Article

Methodology for an Audit of Institutional Projects in the Energy Sector

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Abstract: Auditing activity, in the last decade, is one of the most dynamically changing types of economic activity, on the one hand, due to an increase in the number of state projects implemented by many countries, and on the other hand, due to technological innovations and digitalization. Russian auditing practices are also being actively reformed. For example, the Ministry of Energy is updating their audit methodology. The subject of this study is to ensure the efficiency of spending public funds for the implementation of strategic projects. The object of this study is the methodology of a state audit. An analysis of the currently used Russian and international standards for public audits shows that there are many opportunities to improve the methodology for conducting financial, strategic and performance audits. First of all, there is a need to solve methodological problems in monitoring the efficiency of investment developments, since partnerships between private investors and government bodies for the implementation of strategic projects have expanded. The main difficulty of audit methodology is the definition of a system of target criteria in long-term projects. Quite often it is difficult to determine the main expected result, for example, financial, or social efficiency or the adequacy of multi-unit tariffs. All these circumstances determine the relevance of methodological changes. The aim of this study is to develop a new audit methodology as, first of all, a management technology. We use a result-oriented approach that is based on the developed system of indicators, to evaluate the effectiveness of an institutional project and to evaluate the effectiveness of environmental costs and technological innovations to reduce anthropogenic emissions and to create a single Asian energy space.

Keywords: state audit; climate policy; institutional projects; modeling; energy

1. Introduction

The COP26 international climate conference in Glasgow, held in November 2021, showed how difficult it is for the world community to reach agreement on a number of key issues, in particular, on the decommissioning of coal-fired generation facilities, the need to reduce methane emissions and deforestation. However, significant progress has been made on some important areas of climate policy that have been neutralized by sanctions. For example, there is an agreement on the mechanisms for international carbon trading under Article 6 of the Paris Agreement, which is expected to lead to increased interactions between countries to achieve climate goals. Despite the global trend towards increased electricity generation from renewable energy sources (RESs), fossil fuels account for more

than 80% of the world's primary energy consumption. The sharp increase in gas prices in Europe in 2021 clearly indicates that the dependence of industrialized countries on fossil energy resources remains high.

The Russian Federation has implemented 14 national projects (programs) in various areas: demography, health, education, housing and the urban environment, ecology, safe and high-quality roads, labor productivity and employment support, science, digital economy, culture, small- and medium-sized businesses and support for individual entrepreneurial initiative, international cooperation and export [1,2]. Each national project consists of a number of federal, regional and institutional projects aimed at achieving national development goals. The system of project management of budget expenditures in the Russian Federation consists of the following elements:

1. National projects that ensure the achievement of priority areas for accelerated development.
2. Federal projects as part of national projects that ensure the achievement of goals, objectives and target indicators of national projects.
3. Federal projects outside of national projects, ensurng the achievement of other indicators on behalf of the President, the Government of the Russian Federation.
4. Regional projects that ensure the achievement of goals, objectives and target indicators of national projects in the areas of jurisdiction of the constituent entities of the Russian Federation.
5. Institutional projects that ensure the achievement of goals, objectives and target indicators of departments.

The Ministry of Energy is implementing four strategic projects "Digital Energy"; "Unified Technical Policy—Reliability of Electricity Supply"; "Improving the Processes for Collecting, Processing, Storing and Using Information Resources of the Fuel and Energy Complex and Development of the State Information System of the Fuel and Energy Complex"; and "Organization of project activities in the Ministry of Energy of Russia", which are being implemented as part of the national project "Digital Economy of the Russian Federation", adopted by the Russian government in 2017 [3–7]. These projects have caused changes in the methodology of a state audit of budget spending.

One of the main requirements for the methodology is the definition of criteria for efficiency, productivity and effectiveness. The auditor should communicate, in a transparent manner, assurance regarding the outcome of the audit in relation to the subject matter. In addition, it is very important to form a conclusion that the results are based on sufficient and appropriate evidence. If there is any error in the evidence, the results and conclusions will also be erroneous [8]. New technology is based on mathematical modeling of investment dynamics.

As part of this study, scientific articles by authors who have studied audit (control) issues of project activities have been analyzed [9–15]. By analyzing the standards of project activities, it can be noted that the generally accepted international methodologies PMBoK and PRINCE2, despite some fundamental differences in individual stages of projects, contain requirements for monitoring their implementations and the need to know all risk factors. The authors of [16] identified high-quality planning and consistent monitoring at all stages of project implementation as key factors for the success of project activities. The author of [17] pointed out the need for qualitative selection of projects during their initiation. The importance of good planning as an analytical basis for evaluating the results of each project was emphasized in [18]. The authors in [19] noted that public projects are complex structures that require too many criteria, which sometime contradict each other; and therefore, create difficulties in assessing the quality of their implementation and achieving the final goals. Some authors have emphasized the need to determine the contribution of the project to the achievement of national development goals [20]. The work by [21] was devoted to the issues of project activities in the energy sector.

2. Materials and Methods

A systems-oriented approach, according to GUID 3910, Article 54, is an approach that does not primarily focus on public policies or goals, but focuses on properly functioning governance systems as a condition for effective and efficient public policies. During the process of developing the audit methodology, provisions to consider include the regulatory legal acts and methodological documents in the field of project activities, INTOSAI international standards and other internal regulatory documents used by the Accounts Chamber of the Russian Federation in the process of controlling state property.

The audit of institutional projects should cover the following issues:

- The purpose of the system;
- Responsible participants;
- Responsibilities of each participant;
- The rules, regulations and procedures that will matter;
- Relevant information flows.

