ASSESSMENT OF ENERGY CONSUMPTION IN INDUSTRIAL NETWORKS OF THE REPUBLIC OF UZBEKISTAN

International Nordic University, Department of Economics and Business Management, associate professor

Nigmanov Azizbek
ORCID: 0000-0002-2722-6902

Abstract

This article industry in enterprises again recoverable energy spending assessment, electricity energy economy in provision problems, them eliminate reach processes and energy resources efficient use such as in directions take went studies, Uzbekistan Republic of industry in networks energy spending assessment according to Economy network and in the fields energy consumption spending correlational, regression analysis is effective until 2035 economic growth in providing near ten annually industry in networks energy spending reduce on the surface suggestions work developed

Keywords: industry, energy consumption, electricity energy, alternative energy, evaluation.

Аннотация

Это в статье промышленность на предприятиях снова восстанавливается оценка расходов энергии, экономия электроэнергии в обеспечении проблем, их устранения достигают процессов и эффективного использования энергетических ресурсов, таких как направления, взятые пошли исследования, Республика Узбекистан промышленность в сетях оценка расходов энергии в соответствии с экономикой сети и в областях потребления энергии корреляционный, регрессионный анализ эффективен до 2035 года экономический рост в обеспечении около десяти ежегодно промышленность в сетях расходы энергии сокращаются на поверхности предложения работы разработаны

Ключевые слова: промышленность, потребление энергии, электроэнергия, альтернативная энергия, оценка.

Introduction

The energy sector is the economy's energy with provide, produced release, and vehicle movement for necessary energy work release and in distribution directly or indirectly participation which of companies complicated and mutually connected network own into received wide and inclusive is a field.

The reasonable use of energy resources is a daily issue, so the current task is to be calculated. Energy resources was of demand more and more increased going today's during this matter is more becoming relevant is going Today's in the day

energy of thrift state policy level that it has been raised that's it in the direction near years inside acceptance done and being done decree , decision and one row normative documents in the example to see can Including , "Uzbekistan until 2030 To the " green " economy of the Republic to pass directed reforms efficiency increase according to measures on ”[1] President decision acceptance done To him according to the industry in the field energy efficiency by at least 20 percent raise , gross internal product to the unit right coming energy spending volume by 30 percent reduce such as sure tasks set given In this respect , in the industry clean energy based on product work release through developed countries standards adaptation opportunity have to be and export potential increase , energy thrifty modern technologies and innovations come in to come acceleration through energy spending reduce , world in the economy face giving green to energy transition in processes active participation reach , green energy sources to build at the expense of of industry new directions app in the sense of a work places create directions studies take to go important importance occupation is enough

To the topic about literature analysis

To date, a number of studies have been carried out in the areas of assessment of renewable energy consumption in industrial enterprises, problems in ensuring energy efficiency, processes of their elimination, and efficient use of energy resources.

In modern conditions, the stable and independent position of the country is influenced not by the wealth of natural resources or large-scale production, but by the high level of innovative indicators. There are also many studies on the effective use of non-traditional energy sources (solar, hydro, geothermal, biomass energy, wind energy) in saving energy resources. Renewable energy is a key component of sustainable development [2].

New energy developments and sources in turn create jobs and export opportunities in growing markets. There are various strategies for promoting emerging energy technologies. A number of factors can influence the choice of strategy, such as available resources, the state of networks, the innovation system, etc. In order to strengthen local industrial enterprises that can ultimately contribute to global exports, the development of domestic markets has also been prioritized [3].

In the studies of IK Sharapova [4], economic efficiency was calculated based on the use of renewable energy sources in the automobile industry. SV Podkovalnikov, MA Polomoshina [5] conducted studies on the evaluation of the efficiency of integration of alternative energy sources into the power supply system of an industrial enterprise.

Most of the researches conducted in Uzbekistan on this problem are devoted to technological problems, in which the main focus is on the identification of alternative energy sources and researches on their technological solutions.

