

The Concept of Information Asymmetry in the Energy Consumer Theory of Firms

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Abstract: In a modern economy, the management of any firm must take into account the value of energy and the value of any information about its effective use. Accordingly, the business is faced with the question; how does the asymmetry of information manifest itself in the process of energy consumption, pay more attention where there are methodological foundations for studying the concept of information asymmetry in energy consumption. The purpose of the study is to create a theoretical and methodological basis for studying the role and significance of information asymmetry from the point of view of a firm's energy-consumption theory and to prepare a number of proposals for representatives of existing firms. Tasks to achieve the goal are related to the analysis of the scientific literature presented in prestigious world databases, explaining the essence of the asymmetry of information; the classification used in the activities of the company of various forms of energy and asymmetry of information in energy consumption, analysis of the asymmetry of information in various stages of pricing for energy, etc. Materials and research methods are based on the use of abstraction, synthesis and comparison as well as on the systematization of the data. To achieve the goal of the research, a methodological review was used which is based on the interdisciplinary of the considered methods of analysis and synthesis. Results and novelty of the study. The main result is that for the first time in the world economic science, the researcher's theoretical and methodological basis has been created for studying the manifestations of information asymmetry in the process of consuming various forms of energy in a firm's activity. Other scientific results that have a scientific novelty include the definition of the essence of "information asymmetry in energy consumption", highlighting the classification signs of information asymmetry in energy consumption, highlighting features of information asymmetry manifestations in energy consumption compared to the finished product market. Transparency of information, long-term view of contractual relations may keep information asymmetry at an acceptable level. The significance of the impact of network intellectualization on the energy market on information asymmetry is also determined.

Key words: Energy theory of the company, information asymmetry, forms of energy, asymmetry of information in the energy sector, network intellectualization, systematization

INTRODUCTION

Solving problems in the field of optimizing energy consumption in the process of a company's activities has always been the focus of its management. This is mainly due to the desire of the company to maximize profits, the growth of state requirements in the field of energy conservation, tougher competition in the production and consumption of energy resources. The multidimensional state of the process of energy consumption of a company predetermines the need for an integrated and systematic approach to its in-depth study. A number of studies in the field of energy consumption were carried out at the junction of various sciences, for example, at the junction

of technical and sectoral economics. Such approaches on the one hand, provide definite and practically significant scientific results but on the other hand, the level of holistic vision of the problems in the field of energy consumption is reduced. The industry results can even play a destabilizing role in economic development.

In such conditions, it is necessary to pay attention to the use of general theoretical and methodological foundations of research on emerging problems in the field of energy consumption of the company and identify ways to solve them. Such bases include the use of the potential of economic theory in particular the theory of the firm. A creative rethinking of the existing theory of the company to address issues of energy consumption and energy

efficiency should contribute to obtaining holistic and integrating scientific results, sought after by theorists and business representatives.

In order to theoretically substantiate the processes of energy consumption, the scientific community was first proposed to use the theory of the firm (Burganov and Zalyalieva, 2014; Abrarovich and Anatolyevna, 2018). It should be noted that the proposal found a response in Foreign publications. For example, it is noted that the cost of production and the price of energy as a product and phenomenon of a company can become a leitmotif of the creation of such a theory (Markina *et al.*, 2018). A firm's energy-consuming theory is understood as a theory that describes the decision-making process in the field of energy consumption at different levels of business and is based on energy consumption as the main factor of a firm's activity. Without energy as well as without labor, capital and land, any purposeful actions to produce products and provide services cannot be carried out. Energy theory was created on the basis that the existing versions of the theory of firms did not sufficiently take into account the complex processes of energy consumption and energy saving did not provide recommendations for the company's management to achieve a certain success in the field of energy efficiency, thereby not contributing to the achievement of indicators of the company's energy strategy and national economy. As you know, the behavior of the company in the field of energy consumption depends on numerous factors that can be divided into exogenous and endogenous. Among which it is possible to single out the availability of external and internal information to management for making appropriate decisions in the field of optimizing the use of various types of energy. In both cases, the management of the company must have a primary database of verified information data.