In addition to the questions specified in GUID 3910, the following is advisable:

- Identification and analysis of the tasks to be solved by the project;
- Identification of executors and beneficiaries of the project;
- Analysis of the transformational mechanism of the project;
- Assessment of the sufficiency of resource support for the implementation of the project and the validity of the distribution of resources for project activities;
- Analysis of the quality of planning project targets;
- Checking of the compliance of the project passport with the established requirements for the project development procedure;
- Checking of the implementation of project milestones;
- Checking of the implementation of project activities;
- Assessment of the achievement of project targets;
- Analysis of the quality of project implementation;
- Evaluation of the cost effectiveness of the project implementation [22].

The identified tasks to be solved by the project should be ranked according to the degree of technical and financial significance, with the assignment of weighting coefficients, which are determined by the internal audit standards of the self-regulatory organization of auditors (SRO) working with energy companies on institutional projects. For each project, a goal is identified and a network of interrelated tasks is formed that form a network graph, as well as a list of criteria for monitoring managerial impacts. The network graph (or goal tree) assumes that all elements are distributed over resources and over time. Each task (or event of this graph) has different technical and financial characteristics (Figure 1).
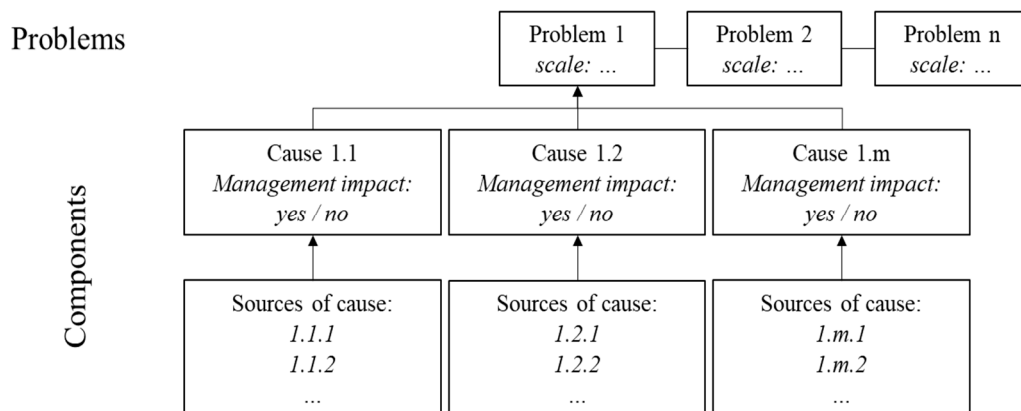

Figure 1. "Network graph" of the tasks to be solved within the framework of the national project, compiled by the authors.

A "task tree" is the basis for the subsequent analysis of the content of an institutional project using the criterion of completeness of coverage of all tasks and their components by the tasks set in the project. If the project tasks are not aimed at eliminating individual causes of tasks that can be managed, this is qualified as the cause of the risk of not achieving the project goals. The "task tree" as a tool is widely used in the choice of investment alternatives, in the tax control of affiliated persons.

The information necessary to build a "tree of tasks" is formed on the basis of regulatory legal and methodological information, official statistics, results of scientific research, the results of previously conducted control and expert analytical activities on the analyzed topic and information obtained during their implementation.

In addition, based on a comparison of the "reference" and actual parameters of a project, an analysis of its transformational mechanism is performed: An assessment is made of the coverage of the identified tasks and components by the project activities as a whole and in the context of activities that can be adjusted taking into account the conclusion that the expected results (project activities) correspond to the identified tasks. An analysis of the sufficiency of resource support for the implementation of the project and the validity of the distribution of resources for individual activities is performed.

The results of the analysis are summarized in the form of a roadmap or project results map (Figure 2).
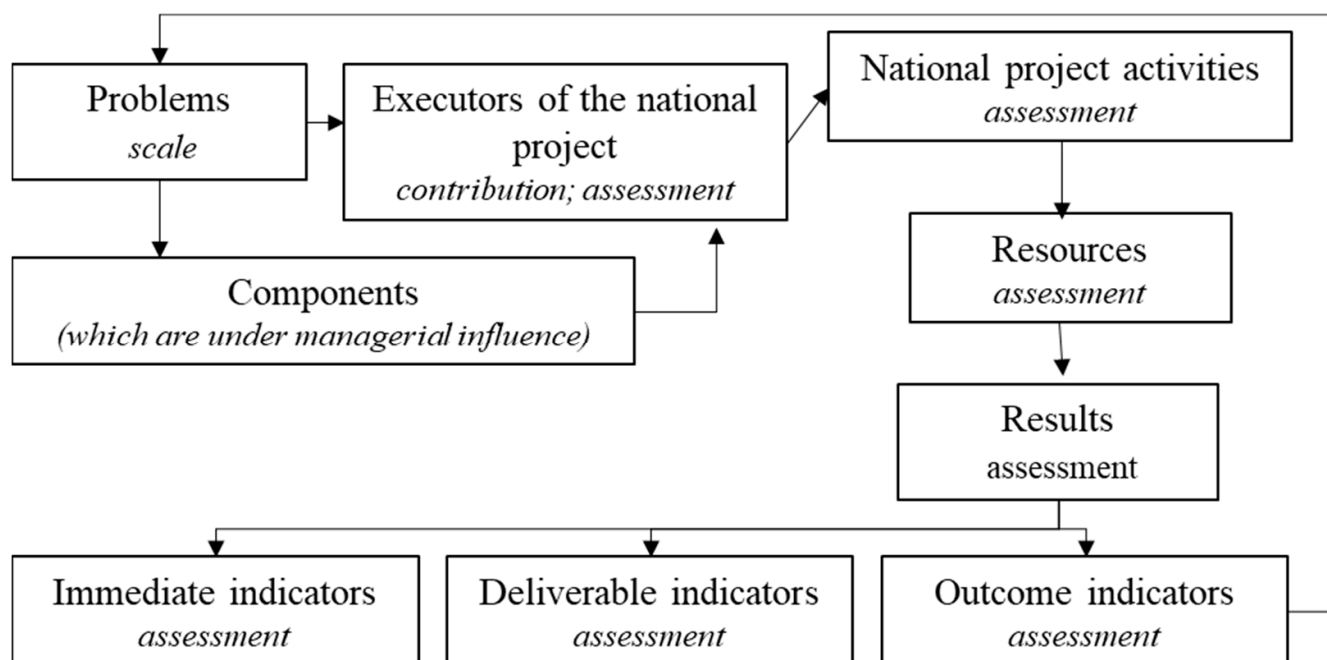

Figure 2. Map of the results of the project.

