



REPUBLIC OF KOSOVO

**MINISTRY OF INDUSTRY, ENTREPRENEURSHIP,
TRADE AND INNOVATION**



ANALYSIS FOR THE ADVANCEMENT OF INDUSTRIAL PARKS WITH ENVIRONMENTALLY FRIENDLY CHARACTERISTICS

REPORT

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REPUBLIC OF KOSOVO
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TRADE AND INNOVATION

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The analysis for the advancement of industrial parks with environmentally friendly characteristics was developed by:
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List of abbreviations

Abbreviations	Full description
EIP	Ecological Industrial Park (Eco-Industrial Park)
PME	Park Management Unit
MRV	Monitoring, Reporting and Verification
AP	Photovoltaic system for solar energy production
RES	Renewable energy sources
EIA	Environmental Impact Assessment
IPPC	Integrated Pollution Prevention and Control
BAT	Best available techniques
European Union	European Union
UNIDO	United Nations Industrial Development Organization
MINT	Ministry of Industry, Entrepreneurship and Trade
Kies	Investment and Enterprise Support Agency in Kosovo
MMPHI	Ministry of Environment, Spatial Planning and Infrastructure
European Commission	European Commission
MDP	Municipal Development Plan
MZM	Municipal Zonal Map
KPI	Key performance indicators
SME	Small and medium-sized enterprises
O&M	Operation and maintenance

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1. INTRODUCTION

1.1 Project Purpose and Mandate according to the ToR

This project was initiated by the Ministry of Industry, Entrepreneurship and Trade (MINT) in the context of the need to modernize and transform industrial parks in Kosovo towards a more sustainable, competitive and aligned model with European Union standards.

The mandate set out in the Terms of Reference (ToR) requires:

- Assessment of the current environmental and infrastructural status of the three industrial parks;
- Gap analysis in relation to international practices for Eco-Industrial Parks (EIP);
- Identification of concrete technical, institutional and financial measures for their advancement;
- Drafting of applicable recommendations in the short, medium and long term.

This report is not only descriptive in nature, but aims to create the basis for a structural transformation of the industrial park management model in Kosovo.

1.2 Context of Industrial Park Development in Kosovo

The development of industrial parks and economic zones in Kosovo has been a central instrument of public policies to promote economic development, increase employment and attract domestic and foreign investment. As evidenced in *the Study of Economic Zones in Kosovo*, 12 economic zones with different functional profiles have been established in the country, including industrial parks, technology parks and specialized zones for production and processing. These zones are conceived as geographically demarcated spaces, where businesses benefit from a pre-prepared infrastructure and a simplified administrative regime in relation to the territory outside them.

However, an in-depth analysis of strategic documents and feasibility studies shows that the model of development of industrial parks in Kosovo has been mainly traditional and infrastructural. The emphasis has been placed on providing public land for investors, building basic infrastructure (internal roads, electricity grid, water supply, sewage, public lighting), as well as on creating conditions for allocating plots for long-term use. This approach is also clearly reflected in the *Feasibility Study for the Drenas 2 Industrial Park*, where the main priority of the project is the construction of physical infrastructure and the creation of favorable conditions for investment, while the environmental dimension is mainly addressed within the framework of impact assessment and legal compliance, not as a strategic axis of the functional model of the park.

In practice, industrial parks in Kosovo operate according to an administrative model that focuses on the management of public property and the allocation of plots. The role of central and municipal institutions has been mainly regulatory and contractual: selecting businesses, signing land use contracts and formally monitoring the implementation of committed investments. However, there is no consolidated structure of park management as a professional entity with a clear mandate for joint environmental management, for optimizing resource use or for creating synergies between enterprises. In this sense, the park functions as an aggregate of independent plots, not as an integrated industrial system.

Although enterprises within the parks are subject to applicable environmental legislation including requirements for Environmental Impact Assessment, environmental permits, waste management and water treatment, there is no collective mechanism at the park level for the management of industrial waste, for the joint treatment of wastewater or for the joint monitoring of energy and water consumption. There are no integrated environmental performance reporting systems at the park level, nor measurable indicators for energy efficiency, emission reduction or circular economy. This limits the opportunity to create collective benefits and reduce costs through cooperation between businesses.

From an international comparative perspective, the current model in Kosovo remains far from the Eco-Industrial Park (EIP) standards promoted by UNIDO through the Global Eco-Industrial Parks Programme (GEIPP). According to this model, an industrial park is considered an EIP when it integrates three interrelated dimensions: environmental performance (increasing resource productivity and reducing the environmental footprint), economic performance (reducing costs and increasing competitiveness through industrial symbiosis) and social performance (quality employment, inclusion of SMEs and respect for labor standards). In this model, the park is treated as an integrated system where infrastructure, management and cooperation between enterprises are structured to produce measurable and verifiable benefits.

In Kosovo, although there is a significant infrastructure base and several years of experience in the administration of economic zones, the integration of the sustainability dimension remains fragmented. National strategies for industrial development and commitments for approximation with the EU acquis require increasing energy efficiency, improving waste management, promoting the circular economy and reducing emissions. However, these objectives are not yet systematically integrated into the operational model of industrial parks.

Another structural challenge is the lack of a centralized database for park performance at the national level. Data on energy consumption, water use, waste generation or greenhouse gas emissions at the park level are not collected and analyzed in an integrated manner. This makes it difficult to plan strategically, access international funds for the green transition and measure progress against European standards.

In the context of the European green transition, carbon border mechanisms (CBAM), increasing ESG reporting requirements and the pressure of international supply chains to decarbonise, the traditional model of the industrial park as an infrastructure space is no longer sufficient. To maintain and increase the competitiveness of local industry, industrial parks need to be transformed from a passive instrument of land allocation into an active platform for environmental innovation, resource efficiency and industrial cooperation.

In this sense, the transformation towards the Eco-Industrial Park model represents a structural and strategic step for Kosovo. It implies not only improving the infrastructure, but also reforming the management model, integrating common environmental systems, developing mechanisms of industrial symbiosis and institutionalizing performance reporting. Such an approach would enable not only cost reduction and increased competitiveness for businesses, but also gradual fulfillment of European standards and a more favorable positioning of Kosovo industry in international markets.

