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International Functional Economic Accounting and Calculation of Energy by Equivalent on the BRICS+ Platform

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Abstract

According to the forecast of the International Energy Agency (International Energy Agency), global demand for electricity by 2040 will increase by 70%. The global energy production and distribution industry must be restructured. The solution to the problem will be the transition to energy efficient technologies and international functional accounting and calculation of all types of energy in terms of energy equivalent on the BRICS + platform using digital platforms.

Keywords: international functional calculation of energy, energy equivalent, BRICS+

1. Introduction

The modern international system of economic accounting and calculation of energy on the basis of unbalanced investment without correct consideration of supply and demand and existing natural energy resources does not rationally use them.

International functional economic accounting and calculation of energy based on the energy equivalent correctly determines the current indicators of natural resources at the global, state, industrial and individual levels, contributing to the creation and development of industries and services. There is a rational training of personnel for various sectors of the economy, industry and services. Reliance on the energy equivalent makes it possible to effectively solve environmental problems, take into account the balance of disturbance and restoration of the environment.

Functional unified international accounting and calculation of energy indicators helps to rationally conduct economic, industrial and social activities, states, enterprises and social institutions, taking into account population, and more effectively follow the path of development.

The international functional unified accounting and calculation of energy indicators, the exchange of experience and synergy in various fields of activity and industries will make it possible to achieve the stability of the world economy.

BRICS+ can serve as a launching pad for global functional economic accounting and calculation of energy based on the energy equivalent. The new technological system of BRICS+ functional platforms can become a world system and replace the existing automated international

platform for the economic calculation of energy and lead the world community to sustainable development and peaceful coexistence of all peoples, nations and ethnic groups.

The participation of the world community on the BRICS+ site will allow rationally conducting international functional unified economic accounting and calculation of energy based on the energy equivalent and form a sustainable economy for the rational use of natural energy resources and balanced investment. The BRICS+ technological platform will harmonize the production cycles of various areas of the economy and lead to a uniform and efficient energy consumption on an international scale.

When the BRICS+ technological platform becomes a pole of international economic attraction for various states, the problems of energy consumption will be promptly and rationally solved by coordinated execution at the level of states, industries and professional performers. Coordinated execution will ensure synergy of industrial production cycles at the international level (Evgeny Bryndin, 2021a; 2021b; 2023; Bryndin E. G., 2023).

Under conditions of peaceful existence and uniform energy consumption, international functional economic accounting and calculation based on the energy equivalent, rational use of natural resources, balanced investment and compliance with the conditions for self-healing of the environment will work effectively.

2. Energy Equivalent of Various Energies

Energy resources are of key importance in the economy. First, any processes in the manufacturing sector are associated with energy consumption. Energy costs permeate all spheres of material production, are the most important and integral part of both fixed and working capital. Secondly, energy resources today are scarce and determine the limits of economic development. Currently, much attention is paid to the issues of increasing the energy efficiency of sectors of the economy. For the implementation of programs to improve economic efficiency, the development of theoretical provisions and methodological foundations for the energy and economic assessment of production is of great importance. There is a variation in the value of equivalents of energy costs of production resources offered by standards for various types of energy. Considering the issues of energy in economic systems, there is no economic energy in the relevant classifications, however, experts consider it timely to single out such a category in the theory of economic development, moreover, this category fully corresponds to all economic indicators. The use of the energy equivalent allows you to move to a single measure of energy for all types. A single measure of energy makes it possible to move to a single international measure of energy for financial and economic international cooperation. The energy equivalent will be the stabilizer of the economic system.

The economic interests of all states in international cooperation can be provided by a single world economic energy equivalent. The transition to a single world economic energy equivalent can be made on the basis of a single measure of energy for all types of energy. The association of countries, the developing BRICS+ community, can become an international platform.

There are several types of energy: biochemical, electrical, magnetic, gravitational, mechanical, thermal, chemical, nuclear and other types. The energy of one system can generate the energy of another system according to the law of conservation of energy: how much energy of one type was spent, how much energy of another type was received. Each type of energy has its own unit of measurement. International standard measurement systems have been formed. The physical dimension and the ratio between units of measurement are determined. Units of measurement of energy in the SI system - joule, in the CGS system - erg. In the system of physical quantities LMT, each type of energy has its own dimension. The system of physical quantities LMT is a set of units of measurement for various types of energy, formed in accordance with physical principles. Equivalent ratios between units of measurement of various types of energy are determined. Equivalent ratios of units of measurement of various types of energy are determined experimentally in accordance with the law of conservation of energy.

