Interfax – ERA:
Ratings to save the Earth

Environmental and energy rating Agency "Interfax-ERA" has created and operates a simple and universal system of criteria for sustainable development, which allows to diagnose and monitor the sustainability and crisis states of countries, regions, industries, companies and enterprises. There has always been a need for an objective assessment of the nature of development, but in times of crisis the criteria and feasibility of such monitoring are particularly acute.

That is why, in frames of the campaign "Open reporting in the Year of Ecology!" the Russian government approved the Concept and plan for the development of public non-financial reporting, and at the end of the Year of Ecology (December 30, 2017) submitted for discussion the draft of Federal Law on Public non-financial reporting. Environmental reporting disclosure and ratings inevitably become the norm of socially responsible business.

Almost 20 years ago, the Project of the Global Environmental Fund "Biodiversity Conservation" was launched in Russia. Its strategy was to include all sectors of society – from the army to the Church and business - in nature protection. In early 2000 we gave business a "carrot" ("Nature and Profit" - a Guide for Children and Ministers for environmentally responsible business) and "whip" ("13*13*13" - Environmental ratings of companies, regions, industries). From brochure "13*13*13" the new ERA a in the development of the Russian system of environmental ratings has started. It covered thirteen companies, thirteen branches of industry and thirteen regions, the environmental performance of which in 2000 was compared and ranked.

Data

The source of data for the very first ratings was the state statistics of environmental impacts, structured by industry and region. Then the questionnaire which began to send on constantly increasing circle of the enterprises and the companies was created. The first company that responded to the questionnaire was Slavneft, it began to catch up the others.

The format of the questionnaire has not changed for almost 10 years, which allows to adequately analyze the long-term dynamics of indicators. The one-page questionnaire is maximally adapted to the Russian system of production statistics and the level of professional qualification of ordinary employees of enterprises, and the indicators present in the current forms of mandatory statistical reporting are taken as a basis, with the necessary clarifications reflecting the industry specifics and experience of correcting the most common mistakes. To minimize the "manual" filling of basic questionnaires, we strongly asked to use the electronic version posted on the website http://interfax-era.ru/, and send it by email.

At the start, our team was called an Independent Environmental Rating Agency. We always widely published our methodology (for example, https://www.interfax-era.ru/metodologiya/kniga) and our example could be followed by other teams. But this did not happen, although we hoped for it. Today the original, simple technique has grown

to unique computer technologies for checking and balancing data, (which always have a lot of errors), what made our calculations and estimations highly reliable.

Methodology

The pragmatic basis for identifying the material (as opposed to financial efficiency of companies in the real sector) is the considerations that at the intensive stage of civilization development it is necessary to apply criteria, that reflect not the gross volumes, but the ratio of "useful work/useful products" to all the processes, for which resources and primary energy are spent.

If ***E*** – is total volume of Substance-Energy for system operation, ***P*** – is the volume, contained in the final products, and ***I*** – is the residual Substance-Energy, released into environment in the form of anthropogenic Impacts, the classical efficiency = P/E. If the amount of wastes, disturbed land, car exhaust, sewage, gas plumes of pipes is divided by the total amount of energy consumed (I/E), then we get a measure of inefficiency or a kind of coefficient of harmful action of the production system. The minimal transformation of these proportions gives two criteria: ***Energy Efficiency***=P/(I•E) and ***Technological Efficiency***=E/I.

In several years, the ranking on energy-resource and technological efficiency was supplemented by ranking on the ***Transparency*** of companies (can be considered as social efficiency), calculated by the percentage of completed questionnaire items, as well as performance dynamics indicators.

Later, for the first time in the world practice, an indicator of ***Ecosystem efficiency*** was added to the evaluation criteria, which measures the impact of the enterprise on the natural environment, taking into account the current state of the region's ecosystems and, accordingly, their ability to absorb the harmful effects of economic activity.

In the overall ranking, the places are defined as the arithmetic mean of the places in each of the five thematic ratings, while the positions in the thematic ratings are also published on the Interfax-ERA site.