The study of the influence of available and diverse information on the behavior of economic entities is predetermined not only at the level of an economic entity, but also with the need to take into account current trends in the global economy. E. Shafieepoofard, M. Raginsky as a result of their research, concludes that the era of major information transformations in order to remain competitive and profitable, management of enterprises must learn to use the information of their companies to create new products and services or even a new market (E. Shafieepoofard, M. Raginsky). It means that he has to make it a matter of course market. This is a new quality epoch; wealth of information (information products and services (Garifova, 2014). Based on the data obtained during the research the researcher comes to the conclusion that the era of major information

transformations in order to remain competitive and profitable, management of the enterprises must learn to use the information of their companies to create new products and services or even a new market. The world has entered a new digital epoch; here, the activity of the organizations is mainly in the production and use of information technologies and accumulated information to make all other forms of production more efficient and thereby ensure a new quality of economic growth and creating greater wealth of information (information products and services (Garifova, 2014).

The transition to the digital stage of development of society is a characteristic feature of modern civilization. Modern studies show that in the past decades, digitization has become the basis for the growth of the economies of developed countries (Brynjolfsson and McAfee, 2011; Zhao *et al.*, 2015). In particular, Russia has adopted the "Digital Economy of the Russian Federation" program is actively studying the introduction of elements of "Industry 4.0" into the activities of many sectors of the national economy.

Receipt and processing of information as well as its use in the production of products and/or the provision of services predetermines the effectiveness of the entire company. The concept of "information" can be viewed from different scientific positions in particular, it is understood as a form and method of existence, storage, transfer and exchange of knowledge (Wheels, 2008). It plays a significant role in the activities of the company, along with the material, labor and energy resources of the company.

However, possession of information about something may have a narrow meaning for the firm. Having information is dead weight. The main thing is the ability to use advantages in the possession of information. The theoretical basis of this behavior of the company is directly related to the provisions of the concept of asymmetry of information. For a company, the prevailing behavior is not the availability of the resource potential of information in the field of energy consumption but the possibility of its advantageous use for the company. That is there is the problem of finding a balance between the ownership of information and its availability to other persons. Violation of the information balance between counterparties may predetermine the efficiency of a company's business in energy consumption.

In general, it is necessary to pay more attention to the constituent elements of the asymmetry of information in the process of energy consumption in the company and to define conceptual approaches to the calculations related to taking into account the asymmetry of information.

The concept of “asymmetry information” has a generally accepted meaning and is defined as a situation where one party to the transaction has important information that is not owned by other interested parties. In this embodiment, one party has an informational advantage which should be skillfully used by the management of the company.

Literature review

Hypothesis development: Having a scientific literature on the research topic can be divided into two groups. The first group of studies was created in the 20th century by the efforts of the founders of the concept of information asymmetry. Among them are such famous scientists as William Spencer Vickrey, George A. Akerlof and James Mirrlis. The object of their analysis was the purchase and sale of the final (finished) product. The seller of the product knows more about its quality than the buyer. It was noted that the lack of information about the quality of goods sold leads to an endless fall in prices. The study of markets with asymmetric information by Grossman and Stiglitz (1980) is essential for world science.

The second group of studies was based on the analysis of the use of information asymmetry in other sectors and areas of the national economy. For example, in management theory it is noted that the manager knows about the potential of the company more fully than the shareholder. It was determined that information asymmetry affects the capital structure of firms by increasing their debt burden.

In recent years, many scientific papers have been devoted to the consideration of information asymmetry. All of them, according to U. Shalbe, devoted to the consideration of information asymmetry noted that “the spectrum covered by the information economy today varies from the Stigler search theory to the industrial economy, including oligopoly theory, innovation and research and development” (Schwalbe, 1999).