In the research carried out by A. Imamov and others [6], the creation and implementation of standards for the use and consumption of alternative energy, the development of a national program for energy saving in economic sectors and social

objects, new devices, equipment and spare parts related to non-traditional energy proposals for creation and production are given.

ZFFakhriddinova, XXRejapovlar [7] Sources of production of renewable electricity in Uzbekistan and the level of their use are analyzed.

In general, in Uzbekistan, there are not enough scientific studies devoted to the scientific-methodical and practical issues of creating organizational and economic mechanisms for the use of energy sources and energy consumption assessment in industrial enterprises.

Analysis and results

A set of processes aimed at efficient (rational), that is, rational use of energy resources is the primary definition of energy efficiency. Achieving the desired result at the expense of less energy consumption for the energy supply of buildings or production processes is also an indicator of efficiency.

The economy and industry of Uzbekistan is a country with dynamic growth indicators. Along with industry, agriculture, transport and construction are also developing in it. But it is important that the development of the country's economy causes an increase in energy consumption.

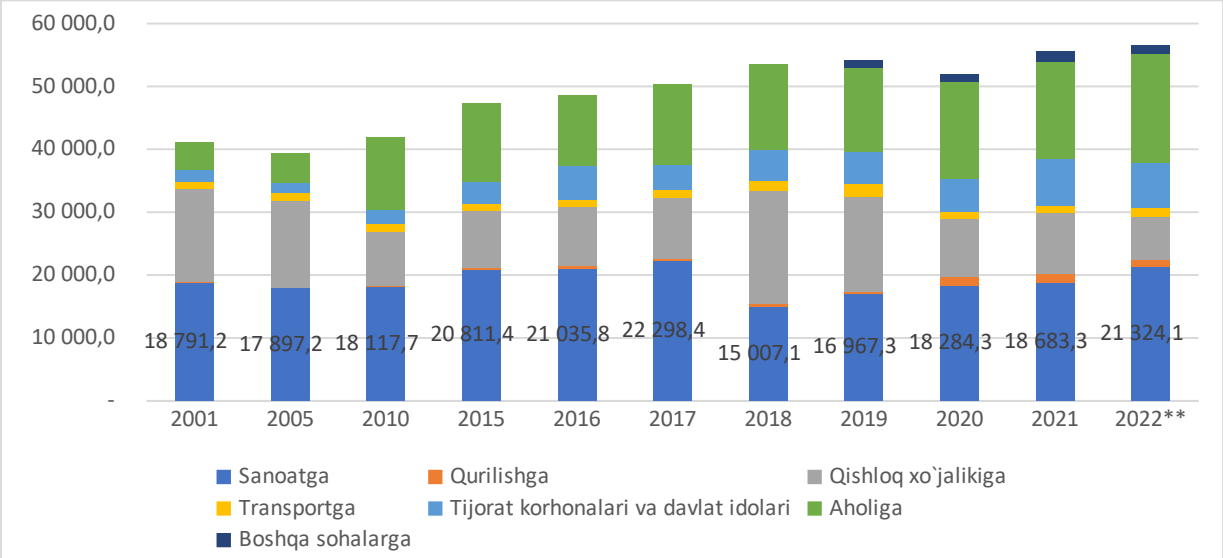

Figure 1. Energy consumption [1]in sectors and sectors of the economy

Based on the data of Figure 1, when analyzing the consumption of energy in sectors and sectors of the economy, it can be seen that the highest indicators of energy consumption correspond to industry, agriculture and population consumption. possible For example, in 2022, the electricity consumption of industrial enterprises was 21,324.1 million kWh. Between 2001 and 2022, this figure fluctuated between 15,000 and 23,000 million kWh.

As industrial enterprises have a high rate of electricity consumption in the country, it is appropriate to use alternative options for reducing energy consumption in this sector.