Therefore, the current state of industrial parks in Kosovo can be characterized as a phase of infrastructural consolidation, but not yet a functional transformation towards integrated sustainability. This creates an important strategic opportunity: the physical and institutional basis already exists, but a reorientation of the model towards the full integration of the environmental, economic and social dimensions according

to the EIP framework is required, in line with international practices and the country's commitments in the European integration process.

1.3 Link to SDG 2030 – Goal 4 (Green Industry)

The Strategy for Industrial Development and Business Support 2030 (SZHIMB 2030) clearly positions the transition towards Green Industry as a national priority and as one of the main pillars for the modernization of the industrial sector in Kosovo. Within this strategy, Objective 4 represents the fundamental framework for the structural transformation of industry, aiming to harmonize economic development with environmental and climate requirements.

Objective 4 explicitly addresses:

- Gradual decarbonization of the industrial sector,
- Increasing energy efficiency,
- The use of renewable energy sources,
- Systematic integration of environmental standards into production processes.

These elements are not declarative in nature, but constitute a transformative orientation that requires concrete implementation instruments at the territorial and sectoral level. In this context, industrial parks represent the most structured and appropriate space for the practical operationalization of Objective 4.

Currently, the industrial sector in Kosovo is characterized by relatively high energy consumption per unit of production, significant dependence on fossil-based energy, and limited capacities for recycling and resource recovery. Achieving Objective 4 requires a shift from individual interventions at the enterprise level to systemic interventions at the industrial ecosystem level. This is precisely the logic on which the Eco-Industrial Park (EIP) model is built.

The transformation of industrial parks into EIPs constitutes a practical instrument for the operationalization of Objective 4 of the SDG 2030, because:

First, gradual decarbonization can be achieved more effectively through collective solutions than through fragmented individual interventions. An industrial park organized according to the EIP model can implement joint systems for renewable energy production (e.g. photovoltaic panels at the park level), waste heat recovery, optimization of distribution networks and integrated energy consumption management. This creates economies of scale and reduces transition costs for enterprises, especially SMEs.

Second, energy efficiency at the park level can be improved through joint energy audits, consumption management platforms and the exchange of best practices between utilities. In a traditional park, each utility operates in isolation; in an EIP, utilities become part of a collaborative system aimed at collectively reducing energy intensity.

Third, the use of renewable resources becomes more feasible when the infrastructure is designed and managed in an integrated manner. Installing shared capacities for solar energy or hybrid systems is more economical and functional at the park level than at the individual level of each enterprise.

Fourth, the integration of environmental standards into production can be institutionalized through common environmental management systems (EMS) at the park level, through common performance reporting, and through the establishment of measurable indicators for waste reduction, water use optimization, and emission minimization.

If industrial parks operate according to the EIP model, they can become:

- Pilot platform for green transition – testing on a limited but controlled scale, decarbonization and circular economy mechanisms that can then be replicated at the national level.
- Environmental innovation hubs – where collaboration between industry, public institutions and innovation actors can generate new production models with lower carbon intensity and higher resource productivity.
- Integrated circular economy zones – where waste from one enterprise is transformed into input for another, creating industrial symbiosis and reducing dependence on primary resources.

Furthermore, the transformation of parks into EIPs is in line not only with the 2030 SDGs, but also with Kosovo's commitments in the European integration process, including approximation with the EU acquis in the field of environment, energy and climate. This includes harmonization with the principles of the European Green Deal, increasing capacities for environmental reporting and preparing the industrial sector for mechanisms such as the Carbon Border Adjustment Mechanism (CBAM).

From a public policy perspective, the EIP serves as an intermediary mechanism between strategy and practice. The 2030 SDGs set the strategic direction; the EIP parks provide the territorial instrument for the concrete implementation of this direction. In the absence of this instrument, Objective 4 risks remaining dispersed in individual measures without synergistic effect.

Therefore, the integration of the EIP concept into policies for the development and management of industrial parks represents a necessary step towards strategic coherence. It ensures that investments in industrial infrastructure are not only physical investments, but also investments in structural transformation towards a greener, more competitive and more resilient industry.

1.4 The Importance of an Environmentally Friendly Approach

The traditional model of industrial development in most countries, including the Kosovo context, has historically treated the environmental dimension mainly as a regulatory obligation. In this approach, the environment is considered an external constraint on economic activity, where businesses focus on minimally meeting legal requirements to avoid penalties or interruption of operations. Environmental investments in this logic are seen as additional costs and not as an integral part of the competitiveness strategy.

The Eco-Industrial Park (EIP) model represents a fundamental change in this approach. It treats the environment not as a regulatory burden, but as a source of competitive advantage and as a factor that generates economic value, social stability and long-term resilience. In this sense, the environmentally friendly approach is not a peripheral component, but becomes part of the architecture of the industrial development model itself.

The benefits of this approach are threefold and interrelated: economic, environmental, and social.

From an economic perspective, implementing sustainable practices within an industrial park organized according to the EIP model creates direct mechanisms for reducing operating costs. Optimizing energy consumption, more rational use of water and integrated waste management reduce operating expenses for enterprises. Furthermore, increasing resource efficiency improves productivity per unit of input, increasing the economic margin and strengthening the competitive position in the market. In a context where international supply chains and European Union markets are imposing increasingly stringent requirements on the environmental footprint of products, enterprises operating in a park with integrated environmental standards have easier and more secure access to these markets. Thus, environmental performance becomes a strategic asset for export.

From the environmental dimension, the EIP approach contributes to the systematic reduction of pollution and the reduction of greenhouse gas (GHG) emissions. Through integrated management and cooperation between enterprises, the pressure on air, water and land is reduced. Rational use of water, waste heat recovery, material recycling and industrial symbiosis minimize waste and emissions. Unlike fragmented individual interventions, the EIP model creates a synergistic effect, where environmental benefits are multiplied through collective action.

From the social dimension, the benefits are equally important. An industrial park that operates with high environmental standards and increased transparency creates more sustainable relationships with the surrounding community. Pollution reduction and responsible resource management increase the social acceptability of industrial activity. Transparency in reporting and communication on environmental performance strengthens trust between industry, authorities and citizens. In addition, the integration of environmental standards is often accompanied by improved working conditions, investments in occupational safety and health and the enhancement of organizational culture within enterprises.