On the basis of the project results map, an analysis of the quality of planning a project's target indicators is performed according to the following criteria: compliance of the target indicators with the goals and objectives of the project; consideration of the ability of performers to exert managerial influence on the solution of identified tasks when planning the values of target indicators; consideration of the resource constraints of the project when planning the values of target indicators; completeness of the reflection of the expected results in the context of indicators of immediate results, indicators of final results and indicators of the final effect.

Such an in-depth and complete analysis of the formation of a project will allow, in the future, an evaluation of its implementation not only from the point of view of the achievement of milestones, activities and indicators of cash execution for budget expenditures, but also from the point of view of the expected contributions to the achievement of national

development goals of the country. One of the key conditions for implementing a promising approach to a project audit is a high level of digitalization of control and analytical activities. A systematic approach, automation tools and integration with government information systems will ensure sufficient coverage and relevance of information for analytical work within the framework of the project audit. Thus, in-depth systemic analyses of the formation and implementation of projects, aimed at assessing the expected achievement of national development goals, is of great importance in the professional activities of state auditors [23–25].

The main directions for the methodology of a state audit of institutional projects are defined as:

(1) An audit of the formation of the project (determination of the limit of capital investments and financial performance indicators);
(2) An audit of the project implementation (control of the distribution of resources and work in time).

The audit of project formation includes several stages, which are presented in Table 1.

Table 1. Audit of the formation of an institutional project.

No	Audit Stages	Content of Audit Procedures
1	Identification and analysis of the tasks of the region, which the project is aimed at solving	An indicator of the distribution of resources between the project executors in terms of their potential contribution to the solution of each task
2	Identification of performers, investors and beneficiaries	The coefficient of involvement of investors and performers in the solution
3	Analysis of the transformational mechanism of the project	Distribution of weighting coefficients of tasks between the activities of the institutional project with the assumption that they fully cover each identified task.
4	Creating a project results map	The works are adjusted in accordance with the coefficients of sufficiency of the resource provision for the implementation of the institutional project and the coefficients of coverage of tasks and components by the activities of the institutional project in the context of activities.
5	Analysis of the quality of planning indicators	The quality factor of planning the targets of the institutional project.
6	Checking the compliance of the project passport with the established requirements	The quality coefficient of the project passport compilation.
7	Summary assessment of the quality of project formation	Summary coefficient of the quality of project formation.

Source: compiled by the authors.

The methodology for auditing the implementation of institutional projects provides for the sequential implementation of two stages of the state audit in accordance with the recommendations of INTOSAI includes:

(1) Analysis of the achievement of the expected results of the project (Table 2);
(2) Evaluation of the effectiveness of the project.

Table 2. Recommended methodology for analyzing the achievement of expected results of an institutional project.

Indicator	Formula
Assessment of project milestones (Q).	$$Q = \frac{Q_f}{Q_p},$$ where Q_f—actual number of milestones completed within the established time limit at the end of the reporting period; Q_p—number of milestones planned for the reporting period.
Achievement of project target indicators P_i	$$P_i = \frac{P_i^f}{P_i^p},$$ where P_i^f—actual value of the i-th indicator at the end of the reporting period; P_i^p—planned value of the i-th indicator, set for the corresponding reporting period.
Achievement of immediate target indicators ($P_{\text{immediate}}$)	$$P_{i(\text{immediate})} = \frac{\sum_{i(\text{immediate})}^{n1} P_{i(\text{immediate})}}{n1}$$ where $P_{i(\text{immediate})}$—assessment of the achievement of the i-th target indicator of immediate target indicators; $n1$—number of immediate target indicators.
Achievement of deliverable target indicators ($P_{\text{deliverable}}$).	$$P_{i(\text{deliverable})} = \frac{\sum_{i(\text{deliverable})}^{n2} P_{i(\text{deliverable})}}{n2}$$ where $P_{i(\text{deliverable})}$—assessment of the achievement of the i-th target indicator of deliverable target indicators; $n2$—number of deliverable target indicators.
Achievement of outcome target indicators (P_{outcome}).	$$P_{i(\text{outcome})} = \frac{\sum_{i(\text{outcome})}^{n3} P_{i(\text{outcome})}}{n3}$$ where $P_{i(\text{outcome})}$—assessment of the achievement of the i-th target indicator of outcome target indicators; $n3$—number of outcome target indicators.
Final assessment of the achievement of target indicators (P).	$P = \min(P_{\text{immediate}}; P_{\text{deliverable}}; P_{\text{outcome}}) \times P'$, where P'—full data ratio to assess the achievement of target indicators, calculated as the ratio of the number of target indicators for which actual data on implementation is available to the total number of target indicators set in the national project.
Assessment of national project expenditures R_j	$$R_j = \frac{R_j^f}{R_j^p},$$ where R_j^f—actual volume of expenditures from the j-th source to implement the national project at the end of the reporting period; R_j^p—planned volume of expenditures from the j-th source to implement the national project at the end of the reporting period;
Final assessment of expenditures from all sources to implement the national project (R).	$R = \frac{\sum_j^{n4} R_j \times v_j}{n4}$, where v_j—volume of the j-th source; $n4$—amount of sources.