However, the more important areas of the firm’s activities remain outside the purview of researchers and practitioners. In particular, the energy consumption of different forms. There are separate works dedicated to the management of energy consumption of the company. In a concentrated form, this is stated by Andrea Trianni and his colleagues who writes; “therefore, it is very important to evaluate and evaluate the status of energy management in the organization in order to take the most appropriate improvement measures”. Therefore, it is important that you implement the most appropriate improvement actions (Trianni *et al.*, 2019). This is also emphasized by such researchers as Cagno *et al.* (2017), Sa *et al.* (2017) and Shrouf and Miragliotta (2015).

It should be noted that energy management is not carried out without the participation of the information management unit. Valuable for research are the provisions on the special use of different information in order to reduce energy dependence and enhance the energy security of the company.

The researcher has conducted a content analysis of the contents of articles published in several leading energy journals in recent years such as Energy Economics, Energy Policy, Energy Research and Social Science, IEEE Power and Energy Magazine, Energy for Sustainable Development, etc. Unfortunately, it should be noted that in the articles considered, conceptual methods for studying the asymmetry of information in the electric power industry were not considered. There are only isolated references to the use of information asymmetry in the energy market.

In the world economic science, according to the analysis of domestic and Foreign research works of famous research centers, presented in various databases, for example, in WoS, Scopus, Science Direct there are no studies devoted to the topic of this study. There are separate studies on narrow energy consumption problems (Chen *et al.*, 2018). Or “the findings indicate that oil and gasoline prices provide mixed evidence of an asymmetric behavior” (Apergis and Vouzavalis, 2018). De-Miguel *et al.* (2015) draw attention to the role of information in improving energy efficiency. They write that “that standard regulatory approaches, proper energy pricing, overcoming” market barriers and “proper information could all contribute to improving energy efficiency indicators” (Carloste).

Definitely, the concepts of information asymmetry created earlier, considering the activities of firms as systems do not adequately reflect the realities of the current economic situation in energy consumption. In this aspect, the results of this study are valuable and fill gaps in the theory of the firm.

MATERIALS AND METHODS

Energy consumption and energy conservation permeate all aspects of the life of the company and predetermine the behavior of the company in any industry. An in-depth study of the role and significance of asymmetric information from the point of view of the firm’s energy-consumption theory should facilitate the search for new reserves for increasing energy saving and accordingly, maximizing profits.

The materials and results of the research are based on the use of methods of abstraction, generalization and systematization of the data obtained. To achieve the goal

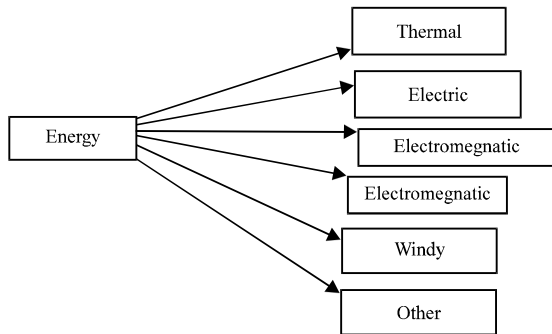


Fig. 1: The main forms of energy used in the activities of the company

of the research, a methodological review was used which is based on the interdisciplinarity of the considered methods of analysis and synthesis.

As a category of economic science, the asymmetry of information in energy consumption can be defined as a different level of equilibrium between the ownership of information by management and its availability to third parties in the process of using energy resources in a firm's activities. Any company in the process of energy consumption must anticipate the consequences of the realization of the asymmetry of information that can be positive and negative. The negative manifestations of the asymmetry of information in the company's energy consumption include its ambiguous influence on the management decision-making process. For example, the received information on the state of technical means (machines, equipment, etc.) during the direct manufacture of products.

The asymmetry of information in the process of energy consumption covers all aspects of the company. A key element in the analysis of the asymmetry of information in a firm's energy-consuming theory is "energy" in a broad sense. The concept of "energy" is multidimensional and abstract. From the ancient Greek language, "energeia" is defined as an activity or an active force. Energy in various forms, like money has penetrated into all spheres of society and the national economy. It is necessary for the implementation of any activity. Energy differ for different reasons (Fig. 1).

