as a priority in the Soviet period; accordingly the electrification plan of the country was applied. In this regard, it should be noted that with V.I.Lenin’s own initiative the Presidium of the Supreme Council of National Economy confirmed the composition of State Commission on the electrification of Russia under the chairmanship of Q.M.Krijjanovski by its resolution dated February 21, 1920. The duty of the commission was to draw up the plan, called GOELRO. More than 200 scientists and specialists were involved in compiling of the mentioned plan. Working about 9 months, the GOELRO commission confirmed the unified economic plan of the country’s electrification in the Congress of Soviets that launched in December, 1920. The implementation of electrification in the 8 economic regions of the country was intended in the plan. These were the following: 1) The North 2) Central industry, 3) The South, 4) Around of Volga, 5) Ural, 6) Siberia, 7) Caucasus, 8) Turkistan. The plan of GOELRO consisted of two parts, “A” and “B” programs. In part I, in program “A”-, the restoration of a post-World War I level was envisaged in the electricity industry, in program “B” the construction of 30 big power stations was envisaged with the total capacity of 1 million 750 thousand kW/h over 10-15 years. [3, p. 9-10].

Stating the achievement of the goals related to the development of power engineering economy in the second half of 30s, the Soviet leadership defined new positions related to the further development of the field. Total capacity of power stations reached 8 million 235 kW/h and the electric power production reached 36 billion 173 thousand kW/h in 1937 in the USSR. USSR stayed behind only the USA and Germany in terms of the production of electricity in 1935. In 1937-1940s 37 big power stations were built in the USSR. Total capacity of power stations was 11.2 million kW/h and electric power production was 48,3 billion kW/h in 1940. [3, p. 14].

It would be appropriate to note on the current situation in Azerbaijan SSR that, the nationalized power plants of “Elektriceskaya sila” stock company were united into a single entity under the name of “Elektrotok” along with industrial enterprises by the Military Revolutionary Committee’s decree dated June 12, 1920. Elektrotok played an important role in the energy supply of electric power of Baku. Power supply of the country’s second largest city, Ganja and region’s centers was on the agenda in the early of 20s. The project of the construction of small hydro power plants with a capacity of 75 horse-power in Salyan, 100 horsepower in Kazakh, 100 horsepower in Shusha, 140 horsepower in Shamakhi in 1924 and these projects began to be realized. Accordingly a small power station was constructed for the electrification of the salt mines in Nakhchivan in 1922-1924 (with a capacity of 25 or 130 horsepower). 16 small power plants, as well as 14 heating and 2 hydroelectric stations operated in the regions in 1924-1925s. [3, p.20, s. 31]. But demand to electric power increased by the increasing demands of the oil industry and other production industries. Related to the institutional solution of the problem, the commission of electrification regions was established under the chairmanship of D.Bunyadzade in 1926. Azerbaijan SSR Supreme Economic Council allocated about 510 thousand rubles for these purposes in 1929-1930s. As a result of the implemented measures 31 small power stations were built in the regions in 1926-1932s. The power of these stations reached 11 thousand kW/h in 1932. In general, 200 small power stations were built in the regions till 1936. The hydroelectric power station with the power of 600 kW on Kishchay in 1928, Zurnabad hydro station in 1929 (with the power of 2700 kW), in Khankandi and Zagatala in 1930, the part of Nukha hydro station working in the second turn (1660 kW) in 1936, Guba hydro station (1150 kW), Ganja Heating Power Station Center (5820 kW) in 1932-1937s put into operation. It should be noted for comparing that, if there were only 12 power stations in the country, 250 power stations operated in the country in the second half of 30s. [1, p. 12-13].

It can be known from the above mentioned facts that, there was a sparse in the energy sector in the republic. The stations with quite limited capacity and opportunities according to the production of electric power were being built at the exploitation stations of mineral resources and raw material resources according to the production of electric power.

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Table 1

Schedule.