A complete system of equivalent ratios of units of measurement allows you to introduce a single standard unit of energy, regardless of the type of energy. Equivalent ratios of units of measurement of various types of energy through pairs of ratios lead to a single standard unit of measurement for all types of energy

(Evgeny Bryndin, 2021a; https://kalkulator.pro/energy-conversion.html.). It is proposed to introduce a single standard measure of energy, as the base energy scale, **beg (base energy gauge).**

A single measure of energy expands and consolidates cooperation, a common vision and a single approach to all work situations is formed. A single measure will simplify the approach to the issues of international legal regulation. A single measure of energy will be an international unit of account for all types of energy and various natural energy resources on the energy scale **beg.** The transition to a single standard unit of measurement for all types of energy will simplify the standardization and certification system and make it more efficient and uniform on an international scale.

3. Functional Calculation of Natural Energy Resources on the Beg Scale

Energy supply is one of the most important functions that determines the level of development of any economic entity and the efficiency of its functioning. The study of its laws is required for the rational, efficient and timely formation and distribution of energy resources necessary for carrying out work on all cycles of production of products or services.

The efficiency of the use of energy resources characterizes the relationship between their quantity consumed in the production process and the quantity of goods and services obtained as a result of the use of these resources. An increase in the amount of goods and services that the national economy produces for a given volume of energy resources means an increase in the efficiency of resource use. Conversely, a decrease in the volume of production that is obtained from a given value of attracted energy resources indicates a decrease in the efficiency of their use.

Efficient use of energy resources involves achieving:

- rational use of energy resources;
- full volume of production.

The use of all available energy resources does not guarantee their efficient use. Full production should also be ensured. The full volume of production means that energy resources are used in such a way that they most fully meet the needs and demands of society. If the country's economy has not reached full production, it is said that energy resources are overused. The full volume of production is achieved in the presence of two types of efficiency — distribution and production. Every society with its limited energy resources is faced with the problem of their distribution between the production of a wide variety of products.

Energy functional assessment of the efficiency and optimization of the use of enterprise resources is the most objective according to the law of conservation of energy and the proportionality of mass and energy of the theory of relativity. E = mc2 can be considered as a measure of the total energy contained in a body with mass m. The value of E0 = m0c2 can be considered the rest energy — this is the total energy possessed by a body at rest. In this case, the kinetic energy will be equal to ΔE the change in total energy:

$$\Delta E = E - E_0 = c^2 (m - m_0) = c^2 \Delta m$$

One kind of energy goes into another, so one kind of relationship between kinetic energy and change in body mass can be generalized to all forms of energy. When the body energy changes by ΔE, the body mass changes by Δm. When the body mass changes by Δm, the total energy changes by ΔE.

The general indicator that determines the impact of the rational use of the enterprise's energy resources on improving their efficiency (E) will be the functional F, as an assessment of the impact of such parameters as the energy intensity of the energy resources available at the enterprise (K_1), the energy intensity of the resources used in the production of products (K_2), the energy intensity of natural energy resources (K_3), environmental energy intensity (K_4):

$$E=F \sum K_1^n; \quad (1)$$

where E is the efficiency of the rational use of resources;

K_n are indices characterizing the factors and their influence on the economic development of enterprises and industrial territory (n=1; 2; 3; 4;).

The assessment of the energy intensity of energy resources is carried out according to the principle of utility, according to their ability to satisfy the necessary needs of society, depending on supply and demand when they

are used for a certain period of time.

The functional calculation of the distribution energy intensity K is carried out according to the formulas based on the energy economic equivalent **beg**:

$$K = \sum_{i=1}^{N} K_i$$

$$K_j = E_j\, d_j(m)\ beg = M_j\, d_j(e)\ beg, \text{ где}$$

Ej is the energy intensity of resource i,

Mj is the mass of resource i,

dj(m) is the mass density of resource i,

dj(e) is the energy density of resource i.