It should be noted that we are talking about the use of various forms of energy in the activities of the company and not about sources. In the theory of energy consumption not the last role is played by other forms of energy to which attention must be paid. So, in the activities of the company you can use the achievements of scientists on the use of energy steps (Energy steps). The use of heat energy, wind, etc., directly in the activities of a small or medium-sized firm is difficult and difficult.

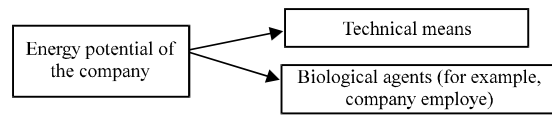


Fig. 2: The structure of the energy potential of the company

Theoretically, the total amount of energy consumed is determined by summing the costs of each type of energy but in practice there will be certain difficulties. In addition, the energy potential of technical and biological means (energy of muscles, the brain of an employee of a company) must be considered separately in the activities of the company (Fig. 2).

Efficient use of employee energy affects all the results of a firm. In the labor market, labor intensity is defined as the amount of energy that an employee spends per unit of work time. Therefore, it is very important to know the levels of energy expenditure opportunities for the individual employee and/or the staff of the firm as a whole. If the management of the company does not possess the asymmetry of information in the internal labor market about the energy potential of the personnel of the company, this is reflected in the stable development of the company.

In general, the management of the company should have information about the benefits of using various forms of energy. For example, about alternatives in the consumption of electrical or thermal energy.

The study of the problems of the production and sale of various types of energy is not only the task of a separate company but is among the state tasks. Firms in the course of their activities should determine all types of energy that contribute to achieving the goal of optimizing energy consumption, respectively, maximizing profits. For complete information about the possibilities of using not only electricity but also thermal, technological, etc., energy forms needed:

- Increase the level of knowledge of the company's management, especially, in the field of energy production technology
- To have information about the potential of the company for the use of energy in the course of the company's activity

In order to fully analyze the totality of information asymmetry manifestations in the process of energy consumption, it is necessary to classify them (Table 1). Each group of information asymmetry in energy consumption is subject to additional study and can be empirically established.

Table 1: Classification of information asymmetry in energy consumption (researchers version)

Classification characteristics	Level of development	Contents of manifestation
On related energy consumption objects in the course of the transaction	In the markets: Electricity Electrical goods Energy services Energy resources Labor resources	Incomplete awareness of the consumer about the object of the transaction For example, information about the parameters and properties of electrical products. So, the final term of the electric light bulb is only revealed when it burns out
By functional activities accounting for information on the process of energy consumption	Protection of information in the process of energy consumption. Incomplete accounting of data on energy consumption	The difference in the ways and levels of protection of information about energy consumption
On accounting and measurement of information	Use of norms and norms of energy consumption	Incomplete awareness of the contents of regulatory and legal acts of energy consumption
On profitability for the company	Profitability and profitability of the firm	Increase of profitability and profitability of the firm as a result of the use of asymmetric information
On the causal relationship of the company's internal structural units in the process of energy consumption	Intra-structural divisions of the firm	Different level of awareness of intra-structural units on energy consumption and energy saving
On the influencing factors on energy consumption	Exogenous and endogenous factors	Incomplete receiving of information
In relation to the appearance of information asymmetry	Reliability and objectivity of signals about the process of energy consumption	Use of untested and false information The lack of information affects the company's behavior in energy consumption

Table 2: Average producer and purchase prices for electricity per thousand kWh at the end of the year, Russian Statistical Yearbook (2017)

Variables	Years	Average prices (rub)
Production	2010	665
	2014	1009
	2015	989
	2016	1013
	2010	1539
Purchased	2014	2103
	2015	2189
	2016	2253

Also in an existing company, the analysis of information asymmetry in the process of energy consumption can be carried out according to the technical, technological and financial and economic fundamentals of the company (Table 2).

In technical and technological terms, the energy consumption of a company includes such processes as connection to energy sources (networks), energy distribution and direct energy consumption. The implementation of each process is based on the use of information asymmetry data. So, connecting to energy sources (networks) involves three options-connecting to energy suppliers, then to energy sales companies; connection to its autonomous substation or generator, combined connection. The consumer company must have complete information about the advantages and disadvantages of various connection options. The main thing is to reduce the level of risk and uncertainty in energy consumption in the course of the company's activity.