In this sense, the EIP is not just a technical model aimed at energy optimization or waste reduction. It represents a transformation of the industrial development paradigm: from a linear, resource-intensive model focused on short-term production, towards an integrated, circular model oriented towards long-term sustainability. This transformation implies institutional reorganization, a change in management methods and the adoption of a new industrial culture where economic and environmental performance are not in conflict, but are complementary.

For Kosovo, where the industry is facing the challenges of energy transition and increasing demands for compliance with European standards, the environmentally friendly approach through the EIP model represents a realistic and structured way to increase competitiveness without compromising sustainability. Therefore, the importance of this approach goes beyond the technical level and becomes a key element of the modern industrial development strategy.

1.5 Scope of Analysis and Objects Included

This analysis focuses on three industrial parks with different developmental and structural characteristics, which represent three different phases of the life cycle of industrial infrastructure in Kosovo. The selection of these three cases is not accidental; it allows for an in-depth comparative analysis between the greenfield and retrofit models, as well as the identification of differentiated approaches for transformation towards the Eco-Industrial Park (EIP) model.

The three parks included in the analysis are:

Rahovec Industrial Park (Opterushë)

A *greenfield* project, in the development phase. As a new park, it offers the most favorable opportunity for integrating sustainability principles from the planning and design phase. In this context, Rahovec represents a typical case where the EIP model can be incorporated into the initial design structure, through the planning of energy infrastructure, water management, spatial organization of plots and the creation of conditions for industrial symbiosis. The fact that the park is under development means that the costs of adapting to the EIP model are lower compared to an existing park, as interventions can be made before the consolidation of physical and operational structures.

Lipjan Industrial Park (Qylage)

This park is also classified as a *greenfield*, but with an additional essential characteristic: strategic location. Its positioning near major road corridors and urban centers creates high potential for economic development, for attracting investments and for integration into regional supply chains. Lipjan offers the opportunity to develop as a reference model for new industrial parks in Kosovo, testing a more advanced approach to integrated planning. Being in its initial phase, it can become a demonstration park for the implementation of EIP standards, combining territorial advantage with sustainable design.

Shtime Technology Park

Unlike the first two cases, the Shtime Technology Park is a functional and operational park, with active businesses and consolidated infrastructure. This park represents a *retrofit case*, where the transformation towards the EIP model cannot be achieved through initial design, but through gradual and structured interventions in an already existing system.

The main challenge in this case lies in integrating sustainable practices without disrupting the operation of existing enterprises, as well as in harmonizing the interests of active businesses with the objectives of the green transition. The transformation of this park requires detailed analyses of energy consumption, waste management, water use and the potential for industrial symbiosis, as well as the construction of an institutional mechanism for joint management.

The structural difference between these three parks is fundamental for comparative analysis and for the formulation of differentiated recommendations. Greenfield and retrofit represent two different intervention paradigms:

- In the greenfield cases (Rahovec and Lipjan), the main focus is the integration of EIP principles in the design, spatial planning and initial investment phase.
- In the retrofit case (Shtime), the focus is on the progressive transformation of an existing structure through optimization, institutional restructuring, and cooperation between enterprises.

This methodological distinction is critical, because the tools, costs, duration, and implementation mechanisms differ significantly between these two approaches. A greenfield park offers greater flexibility in design, but requires strategic vision from the outset. A retrofit park requires more careful intervention, in-depth analysis of existing systems, and change management strategies.

In this sense, the inclusion of these three cases creates a strong analytical basis for:

- identifying gaps in relation to EIP standards,
- comparing structural potentials and limitations,
- developing transformation scenarios tailored to each park,
- formulating strategic recommendations differentiated according to development typology.

Therefore, the scope of analysis is not just a description of the three locations, but a methodological platform that enables testing the applicability of the EIP model in different structural contexts within the same national industrial framework.

1.6 Legal Framework of the European Union and the Republic of Kosovo in Function of the Development of Industrial Parks and the Transition towards Eco-Industrial Park (EIP)

The development of industrial and technological parks in Europe is not regulated by a single legal instrument, but by an integrated system of policies and legislation that combines economic development with environmental protection, fair competition and long-term sustainability. In the European Union, industrial parks are considered not only as production areas, but as territorial units with integrated environmental, social and institutional responsibilities. This approach is in line with the transition towards a green economy and the circular economy model, which constitutes the conceptual basis of the **Eco-Industrial Park (EIP) model**.

The European Union regulatory framework

There is no specific directive in the EU that directly regulates industrial parks. However, their operation and development are influenced by a wide range of directives and policies covering regional development, competitiveness, environmental protection and industrial safety.

In the economic and territorial dimension, industrial parks are linked to the European Union's cohesion and regional development policies. Public investments in industrial infrastructure are supported by financial instruments such as the European Regional Development Fund and the Cohesion Fund, which require that infrastructure projects are sustainable, transparent and contribute to the green transition. At the same time, state aid and competition rules require that subsidies for the development of industrial parks are justified, proportionate and transparent to avoid market distortions.

In the environmental dimension, the EU legal framework consists of several key directives that directly affect the planning and operation of industrial sites. The **Environmental Impact Assessment Directive (2011/92/EU, amended by 2014/52/EU)** requires industrial and infrastructure projects to be analysed for their environmental impacts before their approval. The **Industrial Emissions Directive (2010/75/EU)** establishes the integrated pollution control system and requires the use of best available techniques (BAT). In the field of water, the **Water Framework Directive (2000/60/EC)** sets objectives for the protection of water bodies and the control of discharges. Meanwhile, the **Waste Framework Directive (2008/98/EC)** establishes the waste management hierarchy and the “polluter pays” principle, creating the legal basis for the circular economy and for industrial symbiosis practices.

In addition, other directives relevant to industrial sites include **the Environmental Noise Directive (2002/49/EC)**, which requires noise mapping and management plans, and **the SEVESO III Directive (2012/18/EU)** on the prevention of major industrial accidents involving dangerous substances. These instruments create a regulatory architecture requiring integrated management of environmental impacts and industrial risks.

Legal framework of the Republic of Kosovo

The Republic of Kosovo, in the framework of harmonization with the *acquis communautaire* and obligations arising from the Stabilization and Association Agreement, has developed an extensive legal package covering the development of industrial parks and environmental protection.

In the developmental and institutional dimension, the main legal basis is **Law No. 08/L-208 on Industrial and Technological Parks**, which regulates the establishment, administration, management, promotion and monitoring of industrial and technological parks in Kosovo. This law defines the institutional competencies, the way the park is organized and the relations with the economic operators operating within it.