The functional unit of energy economic equivalent beg can be used for energy and mass use.

The efficiency of distributive energy intensity means that energy resources are involved in the production of exactly those goods and services that are necessary for society. The full volume of production also implies the achievement of production efficiency, that is, the use of modern technology that ensures the maximum return on the attracted energy resources, the production of goods and the provision of services at the lowest cost.

Today, mechanisms are being developed for the joint use of various energy resources, which allows them to be used only to the extent necessary and only when it is really necessary. Non-production losses from inefficient use of energy resources can be minimized.

4. BRICS+ International Energy Platform

One of the main tasks of the BRICS+ international energy platform is to provide a reliable and affordable energy supply for all inhabitants of the planet. The symbiosis of base fuels with technologies that will be jointly developed, implemented and ensure the ecology of the environment, as well as renewable energy sources that give us zero emissions (Popova N. V., 2018; Arkhipova E. Ya., 2019; Bryndin E. G., 2023; V International Forum BRICS+, 2023). The mechanism on the basis of which this energy cooperation is carried out is the BRICS energy research platform, which was established in 2019. The results of the research will also find their application in practice and will be useful not only to the states of the association, but also to other countries, international organizations and major energy companies. All countries show great interest in new energy balance building solutions and new technological solutions.

BRICS+ already exceeds 40% of the energy balance and is in a leading position in several areas of energy development, the opinion of BRICS can become one of the determining factors in solving global energy issues.

The issue of energy efficiency is important. For several years, BRICS has had a working group in this area, within which countries actively exchange managerial and practical experience. The transition to an energy equivalent and international functional accounting and calculation of all types of energy will make it possible to achieve its efficient use.

The issue of sustainability of the fuel and energy complex is very important. First of all, this is the availability of energy, not only physical, so that it can always be used, but also economic, that is, decisions that are made in countries must be functionally justified. This is also a question of the stability of power supply, the consumer should not suffer from blackouts and interruptions.

When ensuring an uninterrupted supply of electricity in order to meet growing demand, one should not forget about the balance between a safe environment and access to energy.

Another interesting question is how the transport sector of the BRICS+ countries will develop, what will be the energy balance in meeting the needs of transport. There is an increase in electric vehicles, some focus on gas motor fuel, somewhere on hydrogen, somewhere on biofuel, and somewhere on a certain combination of all these solutions. For all countries, the issues of efficiency and accessibility of vehicles are relevant.

Currently, the BRICS countries account for about a third of global energy. By 2040, they will account for 40%. Their share in primary energy consumption will exceed 40%, and in production it will approach this mark.

Significant progress has been made in the BRICS+ countries in such areas as nuclear generation and renewable energy sources. It is expected that this dynamics will continue, and the significant growth that is predicted in the coming years will be provided by the BRICS+ countries. In the next two decades, quite serious, even cardinal changes await us. By 2040,

three-quarters of the total energy balance will be provided by fossil fuels; in the power industry, their role, naturally, will be somewhat lower. At the same time, clean energy resources, which include the atom and natural gas, will actually occupy half of the energy balance, and will provide more than half of the electricity generation.

Due to the growing consumption of various types of energy, its efficient use will be one of the problems in the energy sector. Efficient use of various types of energy is possible on the basis of its international functional accounting and calculation of the energy equivalent.

5. Conclusion

To create a better world for us and future generations, we need to change our understanding of energy, its generation, consumption, and distribution. We need a new, holistic functional approach to accounting, calculation and management of electricity. This is how BRICS+ sees the global energy system of the future. So far, from the proposed options for energy supply, it cannot fully meet all the needs of our civilization (Energy of the future, 2021). The energy problem of the planet can be solved by comprehensive measures at the BRICS+ platform. In some areas, it is more convenient to use wind power generation, somewhere — solar panels, and so on. But perhaps the main factor will be the reduction of energy consumption in general and the creation of energy-saving technologies. Each person must understand that he is responsible for the planet, and each must ask himself the question: "What kind of energy do I choose for the future?" Before moving on to other resources, everyone should realize that this is really necessary. With an integrated approach and international functional accounting and calculation of it in terms of energy equivalent, it will be possible to more effectively solve the problem of energy consumption at the BRICS+ site.

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