3. Results

The world is witnessing a change in trends in climate policy, a reorientation of export flows of energy resources and an expansion of investors in state energy financing programs in accordance with the concept of a multipolar world. An analysis of the methodology for

auditing projects in the energy sector, both in the public administration sector and in the corporate sector in many countries, makes it possible to determine common methodological approaches for its implementation. In general, the audit of projects should be primarily aimed at identifying inefficient activities and projects. To do this, it is important to define key performance criteria during the planning stages. This procedure is recommended by all internal auditing standards and the INTOSAI recommendations. Then, benchmarking is appropriate—project management practices are generalized, systematized, and risks are identified and assessed. In Russia, there are now 18 self-regulatory organizations of auditors operating in the energy sector in different geographical areas, which form internal standards for assessing the quality of management and provision of goods in the energy sector.

In connection with the spread of the illegal practice of nationalization and the withdrawal of investments and property, there is a need to establish legal documents and obtain guarantees and pledges to pay off debts. Modern digital technologies expand the possibilities of modeling the relationship between resources and the properties of all types of beneficiaries, since an energy product can now be a multicomponent product and the created energy product can now be stored (this was not possible before). In a state audit of projects, the assessment of quality planning of needs is of key importance. Currently, for example, in Russia, China and Australia, the process of identifying consumers is being conducted. Energy consumers have changed the structure, volumes of consumption and requirements for energy resources. It is the analysis of needs in terms of strategic goal setting, reliability, safety and the optimal distribution of resources over time that makes it possible to implement an integrated approach.

The first stage of the recommended methodology for auditing an institutional project is to identify and analyze the tasks that the project is aimed at solving. The result of this stage is the construction of a "task tree" (Figure 2).

The indicator of the distribution of resources between the project executors in terms of their potential contribution to the solution of each task is defined as:

$$\sum_{i=1}^{n} V_i = \sum_{g=1}^{m} C_g^l = 1 \tag{1}$$

where V_i is the weighting coefficient of the i-th task and is the potential contribution of the g-th executor to solving problems.

At the second stage of an audit of the formation of an institutional project, the executors, investors and beneficiaries are identified by sectors of the economy. The list of performers is determined on the basis of a competition; in Russia and China, this competition is held in the form of a state order. In Russia, often in energy projects, you can find a mixed form of ownership and a wide variety of investors. Therefore, now they take into account the coefficient of involvement of investors and performers in solving problems:

$$E_1 = \frac{\sum_{k=1}^{m} C_g^p}{\sum_{k=1}^{m} C_g^l} \tag{2}$$

where E_1 is the coefficient of investment participation;

- planned contribution of the g-th performer to the solution of the task;
- the potential contribution of the g-th performer to the solution of the tasks set.

The individual coefficient of a performer's involvement in solving tasks is:

$$E_1^g = \frac{C_g^p}{C_g^l} \tag{3}$$

where E_1^g is the coefficient of involvement of the g-th performer in solving the task, C_g^p is the planned contribution of the g-th executor to the solution of the planned task, C_g^l is the potential contribution of the g-th executor in solving the problem.

The list of project executors is correlated with the "task tree" in order to determine the potential contribution of executors (individual organizations) to the solution of the identified tasks (E_i). When calculating the potential contribution, only those components of the tasks that have the ability to exert managerial influence are taken into account.

The list of project beneficiaries should be strictly regulated. The choice of performers should be based on an analysis of the achievements of the performers, the results of previously implemented projects and expert analytical activities on the subject under analysis.

Based on the list of beneficiaries of the project and the "task tree", certain needs are correlated with the tasks, activities and results.

The quantitative indicator of the second stage of an audit of an institutional project is the coefficient of involvement of performers in solving the tasks set (E_i), which, if necessary, is adjusted taking into account the conclusion that the project can satisfy the needs of all groups of beneficiaries by the value (ki):

- Equal to 1, if it is concluded that the institutional project can meet the needs of all groups of beneficiaries;
- Equal to 0.85, if it is concluded that the institutional project has a limited ability to meet the needs of all groups of beneficiaries;
- Equal to 0.7, if there are doubts about the possibility of an institutional project to sufficiently meet the needs of all groups of beneficiaries.

Based on the results of identifying the executors and beneficiaries of a project and the analysis performed, the reasons for possible failures are determined, as well as the ability of the institutional project to sufficiently satisfy the needs of all groups of beneficiaries, for which individual coefficients of involvement of executors in solving the identified tasks (E_i^g) are calculated. The coefficient (E_i^g) if necessary, is adjusted by the value (E_i^g), taking into account the conclusion that the institutional project can satisfy the needs of all groups of beneficiaries, similarly to the order determined for the coefficient of involvement of performers (E_i).

At the third stage of an audit of the formation of an institutional project, an analysis of the transformational mechanism of the project is performed. To do this, task weights (V_i) are distributed among the activities of the institutional project with the assumption that they fully cover each identified task. The distribution of task weights (V_i) between institutional project activities, assuming full coverage of each identified task, is:

$$\sum_{i=1}^{n} V_i = \sum_{j}^{n'} S_j^l = 1, \tag{4}$$

where V_i is the weighting factor of the *i*-th problem and S_j^l is the value of the full coverage of the tasks by the *j*-th event.

The coefficient of coverage of the task components by the activities of the institutional project is:

$$E_2 = \frac{\sum_{j=1}^{n'} S_j^p}{\sum_{j=1}^{n'} S_j^l} \tag{5}$$

where E_2 is the coefficient of coverage of tasks and components by the activities of the institutional project, S_j^p is the planned coverage of the *j*-th event of tasks and components, and S_j^l is the complete coverage of the *j*-th event of tasks and components.

In order to correlate the tasks, activities and expected results of the implementation of the institutional project with the "task tree", an expert assessment is performed:

✓ Coverage of the identified tasks and components by the activities of the institutional project;
✓ Compliance of the expected results of the institutional project with the identified tasks.