The distribution of energy occurs to sources of consumption-by structural units, production sites, etc. The asymmetry of information manifests itself in the possession of complete information about the necessary and sufficient levels of energy consumption in the

company's divisions. In this case, a significant role may be played by the loss of electricity during its distribution.

Direct energy consumption is the supply of energy to the work of various electrical receivers (equipments, heating and lighting devices, etc.). Information asymmetry may arise as a result of owning limited information by the firm's management while technical workers are more aware of the energy potential of technical equipment.

Difficult is the definition of the process of energy consumption by employee's in the course of employment in the company. It should be noted that in modern conditions the study of the processes of energy consumption of intellectual (mental) forces, energy, nerves and energy of physical forces of the enterprise employee's is in demand. Management may not know the level of individual energy costs of a particular employee. The worker on the contrary has asymmetry information about his energy potential and can use it.

In financial and economic terms, the asymmetry of information is directly based on the formation of the cost of energy used. It should be noted the important role of measuring the level of energy consumption. In the scientific literature, it is emphasized that the modeling of energy demand requires different measurements both in terms of methodology and in terms of assessment (Salisu and Ayinde, 2016).

The key to the asymmetry of information is the data on the price of energy consumed in a broad sense. It should be noted that state statistics focuses on determining only the price of electricity. According to the State Statistics Committee of the Russian Federation, average electricity prices tend to rise (Table 2).

Table 3: Manifestations of the asymmetry of information in the stages of pricing electricity prices (researchers version)

Characteristics	Conditional probability of receipt of events
The price of buying electricity in the future is uncertain	0.5
The purchase price of electricity is known: There will be a price increase for a certain percentage	0.2
There will be no price increase	0.2
There will be a reduction in prices by a certain percentage	0.1

Prices (tariffs) in the electric power industry are defined by current legislation as “a system of price rates at which payments are made for electrical energy (power) as well as for services provided in the wholesale and retail markets (Federal Law)”. The founder of the information theory of the company Aoki (1986) noted that “the company organizes its activities in such a way as to minimize (including through specialization) the cost of processing new information and internal dissemination of this information”.

To determine the value of information in the field of prices for consumed electricity, it is necessary to estimate the probability of receipt of certain events (Table 3). Accordingly, these probabilistic data can be used in determining the advantage of information asymmetry.

In the management of the company it is necessary to pay attention to the components of electricity pricing. The price of electricity is formed from three parts; the purchase price on the wholesale market, infrastructure payments, network services for the transmission of electricity and sales surcharge. Electricity and capacity purchase prices on the wholesale market are based on market principles while transmission services and sales margins are set by regulatory authorities.

The asymmetry of information is manifested in all parts of the pricing of electricity. So, when buying electricity and power in the wholesale market, there is a market basis for the possession and disposal of information. Massimo Melucci, Adriano Paggiaro (Filippini and Hunt, 2015) draw attention to price volatility.

Some experts confirm the “need to adjust the parameters of the existing pricing mechanisms for electricity, capacity and network services and show the importance of a differentiated approach to such adjustment in certain segments of the industry at different levels of risk of under-investment” (Velev and Solyanik, 2016). Asymmetry of information in the field of energy prices occurs at all stages of pricing (Table 4). However, to determine the benefits of information asymmetry, it is necessary to analyze all forms of energy used.

Table 4: Manifestations of information asymmetry in pricing stages (researchers version)

Stage pricing for electricity	Characteristic asymmetry of information
Stage pricing for electricity	Different levels of information ownership by the buyer and seller of electricity
Purchase price in the wholesale market	Availability of information on the status of infrastructure technologies
Infrastructure payments	Information benefit network company

The concepts of “the price of the total energy of the company”, “the total amount of energy consumed by the company” are not reflected both in science and in practice. To determine the price of consumption of total energy of the company, it is necessary to find out the amount of consumption of each type of energy and multiply them by the price (tariff).