	1913	1920	1928	1929	1930	1931	1932	1933	1937	1940
Electric power was produced in the whole republic (million kW/h)	110.8	122.0	376.6	417.3	501.3	586.0	632.1	720.4	1387.2	1826.5
The capacity of power stations (thousand kW/h)	39,8	56,4	88.20	109.96	129.46	124.22	170.43	171.83	234	296

Source [7, pp. 543-544; 11, p.50-53; 12, p. 71]

The assessments in the periodical and scientific publication bodies related to the implementation of the country's energy capacity

First of all, it is necessary to mention that initiatives and projects with the experimental levels were paid a special attention for the development of the mentioned field in Azerbaijan SSR as in the whole Soviet Union. Accordingly, , special attention should be paid to the published article published in the "Science and technology" section of "New way" newspaper on November 16, 1926 related to the project of getting the power from marine waters and wastes (the power of the waves). The information was given in the article on the construction of hydroelectric power station with a capacity of 500.000 horse-power by using the power of waves (fayzan) on the bank of Yasavodka River located in the Men region and it was noted that the author of the project, according to this project., hydro engineer Dexter Guperdor explored the opportunities to utilize the power of waves by making large pools on the area dividing into bay and islands. Dexter offers to construct two pools, one being high and the other one low by constructing multi-barriers between islands and capes. Marine waters are pumped through the canals through feyzan (forward flow of the sea water) and cazr (ebb of the sea water). Powerful machines are placed between the rafts of two pools which come into operation by a lot of water. The average difference (latazul) between the surfaces is about 5 meters. Generally the water pressure can vary between 4 to 3 meters in 24 hours. Total supply requires funds of 100 million dollars to be spend. But as the implementation of the project is too expensive, it had not been realized yet. [13, No 263, 1926].

The next interesting article was published in the "New way" newspaper on December 17, 1926. By drawing attention to the initiative using wood pipes for the first time in the SSR in the hydroelectric power plant constructed in Shaki, it was noted in the article that, A.Vayt, technician of the Supreme Council of National Economy of USSR drew a new

project for Shaki hydro electric station. Usage of wood pipes had been envisaged in this project. Wood pipes have not been used anywhere in USSR till this time. At present, these types of pipes are in use in America and Germany. Azerbaijan State Department of Technical Construction conducts experiments by preparing samples of wood pipes for the hydro electric station. Haci Gasimov, the chairman of Supreme Council of National Economy conducted experiments with the participation of the chairman of State Plan Office industrial sector, Professor Malik Aslanov and other specialists on December 14. It was considered that, the expenses in the preparation of pipes and pipeline will be 50-70% reduced. [13, No 290, 1926].

Assessments in Azerbaijani literatures on the energetic economy intensified in the 30s. All these are because, launch of production, processing and light industrial enterprises and construction in perspective as an integral part of industrialization course increased the demand to electric power. But serious disproportions were observed between the demand to electric power and energy supply. Accordingly, problems of power engineering became subjects of discussion. In this regard, an article of engineer Zolyataryov called "Water resources of Azerbaijan SSR" published in the "Bakinskiy rabochiy" on October 29, 1930, draws attention. By paying special attention to the thermal power plants operating with Absheron oil and gas which occupy the main place in the power engineering of Baku economic region (energy supply), it was noted that, Baku junction has as important role not only in the economic life of Azerbaijan SSR, but of all Transcaucasian. However, despite of all these, Azerbaijan still does not have power engineering balance. This insufficiency should be eliminated. Power engineering base is especially important for Azerbaijan which is in the early development stage of many spheres of national economy. The construction of large enterprises (cotton, ore, alunite) is projected in Western Azerbaijan. Electric power will be required for the organization of machine



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irrigation of cotton fields in the parts of Kur River banks till Yevlakh. At the same time, 600 million kW/h electric power is required for coking in the ammonia production in Dashkasan metallurgical plant. 150-180 million kW/h electric power will be required for the textile and other enterprises in Ganja. Particularly aluminum plant requires attention. 3 billion kW/h energy is required to the plant in which relatively less 100.000 tons of metal are melt. Till this time, water resources of Azerbaijan are not used. Nothing has been done relating to the Low Zurnabad station (3000 horsepower) with total capacity of 1500 horsepower and 3 tiny region hydro-stations (Khankendi, Nukha, Zagatala). The construction of power station with 70.000 horsepower is projected near the village Garasaggal. Nowadays it is important to explore the energetic opportunities according to the water resources of Azerbaijan. The construction of dam with 60 meters in height near Mingachevir on the Kura River will mean the establishment of 7 billion cubic meters of water reservoir for the first time in the world. At the same time, it will be possible to irrigate 750.000 ha areas. 600-700 million kW/h will be used in Mingachevir Hydro electric Power Station. There are other rivers in Azerbaijan like the Terter, Alazan and Araz. Furthermore, engineer Zolyatrayov tried to substantiate the idea of importance to establish the network of developed power engineering in Azerbaijan. [5, No254, 1930]. In the meantime, assistant professor introduced the results of his research that he did on the opportunities of "Using wind power in Absheron" to the public. He noted that, it is an important issue to use wind power for the provision of water motors with electricity particularly in the remote oilfields of Baku where exploration work is conducted, at the same time in the cotton-growing regions. [14, p.77-86, b.3(10), 1931].

