




# ESG Factors Management in Arctic Oil and Gas Field Development Projects: Economic Assessment and Key Performance Indicators System (Case Study of Bashneft-Polyus LLC)

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**Keywords:** ESG factors, Sustainable development, Oil and gas industry, Natural resources management, Arctic fields, key performance indicators, Economic efficiency, Regional economics, Energy transition, Corporate social responsibility.

**Abstract:** This study proposes a KPI-based system to manage ESG factors in Arctic oil and gas projects and assesses the economic benefits using the Trebs and Titov fields of Bashneft-Polyus as a case study. Stricter ecological rules, rising social expectations and the demand for green finance make systematic ESG integration vital for competitiveness. The methodology aligns three KPI blocks – Environmental, Social and Governance – with economic metrics: NPV, IRR and payback period. Applying the framework predicts a 29% cut in specific CO<sub>2</sub> emissions (0.28 → 0.20 t/t oil), a 44% reduction in injury frequency and an ESG rating increase to 0.85. Financially, the project yields an NPV of 3.8 billion RUB and a 3.5-year payback. The results demonstrate that rigorous ESG governance can coexist with high economic returns, offering a replicable model for Arctic assets. Practical value lies in a sustainable development toolkit tailored to harsh climatic, logistic and regulatory constraints that oil and gas operators face north of the Arctic Circle. The proposed indicators provide transparency for stakeholders and facilitate access to preferential financing while reinforcing long-term corporate resilience.

## 1 INTRODUCTION


In the context of global energy transition and increased international attention to sustainable development issues, integration of ESG principles (Environmental, Social, Governance) into corporate strategy of oil and gas companies is becoming not a voluntary initiative but a mandatory condition for maintaining competitiveness. According to international rating agencies, companies with high ESG indicators demonstrate more stable financial sustainability, attract more investments, and have access to preferential financing through green bond mechanisms.


ESG factors management acquires particular relevance for oil and gas field development projects in Arctic regions, where environmental risks are significantly higher, social infrastructure is less


developed, and corporate governance requirements are tightening from both regulators and international investors.

Russia's oil and gas industry is experiencing a period of ESG transformation, driven by both external factors (climate agenda, sanctions pressure, investor requirements) and internal needs (necessity for production modernization, social responsibility, operational efficiency improvement).

However, despite progress at the corporate strategy level, ESG principles integration at the project level often remains fragmented and lacks clear management and efficiency assessment mechanisms. There is a gap between declared sustainable development goals and their practical implementation in specific field development projects. The absence of a unified key performance indicator (KPI) system for

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ESG factors monitoring hampers progress assessment and management decision-making.

The purpose of this study is to develop a comprehensive ESG factors management system for oil and gas field development projects in Arctic conditions and evaluate the economic efficiency of proposed measures using Bashneft-Polyus LLC (R. Trebs and A. Titov fields development project) as a case study.

## 2 RESEARCH METHODOLOGY

Research objectives:

1. Conduct analysis of current ESG factors management state in Bashneft-Polyus LLC and identify problem areas.

2. Develop a key performance indicator (KPI) system for three ESG blocks (Environmental, Social, Governance) with establishment of baseline and target values.

3. Propose a set of measures for improving ESG factors management adapted to Arctic projects specifics.

4. Evaluate economic efficiency of proposed measures implementation with calculation of NPV, IRR, payback period indicators and impact on company's ESG rating.

The research object is the ESG factors management system in oil and gas company project activities. The research subject consists of methods and tools for integrating sustainable development principles into Arctic oil and gas field development projects.

The methodological basis comprises systems analysis, comparative analysis of best industry practices, investment project economic efficiency calculation method, and Balanced Scorecard development methodology.

The information base of the study consisted of financial and non-financial reporting data from Bashneft-Polyus LLC and Rosneft Oil Company PJSC, international ESG reporting standards (GRI, SASB, TCFD), analytical reviews from leading rating agencies, and scientific publications on oil and gas industry sustainable development topics.

The work structure includes a theoretical section devoted to the ESG concept and its significance for the oil and gas industry; an analytical section with project characteristics and assessment of current ESG factors management state; a practical section with KPI system development and management improvement recommendations; and an economic efficiency assessment section for proposed measures.