Tools

The specifics of our data processing method is that we can accurately calculate the approximate indicators for those enterprises, that do not respond to requests and do not publish information about their impact on the environment in open sources. Such enterprises are also included in the rating list, but their estimates are published on lines drenched in gray, which – judging by the reactions – is not too pleasant to the management and often stimulates the disclosure of environmental and energy information.

The module of primary checks clears numeric fields from non-numeric characters, checks the format of the questionnaire, the presence of the necessary attributes of the enterprise identification, the balances of consumption-loss-supply to the side by energy components, reduces the dynamics of physical volumes of production from several types of products to percents to the last year. Data, standardized by measurement units, balanced, free from errors or recording features, equipped with all the necessary attributes, are transmitted as an array of values to an automated database for verification by a qualified expert.

In this case, the identified inaccuracies and errors, both technical (typos, mixed units of measurement) and semantic (not this technique, skipping the components of the whole, double counting), based on a comparison with the data set for the past years and the nearest analogues are diagnosed and, before issuing to the expert for editing, are appropriately marked.

The calculation of statistically probable values of missing indicators for each enterprise is based on calculation of energy-resource proportions in the group of its closest technological analogues. The work is carried out in two stages: first, the selection of the best analogue, then, with its use – the calculation of the value of the exponent by power regression ($y = a \cdot x^b$) better than other linking the dynamics of this indicator (function y) with the dynamics of the other, which acts as an argument x.

In order to optimize the processes of calculations, the next step is to balance the energy consumption values (removing errors that occur when filling gaps). This operation is carried out, firstly, for enterprises by fuel types, and secondly, for holdings in case of discrepancy between the total energy consumption and the sum of the indicators of their individual participants.

An important problem at the initial stage of processing is the correctness of comparisons of parametrs, given in different units. We use a semantic approach to slve this problem. For comparisons of various parameters expressed in their own units of measurement, the data for each indicator is divided by the sum of the values for the entire sample, which is implemented for all primary indicators presented in the database. As a result, data with different units and different ranges of the *absolute scale* are expressed in common units, and their values can be directly compared with each other. For this purpose:

♦ For each of the 30 **P** indicators for the entire sample of N=5735 enterprises, the amount for the last year is considered: $\boldsymbol{S} = \sum_{i=1}^{N} P_i$

♦ Each element $\boldsymbol{p_i}$ of the indicator data series is divided by this amount and expressed as a percentage:

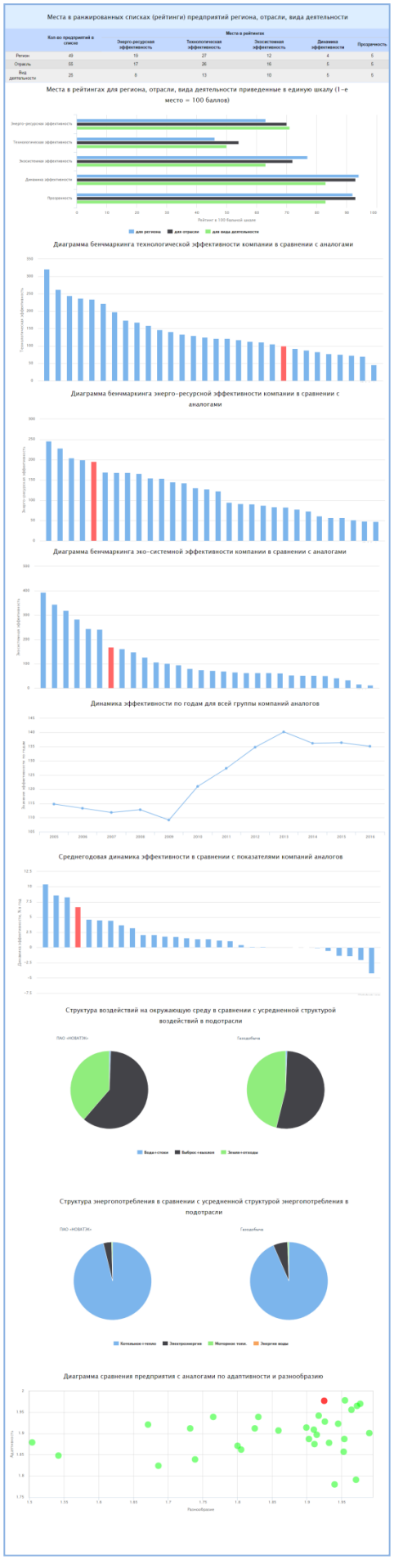
$$\boldsymbol{P_{\%}} = \frac{\boldsymbol{P_i}}{\sum_{i=1}^{N} \boldsymbol{P_i}} \cdot \boldsymbol{100}$$