I Azerbaijan power engineering conference launched on February 24, 1931 in Baku, Turkish Culture Center. Kartelashvili, Polonski, Agha Sultanov, Gasimov, Musabyov, Bunyadzade, Krjijanovski were elected to the Presidium and Political Bureau of Working Group of the conference. Konushki, the chairman of the State Plan Commission of Azerbaijan made an introductory speech and Power engineering Committee of Azerbaijan was elected consisting of 52 members. In the conference Rzasade made a report on the future perspectives of power engineering in Azerbaijan. The opportunities of using rich energetic resources were once more evaluated in the report. [8, No 45, 1931].

It is important to note that, the article of Konushkin with the title "On the plan rails of energetic of Azerbaijan SSR" published in the "Bakinskiy rabochiy" newspaper on February 24, 1931 was dedicated to the Azerbaijan power engineering conference. It was mentioned in the

article that, Azerbaijan has not had real energy balance till today; electrification is carried out slowly and without appropriate planning and guidance. By considering the elimination of this serious insufficiency important, Konushkin noted that 75 million kW/h energy is needed for the energy provision of industrial enterprises of Ganja industry region at first step (chemistry, metallurgy, textile) that are going to be projected, as well as for irrigation of cotton-growing farms along Kur River till Yevlakh. As well as it was forecasted that, 500 million kW/h energy to be needed for Dashkasan metallurgy plant, 150-180 million kW/h electric power for Ganja textile factory, 3 billion kW/h electric power for aluminum plant with a production capacity of 100.000 tons. It was noted that 5.5 billion kW/h electric powers fell into Azerbaijan's and 2 billion kW/h of it into Baku oil industry's share in 1935. It was noted for comparison that, 7 billion kW/h electric powers were used only in California in 1930. In Azerbaijan nothing has been done related to construction of Nukha, Khankendi, Zagatala hydro-stations with 1450 horsepower except Low Zurnabad hydro-station (3900 horsepower). In Western Azerbaijan delays the construction of Garasaggal or Terter hydro-stations. Konushkin suggested all energetic opportunities of Azerbaijan SSR to be exactly explored. Except Garasaggal and Terter hydro-stations with the capacity to produce 660 million kW/h electric power, construction of dam with 50 meters in height on the Kura in Mingachevir means 7 billion cubic meter of water supply, 600-700 billion kW/h electric power, irrigation of 700.000 ha cotton field. The opportunities of the Alazan, Shamkir and Araz Rivers were positively evaluated from energetic point of view. Moreover, planning to construct heating power plants was considered important. [5, No 46, 1931].

In his article called "The ways to develop power engineering in Azerbaijan" published in "Bakinskiy rabochiy" newspaper on March 30, 1931, P.Belausov considered important that Transcaucasian energy center should pay special attention to the issue of meeting increasing demands of Baku economic region and the whole Azerbaijan to energy as a supreme body of planning and regulation of ZSFSR electrical economy. [5, No72, 1931]. P.Belausov put forward relevant assessments on the power engineering problem in "Bakinskiy rabochiy" newspaper in the article called "General plan of electrification of Azerbaijan SSR" on June 26, 1931. By noting the importance of energy industry for developing all fields of national economy here, opinions were put forward for conversion of the field of power engineering into more profitable and productive field. The preparation of specialists working in the field of power engineering, better organization of planning, more efficient use of the

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existing opportunities and equipments were included in the suggestions. [5, No 146,1931].