In the environmental dimension, the legal framework consists of a package of sectoral laws reflecting the main directives of the European Union. **The Law on Environmental Protection** constitutes the general basis of the environmental management system and defines the principles, instruments and institutional responsibilities for environmental protection. **The Law on Environmental Impact Assessment** establishes the procedures for assessing the environmental impacts of development projects and integrates environmental considerations into the planning phase.

In the field of resource management and pollution, Kosovo has adopted a series of laws harmonized with EU directives. **The Law on Water** regulates the protection and use of water resources and establishes a system of discharge permits. **The Law on Waste** establishes the principles of the circular economy, the hierarchy of waste management and the responsibility for hazardous waste. **The Law on Air Protection from Pollution** establishes standards for air quality and the control of atmospheric emissions. Meanwhile, **the Law on Noise Protection** regulates permitted noise limits and measures to protect communities from the acoustic impacts of industrial activities.

An important element of this framework is **the Climate Change Law**, which sets out policies and instruments for reducing greenhouse gas emissions and adapting to climate change, directly influencing the way industrial and energy infrastructure is planned.

In addition to laws, Kosovo has also adopted secondary legislation addressing industrial hazards and environmental accidents. In this context, the Administrative Instructions for the Prevention of Major Accidents with Dangerous Substances reflect the requirements of **the SEVESO Directive**, setting out requirements for hazard identification, emergency plans and incident reporting.

The importance of the legal framework for the Eco-Industrial Park model

The legal framework of the European Union and that of the Republic of Kosovo create a complete normative basis for the development of industrial parks in accordance with the principles of sustainability

and integrated pollution control. However, formal legal compliance does not automatically guarantee environmental and institutional performance at the park level.

Eco-Industrial Park model represents an advanced phase of implementation of this legal framework. It does not create a new legal regime, but integrates and operationalizes existing legislation through a coordinated management system at the park level, which includes environmental performance monitoring, shared infrastructure services, risk management and ongoing reporting.

In this context, the analysis of industrial parks in Rahovec, Lipjan and Shtime aims to assess not only their compliance with existing legislation, but also the institutional and infrastructural capacity to move towards **Eco-Industrial Park standards**, identifying existing gaps and the potential for transition towards European industrial and environmental management practices.

Table: EU legal framework and harmonisation in Kosovo legislation on industrial parks and the EIP model

Field / Policy	EU Directive or Framework	Relevant legislation in Kosovo	Implication for Industrial Parks and the EIP model
Industrial development and park management	EU cohesion policies and state aid rules (State Aid Rules)	Law No. 08/L-208 on Industrial and Technological Parks	It establishes the institutional basis for the creation and management of parks, rules for users, and the role of public institutions in the development of industrial infrastructure.
General framework of environmental protection	Principles of EU environmental policy and the environmental acquis	Law No. 03/L-025 on Environmental Protection	It establishes the general principles of environmental management, institutional responsibilities and environmental control instruments.
Environmental impact assessment	Directive 2011/92/EU (EIA), amended 2014/52/EU	Law No. 08/L-181 on Environmental Impact Assessment	Requires environmental impact analysis for industrial and infrastructure projects prior to park development.
Strategic environmental assessment	Directive 2001/42/EC (SEA)	Law on Strategic Environmental Assessment	Integrates environmental considerations into development plans and territorial planning documents.
Integrated industrial pollution control	Directive 2010/75/EU (Industrial Emissions Directive – IED)	Legal framework for integrated pollution control and	Requires the application of best available techniques (BAT) and integrated permits for industrial

		environmental permitting (IPPC)	installations with pollution potential.
Water protection	Directive 2000/60/EC (Water Framework Directive)	Law No. 04/L-147 on Waters	Establishes a permit system for industrial discharges and the protection of water bodies.
Waste management and circular economy	Directive 2008/98/EC (Waste Framework Directive)	Waste Law	Establishes the waste management hierarchy, source separation and responsibility for hazardous waste.
Air defense	EU Air Quality Directives	Law on the Protection of Air from Pollution	Sets air quality standards and limits on industrial emissions.
Noise in the environment	Directive 2002/49/EC (Environmental Noise Directive)	Law on Noise Protection	It sets permissible noise limits and requires mitigation measures in industrial areas near communities.
Climate change	EU climate policies and the European Green Deal, the Green Agenda	Climate Change Law	It sets targets for reducing greenhouse gas emissions and promotes clean energy and energy efficiency.
Major industrial accidents	Directive 2012/18/EU (SEVESO III)	Administrative instructions for the prevention of major industrial accidents	It establishes requirements for the identification of industrial hazards, emergency planning and management of hazardous substances in industrial areas.

2. OBJECTIVES OF THE ANALYSIS

2.1 Main Objective

The main objective of this analysis is to create a comprehensive and structured assessment of the readiness of the three industrial parks for transition towards the Eco-Industrial Park (EIP) model, as well as to draft a strategic transformation plan that is institutionally feasible in Kosovo conditions.

This objective implies more than a technical analysis of the existing situation. It includes:

- Assessment of infrastructural, environmental and institutional capacities;
- Analysis of compliance with the EIP principles and national strategic objectives;
- Identifying structural and operational gaps;

- Developing a transformation framework that takes into account budgetary constraints, administrative capacities and the regulatory context.

In this sense, the analysis aims not only to identify shortcomings, but to provide an applicable, adaptable and scalable model for transforming industrial parks into platforms for sustainable industrial development.

2.2 Specific Objectives

To operationalize the main objective, the analysis focuses on four fundamental areas that constitute the axis of the Eco-Industrial Park model: water management, waste management, ecological infrastructure and energy from renewable sources.

1. Water Management

In this area, the analysis aims to assess in detail the existing water supply and sewage systems in each park, including:

- The structure of internal networks,
- Treatment of industrial and sewage waters,
- Stormwater management.

A key element is the identification of the need for a joint wastewater treatment plant, as a mechanism for cost reduction and better pollution control. The analysis also includes an assessment of the risk of soil and groundwater contamination, particularly in the context of the lack of integrated monitoring systems.

The objective is not just legal compliance, but the creation of a collective management system that reduces environmental pressure and improves resource performance at the park level.