Based on the results of the assessment, the coefficient of coverage of the identified tasks and components by the activities of the institutional project (E_i) is calculated, which, if necessary, is adjusted, taking into account the conclusion that the expected results of the national project correspond to the identified tasks by the value (ki):

Equal to 1, if it is concluded that the expected results of the institutional project correspond to the identified tasks;

Equal to 0.85, if it is concluded that the expected results of the institutional project meet the identified tasks in a limited way;

Equal to 0.7, if there are doubts about the compliance of the expected results of the institutional project with the identified tasks.

Based on the results of the analysis of the transformational mechanism of the institutional project, the reasons for the failure to fully cover the identified tasks and components by each activity, as well as the discrepancy between the expected results of the national project and the identified tasks, are determined, for which the coefficients for covering the identified tasks and components by the activities of the institutional project in the context of activities E_j^2 are calculated. The coefficient E_j^2 is adjusted, if necessary, by the value k_j^2 taking into account the conclusion that the expected results of the project correspond to the identified tasks in the order determined for the coefficient ($k2$).

At the fourth stage of an audit of the formation of an institutional project, the results of the previous analysis are summarized in the form of a project results map in order to establish:

Sufficiency of resource support for implementation of the institutional project;

The validity of the distribution of resources for the activities of the national project.

The sufficiency of resource support for implementation of the national project is determined based on the number and content of the activities of the institutional project with the assumption that they fully cover each identified task (V_i).

The sufficiency of collateral can be assessed using several coefficients:

$$E_3 = \frac{\sum_{j=1}^{n'} C_j^p}{\sum_{j=1}^{n'} C_j^l} \tag{6}$$

where E_3 is the coefficient of sufficiency of the resource provision for the implementation of the national project, C_j^p is the planned amount of resource support for the implementation of the j-th event of the national project, C_j^l is the required amount of resource support for the implementation of the j-th event of the national project.

The following is the coefficient of sufficiency of resource provision for the implementation of the j-th event of the institutional project:

$$E_3^j = \frac{C_j^p}{C_j^l} \tag{7}$$

where E_3^j is the coefficient of sufficiency of resource support for the implementation of the j-th measure of the institutional project, C_j^p is the planned volume of resource support for the implementation of the j-th measure of the institutional project, and C_j^l is the required amount of resource support for the implementation of the j-th measure of the institutional project.

Based on the results of assessing the planned cost of the activities of the institutional project, the coefficient of sufficiency of resource support for the implementation of the institutional project (E_3) is calculated, based on the results of which, in order to determine the reasons for the insufficiency of resources, the corresponding coefficients are determined in the context of the activities of the institutional project (E_3^j). The validity of the distribution

of resources for the activities of the institutional project implies the maximization of the coefficient (E_3^j) depending on the weighting coefficients (V_i).

In order to determine the validity of the allocation of resources for project activities, the activities are ranked by the weighting coefficients of the tasks to be solved by the corresponding activities. If the values of the coefficients (E_3^j) do not reflect the resulting distribution, a conclusion is made about the unreasonable distribution of resources among the activities of the institutional project.

The residuality coefficient of resource support for the implementation of the institutional project, if necessary, is adjusted by the value (k3):

Equal to 1, if a conclusion is made about the reasonableness of the distribution of resources for the activities of the institutional project;

Equal to 0.85, if it is concluded that the allocation of resources for the activities of the institutional project is insufficiently justified;

Equal to 0.7, if there are doubts about the validity of the distribution of resources for the activities of the institutional project.

The coefficient (E_3^j) in relation to individual activities of the institutional project, taking into account the conclusion about the reasonableness of the distribution of resources for the activities of the institutional project, is not adjusted.

At the fifth stage of an audit of the formation of a national project, based on the results map of the national project, an analysis of the quality of planning the target indicators of the national project is performed.

The institutional project target planning quality factor (E_4) is the sum of the following four criteria:

- Compliance of target indicators with the goals and objectives of the project (weight 0.25);
- The ability of performers to exert managerial influence on the solution of problems when planning the values of target indicators (weight 0.25);
- Availability of resource limitations of the national project when planning the values of target indicators (weight 0.25);
- Completeness of reflection of the expected results in the context of indicators of immediate results, indicators of final results and indicators of the final effect (weight 0.25).

Based on the analysis, the value of the quality factor for planning the target indicators of the institutional project (E_4) is determined as the sum of the above four criteria.

At the sixth stage of an audit of the formation of an institutional project, the compliance of the institutional project passport with the established requirements for the procedure for developing institutional projects is checked, as well as checking the timely updating of the project passport. The project passport quality factor (E_5) is:

- Equal to 1, in the absence of significant comments on the content and (or) timely updating of the project passport;
- Equal to 0.5, if there are significant comments on the content and (or) timely updating of the project passport.

Based on the results of the check, the value of the quality factor for compiling an institutional project passport (E_5) is determined, which takes the following values:

✓ Equal to 1, in the absence of significant comments on the content and (or) timely updating of the project passport;

✓ Equal to 0.5, if there are significant comments on the content and (or) timely updating of the project passport.

At the seventh stage of an audit of the formation of an institutional project, the results obtained at the previous stages are summarized. The summary coefficient of the project formation quality is calculated by:

$$E_{\text{result}} = 0.8 \times \frac{E_{1 \times k_1} + E_{2 \times k_2} + E_{3 \times k_3}}{3} + 0.2 \frac{E_4 + E_5}{2} \times M \tag{8}$$