In the study period, services of I. Rzazade should be noted in the exploration of economical problems of power engineering in Azerbaijan. The article of I.Rzazade published in "Communist" newspaper on July 10, 1931 was dedicated to Mingachevir problem. He noted that, the solution of problem is not just settlement of power engineering problem but at the same time settlement of the problem of construction of water reservoirs. Mingachevir water reservoir should be constructed in relatively unsuitable geological conditions. Considering all these, it is important to benefit from American experience, because the experience of constructing dams in high places exists in America, it is important to benefit from the experience of engineer Uolberg on the construction of dams. The construction of dam in Arizona Slot River in America is more difficult and bigger project. According to Uolberg method, Rzazade noted that 116 million dollars, funds worth of 230 million manats for that time according to the currency rate of manat would be needed for the construction of Mingachevir water reservoir. Along with the construction of water reservoir, this calculation included the expenses to construct main canals, irrigation network, series of drainage, hydro-station with the capacity of 200 thousand horsepower. Rzazade considered that 115,8 dollars, that is 230 manats are required to be spent for the irrigation of each 1 ha field. Rzazade wrote in his mentioned article that, since 1930 the issue of Mingachevir has been forgotten, not any step has been taken forward in this regard. Despite of allocation of 200 min manats for the work of Mingachevir, not any exploration work is conducted yet. [8, No 155, 1931].

Assistant professor I.Rzazade paid special attention on the importance of the issue holding the calculation on the 1) the power of transformation voltage and electric power 2) efficiency 3) calculation of mechanical strength, in his another article called "Economic efficiency of electric transmitter in the high-voltage lines" and at the same time the calculation of the efficiency of network was connected with the calculation of annual maintenance costs. Maintenance costs mean the costs prescribed for the calculation of 1) capital costs a) credit interests b) fund charges for payment of capital c) amortization payments d) expenses spent on the repair and technical control 2) energy loss in the lines. [10,p.87-93, b.3(10), 1931].

I.Rzazade also compiled the regionalization according to the opportunities of energy supply of republic by making assessments on the local electrification. Here included 1)Baku oil industry region 2)Western Azerbaijan with Ganja industry center 3) plains of Azerbaijan SSR, region within the

scope of high-voltage highway movement, line along the railway from Tovuz station to Yevlakh station, areas requiring mechanical irrigation from Yevlakh to Kur river, 4) not well-equipped regions to which brought water and fuel in Azerbaijan SSR. I.Rzazade put forward suggestions on the development of power engineering in Azerbaijan. Here suggested 1) the establishment of special bureau for the planning of energy industries, 2) revision to the 5-year electrification plan in the new bureau, 3) the establishment of Institute of Transcaucasian Power Engineering in Azerbaijan in order to prepare new staff, 4) the establishment of appropriate bodies that will be involved in the work of local electrification in Azerbaijan. [4, p.15-21, No 4-5, 1931].

Then touching upon current and perspective issues of developing power engineering once more, in the article called "Electrification of Azerbaijan SSR in the second five-year" published on may 15, 1932 of which co-authors were I.Rzazade, Salimkhanov, Zolyataryov, it was noted that, measures were taken in narrow limits instead of beginning to develop power engineering and all fields of national economy in Azerbaijan SSR. Main duty in the second five-year is to make better the provision of national economy by using rich energetic opportunities of Azerbaijan. [8, No 114, 1932].

An article of which co-authors engineers were I.Rzazade and N.Salimkhanov was published with the title "Wind power to the service of socialism-the construction on Dnepr" in the "Bakinskiy rabochiy" newspaper on July 9, 1932. It was noted in the article by using the calculation of Malinovski and Zolyataryov that, it is possible to get 2,5-3 billion kW/h powers by using wind power in all Azerbaijan, particularly in Absheron. It is roughly the same with the electric power produced by Dnepstroy. It is possible to get 86,5-500 kW electric power in every square meters in Absheron. The most technologically efficient one is wind power with the speed reaching 8 meters per second; it is possible to get 1930-6950 million kW/h approximately. Till today this resource of Azerbaijan has not been used. At the same time the Branch of Institute of Central Wind power, special group were established with the initiative of Azerbaijan SSR State Planning Commission. [5, No 160, 1932]. In addition to these, engineer Iskander Rzazade wrote by once more bringing up the issue to use rich energy resources of Azerbaijan that, annual power of all rivers of Azerbaijan on average is in the capacity of 4 million horsepower. Till now we have 4 hydro-stations with general power 3.700kW/h being built. Much work has been done relating to oil and cotton, power engineering remains significantly behind. Central bodies in Moscow approved the project of Terter hydro-station. 3.9 million manats were allocated to the preparation work in 1932. It is possible to direct water with the capacity of 140