### 2.1 Scientific Novelty

The scientific novelty of the research consists of the following:

An integrated key performance indicator (KPI) system has been developed for ESG factors management in Arctic oil and gas field development projects, accounting for climatic conditions specifics, heightened environmental risks, and social challenges of the Far North regions. Unlike existing approaches, the proposed system includes not only traditional indicators but also specific indicators for Arctic projects (permafrost reclamation, infrastructure adaptation to extreme temperatures, indigenous peoples development programs).

Quantitative target values for ESG indicators have been established for the first time for hard-to-recover reserves development projects in the Arctic based on comparative analysis of best industry practices and adaptation of international standards (GRI, SASB) to Russian conditions.

A methodology for assessing economic efficiency of ESG measures implementation in oil and gas industry projects has been developed, integrating traditional financial indicators (NPV, IRR, payback period) with non-financial sustainable development metrics (ESG rating, corporate social responsibility index).

Prioritization of ESG measures for Arctic oil and gas projects has been substantiated considering limited resources and phased implementation necessity. Critical success factors of ESG transformation have been identified: energy infrastructure modernization, digital environmental parameter monitoring technologies implementation, partnership development with local communities, and creation of ESG-oriented top management motivation system.

## 3 CASE STUDY: TREBS AND TITOV FIELDS DEVELOPMENT PROJECT

The R. Trebs and A. Titov fields development project, located in the Nenets Autonomous District, represents a strategically important asset of Bashneft-Polyus LLC within Rosneft Oil Company PJSC. According to company data, total recoverable reserves of the fields in categories C1+C2 amount to 140 million tons of oil, equivalent to approximately 1 billion barrels.

Current production indicators demonstrate sustainable growth: 2022: 0.8 million tons; 2023: 1.1 million tons; 2024: 1.4 million tons. Average well flow rate is 45-50 tons per day, exceeding the all-Russian indicator for hard-to-recover reserves. Oil recovery factor (ORF) is at 18-20% level, corresponding to average values for such fields.

### **3.1 Technological Process and Infrastructure**

The technological process of Trebs and Titov fields development is organized considering the complex climatic conditions of the Nenets Autonomous District and requires specialized technical solutions application. The production process basis consists of cluster drilling system, where 12-15 wells with average depth of 2,800-3,200 meters are drilled from one pad. This approach minimizes disturbed land area and reduces environmental footprint by 25-30% compared to traditional schemes.

Gas-lift method is predominantly used (in 85% of wells) for oil production, which is most effective for fields with low reservoir pressure conditions. The remaining 15% of wells are equipped with electric centrifugal pumps ensuring stable flow rate at 45-50 tons per day level. Produced oil transportation is carried out through main pipeline system with total length of 142 km to Varandey terminal, ensuring reliable and uninterrupted supply to export markets.

Project infrastructure support includes two modern fields with total processing capacity of 5 million tons of oil per year, equipped with tank farm of 120 thousand m<sup>3</sup> volume for temporary product storage. Facilities power supply is provided by diesel power plant with capacity of 48 MW ensuring stable operation of the entire technological complex. For personnel accommodation, a shift camp for 1,200 people with developed social infrastructure has been built.

Total investment volume in production infrastructure creation for 2020-2023 amounted to 28 billion rubles, with the largest share of funds (65%) directed to main production assets development, 25% to social facilities, and 10% to environmental measures.

### **3.2 Economic Efficiency and ESG Performance**

Project economic efficiency is characterized by stable indicators despite complex production conditions. Oil production cost is at 8,500-9,200 rubles per ton level, which is 15-20% higher than the all-Russian indicator

but quite competitive for Arctic fields. Capital expenditures for production increase amount to approximately 14,000 rubles per ton, and EBITDA profitability reached 34% in 2023. With oil price maintained at \$60 per barrel level, project payback period is estimated at 7.5 years, corresponding to industry standards for such fields.

In the ESG factors area, the project demonstrates balanced indicators. Environmental component is characterized by specific CO<sub>2</sub> emissions of 0.28 tons per ton of produced oil and high (92%) associated petroleum gas utilization level. Over the past three years, 45 hectares of disturbed lands have been reclaimed.

Social aspects include creation of 1,150 jobs, with 85% of personnel working on shift basis and local personnel share reaching 38%. Investment volume in social programs over three years amounted to 320 million rubles.

In the management sphere, full compliance with international standards ISO 14001 and ISO 45001 has been achieved, all suppliers have passed ESG audit, and for 65% of managers a sustainable development KPI system has been implemented.