where E_1 is the coefficient of involvement of performers in solving problems; k_1 is the value of the adjustment, taking into account the conclusion that the institutional project can meet the needs of all groups of beneficiaries (k_1 takes the values: equal to 1 if it is concluded that the national project can meet the needs of all groups of beneficiaries, equal to 0.85 if a conclusion is made about the limited ability of the national project to meet the needs of all groups of beneficiaries, equal to 0.7 if there are doubts about the ability of the national project to sufficiently meet the needs of all groups of beneficiaries); E_2 is the coefficient of coverage of tasks and components by the activities of the institutional project; k_2 is the amount of adjustment, taking into account the conclusion about the compliance of the expected results of the project with the identified tasks (k_2 takes the values: equal to 1 if it is concluded that the expected results of the institutional project correspond to the identified tasks, equal to 0.85 if it is concluded that the expected results of the institutional project meet the identified tasks in a limited way, equal to 0.7 if there are doubts about the compliance of the expected results of the institutional project with the identified tasks); E_3 is the coefficient of adequacy of resource support for the implementation of the project; k_3 is the value of the adjustment, taking into account the conclusion about the validity of the distribution of resources for project activities (k_3 takes the values: equal to 1 if a conclusion is made about the reasonableness of the distribution of resources for the activities of the institutional project, equal to 0.85, if it is concluded that the allocation of resources for the activities of the institutional project is not sufficiently justified, equal to 0.7, if there are doubts about the reasonableness of the allocation of resources for the activities of the institutional project); E_4 is thequality factor for planning project targets; E_5 is the quality coefficient of the project passport compilation; M is the maturity level of drawing up a national project passport.

For the project as a whole, an assessment of the quality of project formation (E_{result}) is calculated. The maturity level of drawing up an institutional project passport takes values in accordance with the criteria presented in Table 3.

Table 3. Criteria for the maturity level of the project.

Level of Maturity	Criteria	Value
Level 0: lack of indicators or baseline data	Achievement of goals is not characterized by indicators or indicators do not have target values, or justification is not provided to achieve target values of indicators.	0.5
Level 1: explicit assumptions	Assumptions used in justification are clearly stated; Acceptable and reliable statistical data are used; Starting points and inertial scenarios are available only for some indicators.	0.5
Level 2: realistic assumptions and sound methods	Assumptions used in justification are realistic; Methods used for forecasting are reasonable (in particular, expected changes in indicators are calculated directly or follow national and/or international examples).	0.75
Level 3: manageable contingencies	There is a plan of action in case of risks; The most significant risks are correctly identified, assessed and managed.	1

In relation to an institutional project activity, the evaluation of the quality of the formation of the project activity (E_{result}) is calculated. If the assessment of the quality of the formation of an institutional project and (or) the assessment of the quality of the formation of an individual project event takes a value of 0.8 or higher, it is concluded that the institutional project can contribute to the achievement of the national development goals of the Russian Federation for the period up to 2050.

If the assessment of the quality of the formation of an institutional project and (or) the assessment of the quality of the formation of an individual project event takes a value below 0.8, it is concluded that it is necessary to finalize the institutional project in order to contribute to the achievement of the national development goals of the Russian Federation for the period up to 2030 and up to 2050 of the year.

An assessment of the quality of the formation of an institutional project and project activities, as well as conclusions and proposals based on the results of the audit, are used when conducting a state audit of the implementation of institutional projects.

An audit of the implementation of an institutional project is aimed at assessing the achievement of the expected results of the institutional project, as well as the effectiveness of its implementation. When conducting a state audit of the implementation of institutional projects, the reliability of the information contained in the information analytical system for the implementation of institutional projects is also verified.

The first stage of an audit of the implementation of an institutional project is the analysis of the achievement of the expected results of the project. In order to analyze the achievement of expected results, the following are assessed:

- Fulfillment of institutional project milestones;
- Achievement of target indicators of the institutional project;
- Cash execution for the costs of the implementation of the institutional project [26].

The assessment of the degree of implementation of an institutional project milestones (Q) is conducted on the basis of a comparison of the actual number of milestones completed on time at the end of the reporting period and their planned number. When evaluating the degree of fulfillment of control points, the following scale is used:

"High level" of performance is assigned when the value of the score is more than 0.9;
"Average level" of performance is assigned when the score value is more than 0.7;
"Low level" of performance is assigned when the score is 0.7 or less.

If it is impossible to achieve a high level of implementation of the control points of the institutional project, an analysis of the reasons for non-fulfillment is performed, and the risk of non-fulfillment of the expected results of the institutional project is assessed. The assessment of the risk of non-fulfillment of the expected results is conducted taking into account the calculated value of the coefficient of involvement of performers in solving the identified tasks (E_i), adjusted for the conclusion that the institutional project can satisfy the needs of all groups of beneficiaries (k_i).

In the case of failure to achieve a high level of implementation of the project milestones with the value of the adjusted coefficient ($E_i \times k_i$) below 0.8, it is concluded that there are significant risks of not obtaining the expected results of the institutional project.

The assessment of the achievement of the target indicators of the institutional project (P_i) is conducted on the basis of a comparison of the actual values of the indicators at the end of the reporting period and the planned values of the corresponding indicators. For a group of target indicators for direct results, the degree of achievement of target indicators for direct results (P_{direct}) is calculated. For the group of target indicators of the final results, the degree of achievement of the target indicators of the final results (P_{final}) is calculated. For the group of target indicators of the final effect, the degree of achievement of the target indicators of the final effect (P_{result}) is calculated. When assessing the degree of achievement of target indicators for each group, a single scale is used:

- "High level" of performance is assigned when the value of the score is more than 0.9;
- "Average level" of performance is assigned when the score value is more than 0.7;
- "Low level" of performance is assigned when the score is 0.7 or less.

The final assessment of the degree of achievement of the target indicators is based on the smallest of the three estimates of the groups of target indicators (P). If it is impossible to achieve a high level of target indicators, all causes are analyzed and the risk of non-fulfullment of the expected results of the project is assessed. The assessment of the risk of non-fulfillment of the expected results of the national project is conducted taking into

account the calculated coefficients (E2) and (k2). If the value of the adjusted coefficient (E2× k2) is below 0.8, it is concluded that there are significant risks of non-fulfillment of the expected results of the project.

The assessment of the degree of cash execution for the costs of implementing the institutional project (R_j) is based on a comparison of the actual costs of implementing the project at the end of the reporting period and their planned level. When assessing the degree of cash execution for the costs of project implementation, a single scale is used:

- "High level" of performance is assigned when the value of the score is more than 0.9;
- "Average level" of performance is assigned when the score value is more than 0.7;
- "Low level" of performance is assigned when the score is 0.7 or less.