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thousand horsepower to the building of hydro-stations through tunnel by constructing dam in the rock, narrow passage of water with 130 meters in height. It is possible to send water with the capacity of 27 thousand horsepower to the hydro-station to be built secondly through main canal in the course of construction work. The possibility was generally noted to construct 5 hydro-stations with 16,5 thousand/kW powers in water spans. It was mentioned along with these all, prime cost of each kW/h of electric power may be 1,2 kopecks in the hydro-stations built in the areas passing from high mountainous part of Terter. The average total production capacity of Terter hydrostations is 686 million kW/h. This energy can provide Dashkasan plant melting 600 tons of iron of new Ganja industry region, the factory producing 200 tons of aluminum mixtures, textile and electro technical industrial enterprises with electric power. It was noted that the work done was useful for irrigation purposes, the irrigation of 94.000 ha area, particularly provision of cotton fields with water was possible. But by considering impossibility of construction work without making the road infrastructure better, construction of Yevlakh-Shusha railway was considered important till 1934. [5, No 160, 1932].

Assessments of T.L.Zolyatyrov and I.D.Rzazade on the "General plan of electrification in Azerbaijan" can be noted as an interesting speech for the beginning of 30s. On the basis of calculations the mentioned explorers forecasted shortage to be observed in the payment of increasing demand of Azerbaijani industry to electric power in subsequent years. It was noted the shortage to be 5.8% of general demand in 1937 and 10% of general demand in 1940 and installation of cables was suggested connecting electric power system with neighboring republics as one of the ways to overcome. T.L.Zolyatyrov and I.D.Rzazade noted that, water supply, usage opportunities from the solar and wind power of Azerbaijan have not almost been learned and appropriate cadastres should be compiled for this. [15, p.7-25, b.4(11), 1932].

I.Rzazade directed attention on the renewable energy resources in republic in assessments in his series of articles published on the "The problems on using wind power in Absheron". It was noted in the articles that, the name of wind engine was mentioned in II century BC, at the time of Neron. Wind turbines were launched in France in 1105, in England in 1143,

in Italy in 1333. According to the information of Krasovski, the number of wind turbines reaches 170.000. According to information of Kazanski, there were about 200 factories preparing wind engines in America at the end of XIX century. Coming to Azerbaijani realities, I.Rzazade wrote that, the problem of using wind was not properly paid attention. The first experiment engine set in the mines is not used. Central Energy group opened in Baku in 1932 ceased its activity. Explorer directed attention from the opportunities to use wind power to the provision of national economy, particularly, oil industry with electric power that will be improved. [4, p.28-34, №1-2, 1935].

Although Azerbaijan has rich electric resources and major projects have been prepared by specialists on the exploitation of these resources, the issue to build small hydro-stations in the points mentioned by specialists was brought up in chief economic bodies only in July, 1934. In parallel, associates of the sector of power engineering in Azerbaijani branch of the Academy of Sciences of the USSR, conducted research on the issue construction of small power stations in Azerbaijan in 1937 (100-200 horsepower). In this regard, studies of I.G.Esman draw attention. I.G.Esman dedicated special studies on the issue to learn economic efficiency of the application of appropriate turbines able to work in the condition of changeable water tension in his studies relating the small hydroelectric station facilities in Azerbaijan. [6, p.70-79, No 6, 1940].

E.P.Pankov wrote in his published article by studying the opportunities of "Using solar energy in Baku conditions" that, water heaters using solar energy for domestic requirements exist in California. It is possible to use solar energy for many purposes in Azerbaijan too. It in its turn, improves of energy provision of fridges, fruit drying, water purification and field irrigation facilities. The possibility of getting solar energy and its importance in terms of national economy were substantiated in the article. [9, p.103-107, No 6, 1940].

As it is seen, specialist group operated studying on the improvement of energy industry in Azerbaijan in 20-30s. One of the issues drawing attention here is to bring up the usage opportunities of renewable energy resources. At the same time, the importance of using advanced experience of the USA and Europe was particularly noted.

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