To obtain the total price of energy consumed, it is necessary to universalize the indicators used that is to translate all data into an indicator for calculating energy. As a rule, monthly electricity consumption is calculated on the basis of the number of power consumers, their power, the time of their work, etc. Particular difficulties arise in the process of accounting for the energy costs of workers. The question arises: how to sum up the price of a unit of electricity and the price of a unit of energy costs of an employee. The concept of “conditional cumulative unit of energy”, like the indicator “conditional ton of fuel” can be used as a sentence. In general, the asymmetry of information in the pricing of total energy is formed from the data of the pricing information of each type of energy.

Determining the asymmetry of information in the prices of total energy allows us to analyze the financial and economic indicators of the development of the company. Each indicator may contain benefits from the availability and use of full or limited information.

The effectiveness of the use of information asymmetry in energy consumption is directly reflected in energy performance, energy intensity of products, energy efficiency index which in turn have an impact on the formation of financial and economic indicators of the company. For example, a simple example; the availability of information about the benefits of electricity consumption by a fluorescent lamp than an incandescent lamp significantly affects the rational behavior of the company, ultimately on the profitability of its activities.

Thus, the above classification of information asymmetry manifestations in the process of energy consumption covers all aspects of the firm’s activities. The correct calculation of all possible results of the use of information asymmetry will be based on the data of each type of its manifestation.

Table 5: Scale of ownership of the asymmetry of information in the energy consumption of the company

Scale of information	Balance indicators
0	No balance, complete lack of information
0.1	Minimum balance
0.2	
0.3	
0.4	
0.5	Balance
0.6	
0.7	
0.8	
0.9	
1.0	Maximum balance, full ownership of information

Taken together, one can determine the levels of knowledge asymmetry in energy consumption. Conventionally in the calculations, you can use the scale of ownership of information from 0-1. Zero-complete lack of information; absolute possession of information in the field of energy consumption. The balance of ownership of information should be at the level of the coefficient -0.5. Thus, the coefficient 0.8 already shows the potential possibility of using information asymmetry in favor of the company. The coefficient can be used in various economic and mathematical calculations in determining the potential development of the company (Table 5).

The decision-making process itself in the field of energy consumption in the conditions of information asymmetry is a complex and risky activity. It prevents firms from making optimal decisions and efficiently allocating energy resources, leads to unfavorable selection, the emergence of opportunistic behavior of energy users and increases transaction costs. Current trends in the digitalization of the economy, namely the wide distribution of the internet, the development of automation and computerization in the power industry create additional opportunities and risks in the field of information asymmetry.

An analysis of the finished product market revealed that “if consumers do not have accurate information about market prices or product quality, the market system will not function effectively” (Pindyk and Rubinfeld, 1992). In the field of energy consumption, this classic provision can be applied conditionally, since, it is necessary to take into account the peculiarities of applying the principles of a market economy in the electricity sector. The level of monopoly power of generating and marketing energy companies is much higher than in the market for finished products. In addition, the level of energy education of the energy market participants is insufficient for making optimal decisions.

The provisions on information asymmetry noted that, if sellers cannot convince potential buyers of the high

quality of their goods, low-quality products will prevail in the market, since, selling high-quality goods does not bring additional benefits to sellers. Does this relate to energy consumption where energy is a product of sale? Definitely, the seller of electricity knows more about the quality of electricity than the buyer (consumer). Power quality affects consumer performance, energy and resource costs. In contrast to the final product, the quality of electrical energy should ensure the normal functioning of electrical, electronic, electronic and other means of consuming electrical energy. However, in practice there may be deviations of the parameters of electrical energy supplied to consumers from the required standardized values. These deviations may occur as a result of short circuits in the distribution network; accidents in the electrical network; electromagnetic and network processes associated with the inclusion, disconnection and operation of powerful consumers of electricity, etc. Accordingly, the asymmetry of information is only in favor of the manufacturer (supplier) of energy resources.