The final assessment of the degree of cash execution for expenses (R) from all sources for the implementation of the institutional project is based on the lowest of the estimates for each source of expenses.

If it is impossible to achieve a high level of cash execution for expenses from all sources for project implementation, the reasons for the impossibility of failures are analyzed, taking into account the calculated value of the resource adequacy ratio for project implementation (E3), adjusted by taking into account the conclusion about the reasonableness of the distribution of resources for project activities (k3).

If it is impossible to achieve a high level of cash execution for expenses from all sources for the implementation of an institutional project with the value of the adjusted coefficient (E3 × k3) below 0.8, it is concluded that there are significant risks of non-fulfillment of the expected results of the project.

The second stage of an audit of the implementation of an institutional project is the assessment of the effectiveness of its implementation. In order to assess the effectiveness of project implementation, information on the results of the analysis of the implementation of the expected results of the project, the existing significant risks of non-fulfillment of the expected results of the project, is summarized in Table 4.

Table 4. Evaluation of the effectiveness of the implementation of the institutional project.

(Q)/(P)/(R)	$E_1 \times k_1/E_2 \times k_2/E_3 \times k_3$	
	Less than 0.8	**0.8 and More**
Low level	Efficiency is low, there are significant risks of non-fulfillment of expected results of the departmental project, a revision of the content of the national project is required	Efficiency is low, there are significant risks of non-fulfillment of expected results of the departmental project
Average level	Efficiency is average, there are risks of non-fulfillment of expected results of the departmental project, a revision of the project content is required	Efficiency is average, there are risks of non-fulfillment of expected results of the departmental project
High level	Efficiency is high, risks of non-fulfillment of expected results of the departmental project are minimal, a revision of the project content is required	Efficiency is high, risks of non-fulfillment of expected results of the departmental project are minimal

As can be seen, the proposed methodology differs significantly from the traditional one [16] in the gradation of risks and the level and status of beneficiaries.

If it is possible to achieve a high level of efficiency in all areas of the assessment, a conclusion is made about the expediency of the project and its inclusion in the national plan for the period up to 2050.

4. Discussion

During this study, we conclude that there is a need to develop an integrated approach to auditing (control) the efficiency of project activities of executive authorities, which, as part of project activities, initiate and implement institutional projects, the targets of which should be aimed at achieving national development goals provided by federal and national projects. At the same time, the planning stage and the stage of analysis of the project execution are singled out as the main stages of an audit (control) of an institutional project. The main goal of the first stage is an independent assessment of the validity of goal setting and the volume and the timing of expenditures on the institutional project. At the second stage, the efficiency of budgetary resources is estimated.

The need to assess quality planning of a project was emphasized by Mark Velasquez and Patrick T [27], who paid considerable attention in their works to the need for quality selection at the stage of project initiation.

We agree with the conclusions of Primadhika M., Teguh R., Matos S. and Lopes E., who attached great importance to the pre-investment phase when assessing the quality planning of a project, and proposed using such variables as: compliance with quality characteristics, social responsibility, stake-holder satisfaction, costs, timing and reliability. This approach was considered in terms of identifying and analyzing the tasks that an institutional project is aimed at, determining executors and beneficiaries of the project, while developing individual ratios for the involvement of executors in solving identified tasks, which allows assessing the ability of the institutional project to sufficiently satisfy the needs of all groups of beneficiaries [28].

Cordoş, G. S. and Fülöp, M. T. [29] rightly believe that when estimating the efficiency of the project, it is necessary to assess the achievement of desired project results, which is consistent with the conclusion about the need to evaluate the outcome as the final effect of the institutional project.

George-Silviu, C. and Melinda-Timea, F. [30] attached great importance to project activities in the public sector, considering it to be a powerful catalyst for economic recovery and state renewal. The authors noted the need for a subsequent assessment of the results of a project's implementation, which can be both direct (immediate) and indirect (side). At the same time, the authors noted that side effects can cause a negative effect, and performance should be assessed not only in the short term, but also in the long term. As performance indicators, the authors proposed using such criteria as relevance (retaining the need for the project), sustainability (saving benefits throughout the entire implementation period) and benefit costs (cost-benefit analysis). This approach is consistent with the results of this study in terms of the need to cover the entire cycle of using public resources—from project planning to obtaining the outcome.

5. Conclusions

The presented methodology for a state audit of institutional energy projects is universal and can be used for any country. It is recommended that a state audit of institutional projects be performed in the following areas: an audit of the formation of the national project and implementation of the national project.

The methodology focuses on assessing the possibility of each institutional project providing a significant contribution to the achievement of a country's national development goals for the period up to 2050 and on identifying the risks accompanying each project.