### **3.3 Development Prospects and Challenges**

Project development prospects face several challenges, including high dependence on external transport infrastructure, annual cost increase of 12-15% due to production conditions complication, and limited opportunities for oil recovery factor increase by traditional methods.

Strategic development directions include modern enhanced oil recovery technologies implementation aiming to achieve 25% ORF by 2030, transition to hybrid power supply systems, and cooperation development with research centers for specialized Arctic technologies creation.

Overall, the Trebs and Titov fields development project demonstrates sustainable development and has good prospects until 2030 due to significant oil reserves, modern production infrastructure, and integration into Rosneft system. Main risks are associated with high capital intensity of further development, tightening environmental requirements for Arctic projects, and logistical constraints.

## 4 KPI SYSTEM FOR ESG FACTORS MANAGEMENT

A key element of ESG principles integration into Bashneft-Polyus LLC activities is implementation of a key performance indicator (KPI) system that will allow quantitative assessment of company progress in sustainable development area. KPI development covers all three ESG approach components – environmental, social, and managerial – and ensures transparency in achieving set goals.

### 4.1 Environmental Block KPIs

For the environmental block, implementation of KPIs related to reducing negative environmental impact is proposed. Main indicators will be specific CO<sub>2</sub> emissions per ton of produced oil, associated petroleum gas utilization level, and number of oil spill incidents. For example, target value for CO<sub>2</sub> emissions can be reduced from 0.28 to 0.20 tons per ton of oil, corresponding to best industry practices.

Table 1: KPIs for Environmental Block.

Indicator	Baseline Value (2024)	Target Value (2027)	Responsible Department
Specific CO <sub>2</sub> emissions (t/t oil)	0.28	0.20	Environmental Department
APG utilization level (%)	92	98	Technical Department
Number of oil spills (per year)	3	1	Industrial Safety Service

### 4.2 Social Block KPIs

Social KPIs are aimed at improving working conditions, personnel development, and interaction with local communities. Critically important indicators will be injury rate level, staff turnover, and share of local workers in total personnel. Target value for injury rate is planned to be reduced from 2.7 to 1.5 cases per 100 employees, which will require occupational health and safety system modernization and safety culture improvement.

Table 2: KPIs for Social Block.

Indicator	Baseline Value (2024)	Target Value (2027)	Responsible Department
Injury rate (per 100 workers)	2.7	1.5	Occupational Safety Department
Staff turnover (%)	18	10	HR Department
Share of local personnel (%)	38	45	Regional Relations Department

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### 4.3 Social Block KPIs

In the governance block, KPIs will be oriented toward increasing corporate governance transparency and ESG principles integration into company strategy. Key indicators will be share of top managers whose bonuses are tied to achieving ESG goals and percentage of suppliers who have passed ESG audit. Target value for the first indicator should increase from 45% to 70%, which will strengthen management responsibility for sustainable development policy implementation.

Table 3: KPIs for Governance Block.

Indicator	Baseline Value (2024)	Target Value (2027)	Responsible Department
Share of managers with ESG-KPI (%)	45	70	Corporate Secretariat
Suppliers with ESG audit (%)	92	100	Procurement Department
Compliance with GRI standards (%)	80	100	Reporting Department

To ensure KPI system effectiveness, it is necessary to develop monitoring and reporting mechanisms that will allow regular progress assessment and adjustments in case of deviation from target values. Each indicator should be assigned to a specific company department, ensuring clear responsibility distribution. KPI implementation will not only increase ESG process manageability but also create a foundation for long-term sustainable project development corresponding to both Russian and international standards. Implementation of this system will require internal process adaptation and personnel training, however its advantages, including company reputation improvement and access to green financing, will fully justify invested resources.

## 5 ECONOMIC EFFICIENCY ASSESSMENT

To assess the effectiveness of proposed measures for ESG factors implementation in the R. Trebs and A. Titov fields development project, economic indicators analysis before and after their implementation was conducted.

Proposed measures require significant investments distributed across the following directions.

Table 4: ESG Measures Implementation Costs.

Direction	Investment Amount (billion rubles)	Payback Period (years)	Financing Source
Equipment modernization	2.5	4	Own funds, loans
CO <sub>2</sub> capture technologies implementation	1.8	5	Green bonds
Social programs	0.6	3	Company budget
Personnel training	0.3	2	Government grants
Total	5.2	3.5 (average)	

### 5.1 Expected Results

Measures implementation will allow achieving the following results:

1. Environmental Block (E):

- Reduction of specific CO<sub>2</sub> emissions from 0.28 to 0.20 t/t oil;
- Increase of associated petroleum gas utilization level from 92% to 98%;
- Reduction of oil spill number from 3 to 1 case per year.