As a result, all indicators expressed in tons, rubles, cubic meters, hectares or joules are reduced to a comparable form, which allows them to be directly compared. For example, the integral index of environmental impact is determined (can be determined) by adding the percentages for water intake, waste water discharge, emissions, size of exhaust, the amount of waste and the area of occupied lands.

Assessing trends in the changes of efficiency require the same measurements, made at sufficiently long intervals of time. The long-term array of identical indicators allows to solve this problem. For rating purposes it is necessary to reflect the dynamics in one numerical value, but the values for different pairs of years vary greatly (including changing the sign). To integrate the values of efficiency dynamics, a formula is used that takes into account all the year-to-year ratios of "all to all" for 11 years. This calculation allows to combine both short-term and long-term trends through the relations of the initial and final members of the series in one value. According to this formula, two dynamics are included: Eco-energy efficiency and Technological efficiency, from which the geometric mean is taken for the final rating.

Analytics

Calculated (numerical) results for each of 5735 (in 2018) evaluated enterprises, are visualized in order to produce images that eflect the interrelations and positions of the analyzed objects in the best way. For each company on the Interfax-ERA website https://www.interfax-era.ru/ a table showing its location not only in the overall sample, but also in a specific industry, sub-sector, region of activity is presented. The table also shows the number of companies in each sample within which the ranking is performed according to the corresponding criterion. Additional visualization of ranking results in different samples is made in the form of a chart of places converted into a 100-point scale (1 place in the sample = 100), occupied by the company in the industry, region and type of activity (sub-sector) for each of the five criteria of the fundamental efficiency rating. Below are three diagrams (for technological, energy-resource and ecosystem efficiency), which reflect the position in a number of 30 closest analogues of the company. These are benchmarking charts that rank analogues of performance growth, where the column corresponding to the position of the company is highlighted in red. The visual range is continued by the graph of efficiency dynamics for the whole group of technological analogues for 11 years and the diagram of average annual efficiency changes (+/– % per year) for all 30 analogues, with the allocation of the column characterized by the enterprise in red. The first pair of pie charts gives an idea of the differences between the company's structure of environmental impacts and the average for the sub-sector to which it nominally belongs. The second pair of structural diagrams is based on the same principles, comparing the structure of energy consumption in the industry and on the characterized enterprise (company).



The final chart in the block of individual infographics of companies and enterprises requires special comment. This diagram describes the information and structural features of production systems using indicators of adaptability and diversity.

The structure of the systems can be described through the flows of consumed resources, energy, labor costs, production and waste generation, effluents, emissions of different types. The ratio of these flows allows us to calculate the diversity (the number of combinations generated from the elements of different types available in the system) and adaptability (the number of potentially possible combinations that the system can generate by changing the ratio of elements of different types while maintaining at least one element of each type and the total sum of elements). The number of potential combinations

depends on the variety of elements nonlinearly: the greatest number of potential states have not the most diverse systems, but those in which there is a "balance" between diversity (structural factor) and monotony (extensive factor). Balance is a measure of the viability (stability) of the system, including external stresses or internal crises of development. The crisis is an important phase in the development of any system, in fact it is the transition of the system from one stable state to another. In a crisis, the system is most subject to the general laws of development and changes almost always in those directions to which it is predisposed in structure. These dispositions in the trajectories of crisis changes of systems with different ratios of adaptability and diversity, is shown in the final diagram for each company.

See more information at https://www.interfax-era.ru/