References

1. Ermolaev, K.A.; Kuzmin, M.S. Problems of modernization and transition to innovative economy. *Probl. Mod. Econ.* **2017**, *4*, 85–97.
2. Sakharov, G.V.; Kvasov, I.A. Evaluation of investment projects in the field of energy. *Sci. Work. Free. Econ. Soc. Russ.* **2021**, *156*, 283–298.
3. Borodin, A.; Mityushina, I.; Harputlu, M.; Kiseleva, N.; Kulikov, A. Factor Analysis of the Efficiency of Russian Oil and Gas Companies. *Int. J. Energy Econ. Policy* **2023**, *13*, 172–188. [CrossRef]
4. Zehir, C.; Zehir, M.; Borodin, A.; Mamedov, Z.F.; Qurbanov, S. Tailored Blockchain Applications for the Natural Gas Industry: The Case Study of SOCAR. *Energies* **2022**, *15*, 6010. [CrossRef]
5. Borodin, A.; Panaedova, G.; Frumina, S.; Kairbekuly, A.; Shchegolevatykh, N. Modeling the Business Environment of an Energy Holding in the Formation of a Financial Strategy. *Energies* **2021**, *14*, 8107. [CrossRef]
6. Mamedov, Z.F.; Qurbanov, S.H.; Streltsova, E.; Borodin, A.; Yakovenko, I.; Aliev, A. Assessment of the potential for sustainable development of electric power enterprises: Approaches, models, technologies. *Econ. Oil Gas Ind.* **2022**, *2*, 15–27. [CrossRef]
7. Degtyareva, V.V.; Kamchatova, E.Y. Development of medium and small business in the sphere of energy: Features of development of highly intelligent projects. *Econ. Soc. Mod. Model. Dev.* **2018**, *8*, 57–64.
8. Guidance GUID 3910 [Electronic Resource]. Available online: https://www.issai.org/wp-content/uploads/2019/08/GUID-3910 -Central-Concepts-for-Performance-Auditing.pdf (accessed on 26 February 2023).
9. Kerzner, H. *Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance*; John Wiley & Sons: Hoboken, NJ, USA, 2017. Available online: https://www.amazon.com/Project-Management-Metrics-KPIs-Dashboards/ dp/1119427282 (accessed on 4 November 2022).
10. Samset, K.; Christensen, T. Ex ante project evaluation and the complexity of early decision -making. *Public Organ. Rev.* **2017**, *17*, 1–17. [CrossRef]
11. Matos, S.; Lopes, E. Prince2 or PMBOK—A Question of Choice. *Procedia Technol.* **2013**, *9*, 787–794. [CrossRef]
12. Kahalnikov, M.V. Risks of energy digitalization projects under reducing carbon foorprint. *Econ. Entrep.* **2021**, *1*, 230–233.
13. Dorokhina, E.Y. Benefits and risks of green energy projects. *Probl. Sci. Thought* **2022**, *1*, 11–15.
14. Konnov, I.A. Development of a model of risk management of innovative projects in nuclear energy. *Colloq. J.* **2020**, *11*, 20–22.
15. Kulapin, K.I. Strategic development of the Russian fuel and energy complex in the light of the adoption of the Paris climate agreement. *Energy Policy* **2019**, *3*, 18–25.
16. Famuwagun, O.S. Knowledge in Contemporary Global Projects. 2020, p. 11. Available online: https://www.researchgate.net/ publication/345742503_Project_Management_Methodologies_and_Bodies_of_Knowledge_in_Contemporary_Global_Projects (accessed on 15 January 2023).
17. Gasik, S. National public projects implementation systems: How to improve public projects delivery from the country level. *Procedia—Soc. Behav. Sci.* **2016**, *226*, 351–357. [CrossRef]
18. Belcher, B.M.; Claus, R.; Davel, R.; Ramirez, L.F. Linking transdisciplinary research characteristics and quality to effectiveness: A comparative analysis of five research-for-development projects. *Environ. Sci. Policy* **2019**, *101*, 192–203. [CrossRef]
19. Abanda, F.H.; Chia, E.L.; Enongene, K.E.; Manjia, M.B.; Fobissie, K.; Pettang, U.J.M.N.; Pettang, C. A systematic review of the application of multi-criteria decision-making in evaluating Nationally Determined Contribution projects. *Decis. Anal. J.* **2020**, *5*, 100–140. [CrossRef]
20. Soloviev, A.I. About the method of system modeling of the stable economic agents (using the example of the rocket and space industry). In *The Collection: Economic Security of Russia: Problems and Prospects. Materials of the III International Scientific-Practical Conference*; Nizhny Novgorod State Technical University: Nizhny Novgorod, Russia, 2015; pp. 409–415.
21. Dorzhieva, V.V. Digital transformation of the Russian fuel and energy complex: Priorities and development targets. *Kreat. Ekon.* **2021**, *15*, 4079–4094. [CrossRef]
22. *State Audit Standard 104*; External State Audit (Control) Standard; Performance Audit, Approved. Resolution of the Collegium of the Accounts Chamber of the Russian Federation: Moscow, Russia, 9 February 2021; No. 2PK.
23. *State Audit Standard 105*; External State Audit (Control) Standard; Strategic Audit, Approved. Resolution of the Board of the Accounts Chamber of the Russian Federation: Moscow, Russia, 10 November 2020; No. 17PK.
24. Gryzunova, N.; Vedenyev, K.; Manuylenko, V.; Keri, I.; Bilczak, M. Distributed Energy as a Megatrend of Audit of Investment Processes of the Energy Complex. *Energies* **2022**, *15*, 9225. [CrossRef]

25. *No. 11K (1536)*; Methodology for Assessing the Quality of the Formation and Implementation of the RF GP as Part of the Follow-Up Control over the Execution of the Federal Budget. Board of the Accounts Chamber of the Russian Federation: Moscow, Russia, 9 March 2022.

26. Głodziński, E. Project assessment framework: Multidimensional efficiency approach applicable for project-driven organizations. *Procedia Comput. Sci.* **2018**, *138*, 731–738. [CrossRef]

27. Velasquez, M.; Patrick, T. An Analysis of Multi-Criteria Decision-Making Methods. *Int. J. Oper. Res.* **2013**, *10*, 56–66.

28. Marnada, P.; Raharjo, T.; Hardian, B.; Prasetyo, A. Agile project management challenge in handling scope and change: A systematic literature review. *Procedia Comput. Sci.* **2021**, *197*, 290–300. [CrossRef]

29. Cordoş, G.S.; Fülöp, M.T. Understanding audit reporting changes: Introduction of Key Audit Matters. *Account. Manag. Inf. Syst. Contab. Inform. Gestiune* **2015**, *14*, 128–152.

30. George-Silviu, C.; Melinda-Timea, F. New audit reporting challenges: Auditing the going concern basis of accounting. *Procedia Econ. Financ.* **2015**, *32*, 216–224. [CrossRef]