2. Waste Management

Waste management is one of the most critical components for the transition to the EIP model. The analysis focuses on:

- Identification of the main waste flows by business sectors;
- Their classification (ordinary, industrial, hazardous);
- Evaluation of current treatment and disposal practices.

A crucial dimension is the analysis of the potential for recycling and material recovery at the park level. This includes identifying opportunities for industrial symbiosis, where waste or by-products from one enterprise can be used as input for another.

This objective aims to transition from a linear "produce-use-dispose" model to a circular model with reduced costs and increased resource productivity.

3. Green Spaces and Ecological Infrastructure

Ecological infrastructure is treated as a functional component and not just an aesthetic one. The analysis aims to assess:

- The existence and quality of green spaces within the park;
- Integration of buffer zones between the park and residential areas;
- The park's capacity for adaptation to climate change.

Green spaces contribute to dust reduction, noise attenuation and microclimate improvement. Their strategic integration increases the social acceptability of the park and reduces conflicts with the surrounding community.

Within the EIP, ecological infrastructure is considered part of the climate risk management system and territorial resilience.

4. Energy from Renewable Sources

The energy dimension is a key axis of the transition towards a Green Industry. The analysis includes:

- Assessment of solar potential in each park
- The possibility of creating energy communities at the park level;

The objective is to assess whether parks can gradually shift towards the production and consumption of renewable energy collectively, reducing dependence on traditional sources and lowering the carbon footprint.

2.3 Expected Results

The analysis aims to produce concrete, measurable and usable results for decision-making.

First, a Gap Analysis Matrix will be developed, which will compare the current state of each park with the indicators and prerequisites of the EIP model. This matrix will serve as an objective basis for identifying structural, technical and institutional deficiencies.

Secondly, a list of intervention priorities will be prepared, differentiated by park and by typology (greenfield / retrofit), taking into account urgency and impact.

Third, a Roadmap will be drafted, which will structure the transition in time phases (short-term, medium-term and long-term), with clear objectives and implementation mechanisms.

Fourth, a framework of monitoring indicators will be developed, enabling the measurement of progress in the economic, environmental and social performance of the parks.

3. METHODOLOGY

3.1 Analytical Approach and Study Design

The study is built on a multi-dimensional analytical approach, which reflects the complexity of the transition towards the Eco-Industrial Park (EIP) model and the combination of economic, environmental,

social and institutional dimensions. Since the analysis aims not only at the technical assessment of the current situation, but also at the formulation of a strategic transformation plan, the methodological design is conceived to combine different sources and methods of analysis.

In this context, the study includes:

- Documentary analysis of strategic literature, development plans and existing technical studies;
- Technical assessment on the ground to understand the real infrastructural and functional condition of each park;
- Semi-structured interviews with institutional stakeholders and business representatives;
- Comparative analysis in relation to the international EIP model.

The approach is based on data triangulation, meaning that findings are not based on a single source of information, but are verified through a combination of documentary sources, interview evidence, and field observations. This triangulation ensures analytical validity and reduces the risk of biased interpretation of the data.

The methodology is built in line with the objectives of the analysis (Chapter 2) and the strategic framework of industrial development and Green Industry (Chapter 1), ensuring coherence between the context, objectives and assessment method.

3.2 Data Sources

To ensure a comprehensive assessment, various data sources were used, divided into two main categories: secondary sources and primary sources.

In documentary terms, the analysis is based on:

- Feasibility studies of relevant parks;
- Municipal Development Plans (MDPs) and spatial planning documents;
- National strategic documents, including the Strategy for Industrial Development and Business Support 2030;
- Legal and regulatory documents relevant to economic zones, environment and energy.

In terms of primary data, the following were carried out:

- Consultations with representatives of the Ministry of Industry, Entrepreneurship and Trade (MINT);
- Interviews with representatives of the respective municipalities;
- Consultations with representatives of KIESA;
- Interviews with active or potential businesses within the parks;
- Focus groups with the surrounding community, with the aim of assessing the social dimension and public perception.

This combination of sources has enabled not only documented technical analysis, but also in-depth understanding of the institutional dynamics, business expectations, and social impact of industrial parks.

3.3 International Reference Framework – EIP Framework v2.0

To ensure a structured analysis comparable to international practices, the study is based on the Eco-Industrial Park Framework v2.0.

This framework is built on four main pillars:

1. Governance (Environmental Performance) – which includes water, waste, energy, emissions and resource efficiency management.
2. Social Performance – which includes community relations, working conditions, transparency and social impact.
3. Economic Performance – which includes competitiveness, resource productivity, investment potential and financial sustainability.
4. Governance – which includes institutional structures, park management mechanisms, transparency, reporting and stakeholder involvement.
5. Performance - Each park was analyzed against these four pillars, identifying the level of compliance with the EIP criteria and existing gaps. This enabled a unified comparative approach between the greenfield park (Rahovec and Lipjan) and the retrofit park (Shtime), as well as the formulation of differentiated recommendations.

3.4 Methodological Limitations

Like any analytical study, this analysis faces certain methodological limitations, which have been taken into consideration when interpreting the results.

First, there is a lack of accurate and systematized data on the amount of water consumption and waste generation at the park level. The lack of a reporting system at the park level limits the quantitative analysis of environmental performance.

Secondly, the Rahovec Industrial Park and the Lipjan Industrial Park are still in the development phase, which means that some of the assessments are based on planning documents and not on actual operational performance.

Third, the lack of an integrated institutional mechanism for collective park management in some cases makes it more difficult to assess the governance dimension according to EIP standards.

However, despite these limitations, the analysis is based on sufficient and reliable data to formulate strategic conclusions and actionable recommendations. The triangulation of sources, the use of the EIP framework, and the integration of interviews with key stakeholders provide a solid basis for the comparative assessment and for the design of the transformation plan.

4. CONTEXT AND CURRENT STATUS OF INDUSTRIAL PARKS

4.1 Current status of industrial parks in Kosovo

The development of industrial parks and economic zones in Kosovo is part of the policies for the development of the private sector and for the improvement of the investment climate. These initiatives are undertaken mainly by **the Ministry of Industry, Entrepreneurship and Trade (MINT)** and **the Kosovo Investment and Enterprise Support Agency (KIESA)**, in cooperation with the respective municipalities. Their aim is to create organized spaces for the development of production and processing activities, by providing common infrastructure and more favorable conditions for businesses.