[1] Uzbekistan Republic President in the presence of Statistics agency information based on the author by made up

In particular, during the study, the dependence of the indicators of electricity produced by solar power plants (million kWh) and electricity supply per capita (thousand kWh) on the GDP was analyzed (Table 1)

Table 1

Indicators of Uzbekistan's GDP, electricity produced by solar power plants (million kWh) and electricity supply per capita (thousand kWh) in 2015-2022[2]

	2015	2016	2017	2018	2019	2020	2021	2022
Gross domestic product	221 350.9	255 421.9	317 476.4	426 641.0	532 712.5	605 514.9	738 425.2	888 341.7
Electricity produced by solar power plants (million kWh)	0.003	0.3	0.7	0.2	0.1	0.03	49.0	435.8
Electricity supply per capita (thousand kWh)	**1.8**	**1.8**	**1.9**	**1.9**	**1.9**	**2.0**	**2.1**	**2.1**

Multiple R (Multiple R): This is a correlation coefficient that measures the strength of the linear relationship between the dependent variable and the independent variables together.

This value is useful for understanding the overall fit of the regression model to the data. The closer this value is to 1, the better the model explains the variation in the dependent variable.

R-squared (R-squared): It is a coefficient of determination that shows the proportion of variance in the dependent variable that can be explained by the independent variables.

In other words, slightly more than half of the variability of the dependent data can be explained by the model, which means that the model has moderate explanatory power. An R-squared value of 1 means that the model explains all of the variability around the mean of the response data, while a value of 0 means that the model explains none of the variability.

Adjusted R-squared (Normirovannyy R-squared): This adjusts the R-squared value based on the number of predictors in the model relative to the number of data points. A negative value here indicates that the model may be filled with too many unnecessary predictors.

Standard Error (Standartnaya oshibka): It measures the average distance that the observed values fall from the regression line.

Table 2

Correlation analysis results[3]

[2] Uzbekistan Republic President in the presence of Statistics agency information based on the author by made up

[3] Information based on the author development

VIVOD ITOGOV	
Regression statistics	
Mnozhestvenny R	0.96725885
R-squared	0.935589683
Normalized R-squared	0.909825556
Standartnaya oshibka	71422,88029
Nabludeniya	8

Dispersion analysis								
	df	*SS*	*MS*	*F*	*Significantly F*			
Regression	2	3.7E+11	1.85E+11	36.31366	0.001053			
Ostatok	5	2.55E+10	5.1E+09					
Itogo	7	3.96E+11						
	Coefficient	*Standartnaya oshibka*	*t-statistics*	*P-Znachenie*	*Nizhnie 95%*	*Verxnie 95%*	*Nizhny 95.0%*	*Verxnie 95.0%*
Y-peresechenie	-2743669,576	553844.7	-4.95386	0.004271	-4167373	-1319966	-4167373	-1319966,481
Peremennaya X 1	311,1455313	225.7942	1.378005	0.226678	-269,277	891,568	-269,277	891.568037
Peremennaya X 2	1663482,774	289900	5.738126	0.002252	918271	2408695	918271	2408694,525

Observations (Nblyudenia): The number of data points used in the regression analysis.

Coefficients: These are the values that multiply the predictor values in the regression equation.

Standard Error of Coefficients: This measures the average amount by which the coefficient estimate differs from the true mean of our response variable.

t-Statistics and P-values: These are used to determine the statistical significance of each coefficient in the model.

Confidence Intervals (Nijnie 95%, Verxnie 95%): These intervals give us the range of values that can contain the true value of the coefficient with a certain level of confidence, usually 95%.

Figure 2. Location of the regression[4]

The results of the correlation analysis had the following values:

Multiple R (Mnojestvennyy R): 0.96725885. This value is very close to 1, indicating a very strong positive relationship between the dependent and independent variables.

R-squared (R-squared): 0.935589683. About 93.56% of the variance in the dependent variable can be explained by the independent variables in the model. This is considered very high and indicates a good fit of the model to the data.

Corrected R-squared (Normirovannyy R-squared): 0.909825556. Even after adjusting for the number of variables, about 90.98% of the variance is explained, which is still very high and confirms that the independent variables are relevant predictors.

Standard error (Standartnaya oshibka): 71422.88029. This value provides an estimate of the standard deviation of the regression residuals, and it is relatively low compared to the coefficients, indicating that the predictions are very accurate.