An integral part of energy consumption is to obtain a variety of energy services. Representatives of energy service companies know more than other market participants about the peculiarities of energy consumption. In particular, representatives of energy service companies have a positive asymmetric information in energy consumption when they install three-phase or two-phase electricity meters in residential premises. The majority of the population are not familiar with the parametric data of the electrical receivers used and cannot behave adequately in the event of problems in the provision of electricity.

Energy service contracts and contracts for energy services are dictated by one party. The parties to the contractual relationship on the part of energy production and supply have more information than on the consumption side.

The problem of “King Solomon” when the two parties to the transaction are equally informed about the transaction is practically not observed in the field of energy consumption. In any situation, a party has an information advantage and information discrimination will exist.

In modern conditions that is in the conditions of the development of digital energy, a single chain of digital and information systems, components and technologies is created with energy management systems. In such a situation, the level of information asymmetry is objectively reduced. And this is a positive development in the development of not only energy but also society.

Any manager should be able to increase the utility of information asymmetry in energy consumption that is the expected data from its use should be with a positive value. The process of energy consumption has a marginal product of energy supply as an additional volume of production obtained from the use of an additional unit of energy resources. If the information asymmetry has volatility, then this can instantly affect the indicator of the marginal product of energy supply.

To reduce the level of information asymmetry in energy consumption, it is necessary to take a number of measures both at the firm level and at the level of the industry and the state as a whole. Indicators that characterize the asymmetry of information should be available to company management.

Reducing the level of information asymmetry is achieved by protecting information, reducing the need for information, etc. In particular, the long-term view of the contractual relationship allows you to keep the information asymmetry at a stable level.

One of the ways to reduce the asymmetry of information in energy consumption is the active participation of the government in the regulation of the economy. Inadequate or erroneous information adversely affects the energy efficiency of production. However, competition, legislative decisions of the state can force generation and sales power companies to balance the asymmetry of information. Laws, decrees and orders increase the level of transparency in energy consumption.

At present, a legislative base is being formed in Russia aimed at creating conditions for the development of a system of intelligent energy (power) metering. The transition to a digital economy and industry 4.0 should take into account the asymmetry of information in energy consumption which has its own manifestations and significantly affects the effective functioning of any company.

However, in the course of the intellectualization of networks in the market there will be noticeable changes. In particular, the number of participants in the chain of transmission-sales-consumption will decrease. Interactive applications for smartphones and tablets are gradually launched where in remote mode, you can receive information from suppliers of electricity, heat and hot water about calculations, charges, fees, penalties. The consumer can transfer meter readings, get reference information and even find out information on charges all without operator participation. However, the use of informal rules and regulations in the activities of the company can veil any objective information.

Its role in changing the level of asymmetry in energy consumption is a temporary lag. Literally the meaning of

this term is lag. A lag is a time interval separating the effect of a phenomenon from an impact at a previous point in time. For various measures in energy consumption and energy saving correspond short or long lags. So, between identifying problems in the asymmetry of information in energy consumption and their solution may be several months or years. If the solution of problems is connected with the preparation and adoption of regulatory acts, then the asymmetry of information in energy consumption increases. This is especially, observed when setting prices and tariffs for the use of energy resources.

RESULTS AND DISCUSSION

Thus, as a result of the methodological analysis of the collected and studied scientific materials, it was found out that the role and importance of information and manifestations of its asymmetry should occupy a special place in the energy theory of the company. The study defines the essence of the concept of “information asymmetry in energy consumption” as a different level of equilibrium between the ownership of information by management and its accessibility to third parties in the process of using energy in different forms in the activity of a company.

Skillful management of information flow, namely the calculated definition of positive and negative manifestations of the asymmetry of information in energy consumption clearly affects the efficiency of the entire company. The positive side is the possession of complete information in the benefits of using alternative forms of energy. Moreover, the manifestation of information asymmetry can be long-term and short-term in nature. For example, received and late information about the status of energy receivers-technical means (machines, equipment, etc.) during the direct manufacture of products may be a sad one.

