

**TITLE: ESG-BASED MANAGEMENT MODEL FOR SUSTAINABLE  
TRANSFORMATION OF INDUSTRIAL ECOSYSTEMS: CASE OF  
BUKHARA OIL REFINERY (UZBEKISTAN)**

---

*Author: Fatkulina I.S.*

*Graduate student, Department of Project  
Management Higher School of Business and  
Entrepreneurship under the Cabinet of Ministers  
of the Republic of Uzbekistan, Tashkent*

**Annotation:** This article presents an original model of ESG-based (Environmental, Social, and Governance) management adapted for industrial ecosystems in transitional economies. Using the Bukhara Oil Refinery as a case study, the paper outlines the methodology, architecture, digital integration, and the results of a pilot implementation. The model combines international standards (GRI, ISO, TCFD), a step-by-step 4D transformation framework, project management tools (PMBOK, Agile), and digital analytics (Power BI, SAP). Preliminary results demonstrate the model's economic, environmental, and institutional efficiency and its readiness for scaling across the national industry.

**Keywords:** ESG, sustainable development, industrial ecosystem, ROSI, 4D model, digital governance, Uzbekistan.

## **1. Introduction: Context and Problem Statement**

Industry in the 21st century is experiencing unprecedented pressure from climate change, regulatory complexity, and the growing expectations of global investors. ESG has emerged not only as a disclosure framework but as a logic of transformation. For emerging markets, particularly Uzbekistan, the lack of tailored ESG-management systems results in inefficient sustainability policies, limited access to green financing, and reputational risks. There is a need to design a locally adaptable, digitally integrated ESG model for industrial enterprises.

## **2. Research Goal and Methodology**

The goal is to design and pilot a scalable ESG management model that incorporates international standards, project-based implementation, and digital monitoring. The research is based on:

- The **4D framework** (Diagnose, Design, Deliver, Develop) by WBCSD;
- **GRI Standards**, **ISO 14001/50001**, and **TCFD** for sustainability metrics;
- **PMBOK 7th edition** and **Agile** principles for implementation;

- Digital platforms **Power BI** and **SAP Sustainability Control Tower**;
- The **ROSI** methodology (Return on Sustainability Investment) from NYU

Stern.

### 3. Case Description: Bukhara Oil Refinery

Bukhara Oil Refinery is a key industrial player in Uzbekistan's oil and gas sector. Prior to ESG implementation, sustainability efforts were fragmented. The plant lacked coordinated governance, reporting procedures, and digital traceability. With existing SCADA, 1C, and Excel-based systems, Bukhara Oil Refinery became a feasible pilot platform.

### 4. Model Architecture

The model consists of a three-tier structure:

- **Strategic level:** ESG Council defines goals, policies, metrics;
- **Tactical level:** ESG office (PMO), dashboards, KPI monitoring;
- **Operational level:** ESG ambassadors, local initiatives, staff engagement.

The digital dashboard integrates data from SCADA, ERP, and Excel into Power BI, visualizing 12 ESG indicators such as CO2 emissions, energy intensity, safety, and social inclusion.

### 5. Pilot Results (July–November 2024)

- Energy consumption reduced by 15%;
- CO2 emissions reduced by 15%;
- 27 ESG initiatives completed; 160 staff trained;
- ESG coverage of staff increased from 28% to 45%.

### 6. Innovation and Scalability

The model is tailored for transition economies: low-cost, modular, and digital. It can be scaled within Uzbekneftegaz subsidiaries and replicated in other sectors. It supports ESG ratings, green finance access, and national digital ESG platforms.

### 7. Conclusions and Recommendations

The ESG model implemented at Bukhara Oil Refinery demonstrates operational efficiency, financial return, and institutional feasibility. Recommendations include:

- Officially adopting an ESG strategy at Bukhara Oil Refinery (2030 horizon);
- Expanding the model to other enterprises;
- Using the model as a base for a national ESG platform in Uzbekistan.

### References:

1. World Business Council for Sustainable Development (WBCSD). 4D Transformation Framework.
2. Global Reporting Initiative (GRI). GRI Standards 2021.
3. ISO. ISO 14001/50001 Environmental and Energy Management Systems.
4. TCFD. Final Recommendations.
5. PMI. PMBOK Guide, 7th Edition.
6. Agile Manifesto (2001).
7. SAP SE. SAP Sustainability Control Tower.
8. NYU Stern Center. ROSI Framework.
9. IPCC. Sixth Assessment Report, 2023.
10. World Bank. Greening Industry in Central Asia.
11. UNIDO. Industrial Strategy for Emerging Economies.
12. McKinsey & Co. ESG in Heavy Industry (2023).