Observations (New Zealand): 8. The number of data points on which this model is based.

For regression coefficients:

The intercept (Y-peresechenie) has a large negative coefficient with a statistically significant p-value (0.004270696), indicating that it is a meaningful contributor to the model.

The variable X1 (Peremennaya X 1) has a coefficient of 311.1455313, but with a p-value of 0.226677757, it is not statistically significant at conventional levels (eg 0.05), which would not be a useful predictor in the context of this model shows that it is possible. .

[4] Information based on the author development

Variable X2 (Peremennaya X 2) has a very large positive coefficient and a highly significant p-value (0.002252106), indicating that it is a strong and significant predictor in the model.

The F-statistic (36.31365786) and its significance (0.001052904) further confirm the overall significance of the regression model, indicating that the model fits the data.

From the analysis, we can see that the share of primary energy means for the economy will remain relevant in our industries in the near future. Therefore, it is not for nothing that conducting an energy audit in energy management in order to increase the efficiency of reducing energy consumption is becoming a serious issue.

of the Cabinet of Ministers of the Republic of Uzbekistan dated August 7, 2006 VM-164 - " Conducting energy audits and expertise of consumers of fuel and energy resources " [5], the following are mandatory procedures for energy audits: I can see as one of the few mechanisms that contribute to the efficiency of spending:

- design of new and reconstructed objects, technologies and equipment;
- presence of consumers of fuel and energy resources (EE) with annual total consumption of more than 2,000 tons of standard fuel or more than 1,000 tons of motor fuel.

of the President of the Republic of Uzbekistan dated August 22, 2019 No. PQ-4422 " On increasing the energy efficiency of economic sectors and the social sphere, introducing energy-saving technologies and developing renewable energy sources " is in accordance with the Ministry of Energy energoaudit was assigned as the responsible body. Also, in order to reduce energy consumption in all aspects of the economy, especially in the industrial sector, quotas were set for the training of specialists in higher education institutions in the fields of "renewable energy sources", "energy efficiency" and "energy audit". . The second issue is that by January 1, 2023, all energy-consuming enterprises and organizations with a business connection were expected to introduce an energy management system compliant with the international ISO 50001 standard.

2021, 95 companies have the ISO 50001 international certificate, this standardization system is included in the national certification system, and OzDSt is registered under the ISO 50001 number. Due to the high cost of international certification, the costs of obtaining the ISO 50001 standard certificate within the framework of Uzbekistan's state program are fully covered by the state.

2006, in order to reduce energy consumption in industrial sectors, an energy audit has been conducted every five years. In 2020-2022, energy audits of 285 industrial sectors were carried out, and these processes are carried out continuously according to the list approved by the Government of Uzbekistan. This, in turn, increases the effectiveness of measures to reduce energy consumption in industrial sectors.

Summary

Another mechanism for reducing energy consumption in industrial sectors is the Decree of the President of the Republic of Uzbekistan dated July 10 , 2020 PQ-

[5] Fuel and energy resources consumers energy from the inspection and from expertise transfer // https://lex.uz/docs/-1038881

4779 " On increasing the energy efficiency of the economy and reducing the dependence of economic sectors on fuel and energy products by attracting available resources " q we can see the decision on additional measures , the energy set for the years 2020-2023 is that the implementation of mandatory savings planning is determined. It is important to note that the indicators are calculated by economic sectors and within three years the activities of the sectors are included in the centralized planning. But they have an indicative nature, and unfortunately there is no accountability mechanism in Uzbekistan for failure to meet the above indicators, which reduces the effectiveness of measures aimed at increasing the efficiency of energy consumption.

Also, in order to ensure effective economic growth of Uzbekistan until 2035 , we may have the opportunity to reduce energy consumption in industrial sectors in the next decade by solving the following situations, namely:

reduction of greenhouse gas emissions per unit of gross work output;

reducing energy consumption in industries by one and a half, two times;

increasing the renewable energy sources step by step, especially considering the efficiency of nuclear energy in addition to solar and wind energy;

increase the energy efficiency of industrial sectors to at least a quarter of the current efficiency.

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