According to **the Study on Economic Zones in Kosovo**, industrial and economic zones are distributed in several municipalities of the country and constitute one of the main policy instruments for regional economic development. In these zones, mainly manufacturing and processing enterprises operate, which constitute over 80% of the activities of businesses located in economic zones, while the rest includes trade and service activities.

Based on the analysis of this study and institutional documents, industrial parks and economic zones have been established or planned in several municipalities of Kosovo, including: Drenas, Mitrovica, Lipjan, Shtime, Rahovec, Suhareka, Vushtrri, Viti and Podujeva. In most cases, these zones have been created on public lands and are planned to serve as centers for the development of manufacturing, logistics and other economic activities that have potential for export and for the creation of new jobs.

An important element in the development of these zones is the way they are organized and administered. According to **the Study on Economic Zones in Kosovo**, based on the provisions of the legislation on industrial and technological parks, the administration of the parks can be carried out by different institutions, depending on the method of their financing and establishment. In cases where the main investment is made by the Government of Kosovo, the administration can be carried out by central institutions in cooperation with the relevant municipality, while in other cases the administration can be carried out by the municipality or the investor financing the project.

However, in practice, most economic zones in Kosovo are administered by the municipalities in whose territory they are established, while a special case is **the Industrial Park in Drenas**, which is administered by the Ministry of Industry, Entrepreneurship and Trade in cooperation with the Municipality of Drenas.

One of the most analyzed cases in institutional documents is **the Drenas 2 Industrial Park**, which is planned as an expansion of the existing industrial park in this municipality. According to the feasibility study for this project, the park is planned on an area of about **36.6 hectares** and is located in a strategic location near the Pristina–Peja highway, providing good access to the main transport network in the country.

This park is conceived as an organized industrial zone that will provide plots for manufacturing and processing activities, as well as common infrastructure for businesses, including electricity supply, water, road network and other supporting services. Its aim is to create a more favorable environment for investments, attract local and foreign businesses and contribute to the creation of new jobs.

The study also emphasizes that industrial parks are an important component of the program for creating workspaces and for the development of the private sector, as they enable the gathering of businesses in an organized space and create better conditions for cooperation between enterprises, for the exchange of services and for the development of production chains.

However, the analysis of the current situation shows that the development of economic zones in Kosovo also faces several challenges. One of the main challenges is related to the gradual development of infrastructure within the parks, as in many cases public investments in infrastructure are implemented in phases and the establishment of businesses begins before its full completion. Another challenge is related to the park management model, where the lack of specialized management structures in some areas may affect the coordination of services and the further development of the park.

In general, the analysis of existing documents and studies shows that industrial parks in Kosovo are in a phase of gradual development, where basic infrastructure and institutional frameworks have been established in a number of municipalities, but where there is still a need to strengthen park management, improve common infrastructure and integrate the most advanced industrial and environmental development practices. In this regard, the experience of existing parks, such as the case of Drenas, provides an important basis for the planning and development of new industrial parks in the country.

4.2 Rahovec Industrial Park (Opterushë)

4.2.1 Introduction

The Industrial Park in Opterushë, in the administrative territory of the Municipality of Rahovec, represents one of the most important initiatives for the development of economic-industrial zones in Kosovo. The park is conceived as a planned industrial zone that aims to attract manufacturing and processing activities, with a special emphasis on sectors related to the economic potential of the Dukagjini region, such as agro-processing industry, light manufacturing and logistics services.

The park covers an area of about 35 hectares and is currently in the phase of developing the basic infrastructure. Public investments in this park have included the construction of the internal road network, the sanitary and stormwater sewer system, as well as the design of a joint wastewater treatment plant. These investments aim to create the infrastructural base for the development of an organized and functional industrial zone.

From a sustainable industrial development perspective, the Rahovec Industrial Park presents a special case for analysis, because it is a greenfield park, meaning that its development starts from an initial phase without existing industrial activities. This creates an important opportunity for the integration of sustainable industrial development standards from the planning and design phase of the park.

In this context, the park's analysis is oriented towards assessing its compliance with the Eco-Industrial Park (EIP) principles, which require that industrial development be based on a combination of shared infrastructure, effective park governance, and cooperation between businesses for the most efficient use of resources.

4.2.2 General Description of the Park

Location and territorial context

The Rahovec Industrial Park is located in the village of Optrushë, in an area with a rural-industrial character in developmental transition. The positioning of the park in this area creates a functional connection between industrial activities and the agricultural sector that characterizes the local economy of Rahovec and the Dukagjini region.

The park's location is relatively far from dense residential areas, which reduces the risk of social and environmental conflicts that often arise in industrial zones located near urban centers. At the same time, the proximity to agricultural lands creates potential for the development of agro-processing industries and the integration of circular economy models.

In terms of infrastructure access, the park is connected to the regional road network, enabling transport of goods and relatively good access to regional markets.