2. Social Block (S):

- Reduction of injury rate from 2.7 to 1.5 cases per 100 workers;
- Decrease of staff turnover from 18% to 10%;
- Increase of local personnel share from 38% to 45%.

3. Governance Block (G):

- Increase of managers share with ESG-KPI from 45% to 70%;
- Ensuring 100% compliance with GRI standards.

### 5.2 Economic Indicators

For efficiency assessment, the following indicators were used:

$$NPV = \sum \frac{CF_t}{(1+r)^t} - I$$

Where:

- $CF_t$  – cash flow in year  $t$ ;
- $r$  – discount rate (10%);
- $I$  – initial investments.

Calculation results are presented in Table 5.

Table 5: Economic Efficiency of Measures.

Indicator	Value
NPV (billion rubles)	3.8
IRR (%)	18
Payback period (years)	3.5
Profitability (%)	25

After measures implementation, improvement of the following indicators is expected (Table 6).

Table 6: Changes in Key ESG Indicators.

Indicator	Before Implementation	After Implementation	Change (%)
CO <sub>2</sub> emissions (t/t oil)	0.28	0.20	-29
Injury rate level	2.7	1.5	-44
ESG rating (scale 0-1)	0.68	0.85	+25

### 5.3 Key Findings and Recommendations

Key findings:

- Project NPV amounts to 3.8 billion rubles, confirming its financial feasibility;
- Payback period (3.5 years) corresponds to industry standards for such projects;
- 29% reduction in CO<sub>2</sub> emissions and 44% decrease in injury rate will improve environmental and social components;
- ESG rating increase to 0.85 will enhance company's investment attractiveness.

Recommendations:

- Continue monitoring measures effectiveness and adjust them as necessary;
- Consider program expansion possibility by attracting international partners.

Thus, ESG factors implementation in the fields development project not only corresponds to global sustainable development trends but also provides significant economic effect for Bashneft-Polyus LLC.

## 6 CONCLUSIONS

The conducted research on ESG factors management in oil and gas company project activities using Bashneft-Polyus LLC as a case study confirmed the relevance and significance of sustainable development principles integration into industry enterprises' strategy. In conditions of tightening environmental requirements, growing social expectations, and strengthening regulatory pressure, ESG transformation ceases to be a voluntary initiative, becoming a mandatory condition for maintaining competitiveness, attracting investments, and minimizing risks.

Analysis of ESG theoretical aspects showed that environmental, social, and managerial criteria form a comprehensive system that not only reduces negative environmental impact but also creates long-term value for all stakeholders. In the oil and gas industry, where projects are associated with high environmental and social risks, ESG principles implementation is particularly important. Companies ignoring these factors face reputational losses, financial sanctions, and restrictions on access to green financing.

Investigation of Bashneft-Polyus LLC activities revealed both company strengths, such as belonging to large holding Rosneft Oil Company PJSC and unique experience in Arctic conditions, and problem areas, including high production cost, outdated equipment, and increased injury rate. Despite progress in social programs and environmental initiatives area, the company lags behind industry leaders on several key indicators, requiring systemic measures adoption.

Developed recommendations for ESG factors management improvement include KPI implementation for all three blocks (Environmental, Social, Governance), production processes modernization, corporate transparency strengthening, and cooperation development with local communities. Economic efficiency assessment of proposed measures showed their feasibility: project NPV amounts to 3.8 billion rubles, payback period is 3.5 years, and ESG rating improvement to 0.85 points will increase company's investment attractiveness.

Implementation of these measures will allow Bashneft-Polyus LLC not only to comply with

international standards but also achieve significant operational improvements, such as reducing accident response costs, decreasing energy consumption, and increasing labor productivity. Moreover, ESG principles integration into corporate strategy will create a foundation for sustainable development in global energy transition conditions, ensuring company's long-term competitiveness and capitalization growth.

Overall, the work demonstrates that ESG transformation is not just a trend but a necessity for oil and gas companies striving to maintain leading positions in a changing world. Success depends on the ability to combine economic efficiency with environmental responsibility and social justice, which ultimately determines business sustainability in the long term. Bashneft-Polyus LLC, implementing proposed measures, will be able to strengthen its market positions, minimize risks, and become an example of successful ESG approach implementation in Russia's oil and gas industry.

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