In the field of obtaining complete information about the possibilities of using various forms of energy, conditions are given to management, namely, raising the level of knowledge by the management of the company, especially, in the field of energy production technology, the accumulation of information about the potential of the company to use energy in the course of the company's activity.

In order to systematize financial and economic calculations of information asymmetry manifestations, its classification was carried out which allows evaluating all sorts of management decision-making options for energy consumption. Such, classification features as connectedness of energy consumption objects in a transaction, activities, accounting and measurement of

information, profitability for the company, causal relationships of the company's structural divisions in the energy consumption process, affecting the factors on energy consumption, the emergence of information asymmetry are highlighted. For all groups, the levels and content of information asymmetry manifestations in the firm's activities are determined.

Also, the results of the research include conclusions about the peculiarities of the asymmetry manifestations of information on the technical, technological, financial and economic fundamentals of the company. Technical and technological aspects are considered on three planes: connection to energy sources (networks), energy distribution and direct energy consumption. Difficult is the definition of the process of energy consumption by employee's in the course of employment in the company. According to the researchers in modern conditions, it is necessary to pay attention to the state of energy consumption of intellectual (mental) forces, energy, nerves and energy of physical forces of the company's employee's. The emergence of asymmetry information is associated with ignorance of data on the energy potential of an employee of the company. Financial and economic state of the use of information asymmetry is considered in the framework of determining the price (cost) of energy consumed, pricing, information about the probability of receipt of various events. Asymmetry of information in the field of energy prices occurs at all stages of energy pricing.

For the first time, the concepts of "the price of the total energy of the company", "the total amount of energy consumed by the company" are justified and proposed for use in scientific research and in the analysis of the financial and economic activities of a company. The effectiveness of the use of information asymmetry in energy consumption is directly reflected in the energy performance, energy intensity of products, the energy efficiency index of a company.

To assess the state of ownership of information asymmetry in energy consumption, a scale is proposed where the coefficient 0.1 indicates the minimum level of ownership and 1.0 indicates the maximum level. The coefficient can be used in various economic and mathematical calculations in determining the potential development of the company.

The researchers proposed judgments about the impact of automation and computerization in the power industry on the occurrence of additional risks and uncertainties in the field of information asymmetry.

The scientific results include the allocation of features of the manifestations of the asymmetry of information in energy consumption compared to the

market for finished products which mainly depends on an understanding of the essence of energy as a product of sale. The asymmetry of information is only in favor of the manufacturer (supplier) of energy resources.

Consideration of ways to reduce the asymmetry of information in energy consumption is supported by an analysis of the capabilities of a particular firm and the state. Transparency of information, long-term view of contractual relations may keep information asymmetry at an acceptable level. Regulatory decisions of state bodies can balance the asymmetry of information from generating and marketing power companies as they increase the level of transparency in the energy consumption of different forms.

Also, conclusions about the impact of network intellectualization on the energy market, the use of interactive applications for smartphones and tablets reduce uncertainty and risk in obtaining objective information about the energy consumed and contribute to the stability of sales companies.

CONCLUSION

In conclusion, it can be noted that in modern conditions of development of progressive relations, predetermined by the gradual introduction into the economy of the provisions of the Industry 4.0 concept, the search for information asymmetry in energy consumption is in demand for examining the activities of any company. Each institution is subject to transformation. The energy institutions (energy standards) are identified by the energy system (Burganov and Zalyalieva, 2014). The use of information asymmetry in energy consumption of any form creates additional opportunities for the development of the company and maintains a competitive position in its industry. Determination of the benefit of information asymmetry should be an integral part of the analysis of financial, economic and economic indicators of the company.

Future research: In the future, within the framework of this study, it is possible to more deeply analyze the impact of the introduction of the digital economy on reducing the asymmetry of information in energy consumption, to find a solution to determine the specific methodology for the cumulative study of the energy potential of technical equipment and company employee's. Due to the fact that this study mainly considers the general methodological and theoretical basis for the concept of information asymmetry in the energy theory of a firm, its future studies may study its branch features. Researchers will continue this research.

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