Spatial and infrastructural capacities

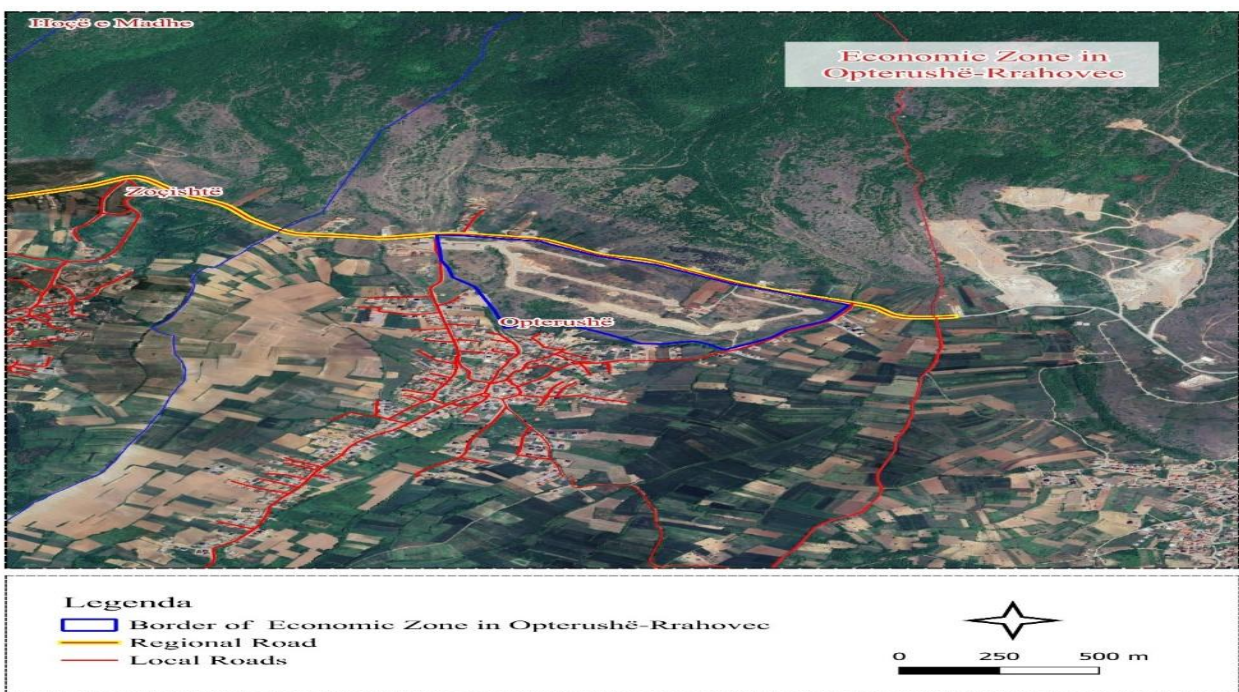


Figure 1. Rahovec Industrial Park Location (Optrushë)

The park is designed as an organized industrial zone with planned parceling and an internal road network that enables the circulation of transportation vehicles and the distribution of industrial activities within the park.

The park's infrastructure capacities include:

- internal road network with main axes and distribution nodes;

- sanitary and stormwater sewer system;
- drainage system for rainwater management;
- project for a joint wastewater treatment plant.

These infrastructural elements create the technical basis for the development of a controlled and organized industrial zone, which is an important prerequisite for the development of industrial parks according to the Eco-Industrial Park model.

Planned structure of industrial activities

Although the park is currently not populated with businesses, its design aims to attract industrial activities that include:

- processing industry;
- agri-food industry;
- light manufacturing industries;
- warehouse and logistics services.

This structure is in line with the economic potential of the region and creates opportunities for the development of industrial clusters and for the establishment of links between the manufacturing and agricultural sectors.

4.2.3 Water Management

Industrial and sanitary waters

One of the most important components of the park's environmental infrastructure is the system designed for sewage and wastewater treatment.

The project envisages the construction of an integrated sewage and industrial sewage network that collects wastewater from all industrial plots and directs it to a common treatment plant. This plant is designed to operate with biological treatment technology and include components for preliminary treatment and stabilization of wastewater.

In the context of the development of Eco-Industrial Parks, the existence of a common water treatment plant constitutes an essential element of the park's infrastructure, because it enables centralized control of industrial emissions and reduces the risk of soil and groundwater pollution.

However, to ensure the effective functioning of this system, it is necessary to establish mechanisms for monitoring wastewater parameters and to define clear standards for industrial discharges by operators that will be located in the park.

Rainwater management

The park project also includes an atmospheric drainage system that aims to manage surface runoff of rainwater and prevent flooding within the park's territory.

In the context of Eco-Industrial Parks standards, stormwater management should also integrate elements of blue-green infrastructure, which include retention ponds, infiltration areas, and green corridors that help reduce runoff and improve water quality.

4.2.4 Waste Management

Since the park is currently in the development phase and there are no active industrial operators yet, the waste management system is not yet operational.

However, based on the planned structure of industrial activities, it is expected that several categories of waste will be generated in the park, including:

- industrial waste from manufacturing processes;
- packaging waste;
- metal and plastic waste;
- organic waste from the agro-food industry;
- hazardous waste such as industrial oils and chemicals.

To ensure sustainable management of this waste, it is necessary to create a common system for the collection, separation and transfer of industrial waste in the park.

This system should include a joint waste management center, temporary storage for hazardous waste, and contracts with licensed operators for their treatment and recycling.

4.2.5 Green Spaces and Ecological Infrastructure

Green spaces constitute an important component of the sustainable development of industrial parks, because they contribute to improving environmental quality and reducing the negative impacts of industrial activity.

The park project includes functional green areas and protective belts along road axes and critical infrastructure.

In Eco-Industrial Parks standards, these spaces have several main functions:

- reducing dust and noise from industrial activities;
- improving the park's microclimate;
- rainwater management;
- preserving biodiversity and the local landscape.

However, to achieve these objectives, it is necessary to set clear standards for the minimum percentage of green areas and for their maintenance at the park level.

4.2.6 Energy and Renewable Resources

The Rahovec Industrial Park has considerable potential for the integration of renewable energy, especially due to its greenfield character and the large areas of industrial facilities that will be built in the future.

Installing photovoltaic systems on the roofs of industrial buildings and in parking spaces can contribute to reducing energy consumption from the electrical grid and reducing greenhouse gas emissions.

In addition, the use of LED lighting systems and intelligent energy management technologies can significantly improve the park's energy efficiency.

However, the development of these systems requires coordination with energy grid operators and the creation of a sustainable financial model for clean energy investments.

4.2.7 Analytical Conclusion

The analysis of the Rahovec Industrial Park shows that the park has a strong infrastructural base and considerable potential for sustainable industrial development.

The greenfield character of the park creates an important opportunity for the integration of Eco-Industrial Park standards from the planning and development phase.

However, to achieve this objective, it is necessary that in addition to the development of physical infrastructure, an effective system of governance and management of the park be created, which will ensure the coordination of industrial activities and the monitoring of environmental performance.

Only through the combination of technical infrastructure, institutional governance and cooperation between businesses, can the Rahovec Industrial Park develop into a successful Eco-Industrial Park model and contribute to the economic and environmental development of the region.



Figure 1 Field photo - Rahovec Industrial Park (Opterushë)

4.3 Lipjan Industrial and Technological Park (Qylagë)

4.3.1 General Description

The Industrial and Technological Park in Lipjan, located in the cadastral area of Qylaga, represents one of the most important planned industrial development projects in Kosovo and one of the main initiatives of the municipality to create a structured zone for industrial and technological investments. The zone has been identified in the municipal spatial planning documents and has been established in accordance with the legislation on economic zones and industrial parks, providing a legal and institutional basis for its development.

The concept of the park has been developed through a feasibility study that analyzed the economic, environmental, legal and administrative dimensions of the project, in accordance with the requirements of the legislation for industrial and technological parks in Kosovo. The study foresees the development of basic industrial infrastructure and the creation of conditions for the establishment of manufacturing and service businesses in an organized and planned space.

The park is conceived as a **greenfield industrial zone**, which means that its development is carried out on free land without the legacy of existing industrial infrastructure. This fact constitutes an important advantage for the integration of modern industrial development standards and for the potential implementation of the Eco-Industrial Park (EIP) model, as the infrastructure and operational rules can be integrated already at the design stage.

From a development point of view, the park extends over a considerable area of about **57 hectares**, creating sufficient space for the development of industrial, logistical and support activities. The development master plan foresees the parcelling of the area for industrial activities, an internal road network for industrial transport, spaces for warehouses and support services, as well as administrative and technical areas.

An important aspect of the current state of the park is that it **has begun to gradually become populated**. Currently, one industrial operator is located within the park, while another is in the process of locating and building its production capacities. This development marks the initial phase of the park's operation and shows that the area is starting to attract investment.

However, from the perspective of sustainable industrial development and the Eco-Industrial Park model, this early phase of population also represents a critical moment for the responsible institutions. The establishment of businesses before the full functionalization of the collective infrastructure (especially for water and waste) can create risks for the management of environmental impacts in the future. For this reason, it is essential that the process of population of the park develops in parallel with the construction and functionalization of joint environmental and park management systems. A particular issue that was mentioned by the representatives of **the Lipjan municipality is the determination of the location for a regional waste landfill in the vicinity of the industrial park. The proximity of a landfill constitutes a significant constraint to the development of the industrial park, negatively impacting the perception and decision-making of potential investors, the image of the park, as well as compliance with Eco-Industrial Park (EIP) standards.**

From a strategic perspective, the geographical position of the park significantly increases its development potential. The area is located in the western part of the Lipjan municipality, close to major road corridors and relatively close to the Pristina International Airport, creating favorable conditions for the development of export-oriented manufacturing and logistics industries.

The combination of this strategic position with the considerable territorial area and structured spatial planning makes the park one of the projects with the greatest potential for sustainable industrial development in Kosovo.

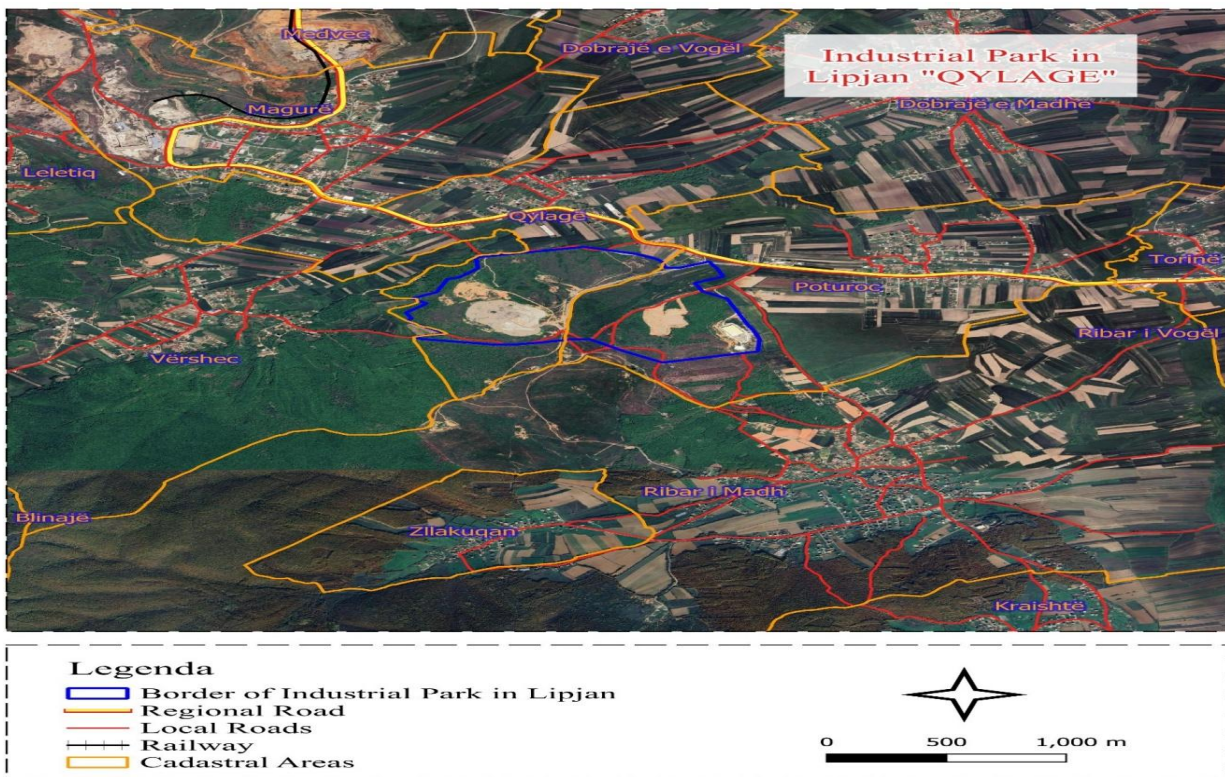


Figure 2 Location of the Industrial Park in Lipjan (Qylagë)

4.3.2 Water Management

Water management constitutes one of the most critical components of the development of the industrial park in Lipjan, as industrial activities can potentially generate significant impacts on water resources if not managed in a controlled manner.

The feasibility study foresees that all industrial units will be connected to a centralized water supply and sewage system, creating the basis for an integrated water management system within the park. In accordance with the requirements of the environmental analysis, the study should include a plan for water supply and treatment of industrial and wastewater, as part of the environmental impact assessment and environmental feasibility of the project.

From a planning perspective, this approach represents a positive step towards collective management of industrial waters, as the centralized system enables better control of discharges and reduces the risk of diffuse pollution.

The analysis of the documentation shows that some important elements of water management are not addressed in detail. In particular, the study does not contain a clear specification of wastewater treatment

technology, treatment plant capacities or discharge standards that should be applied to industrial operators.

From the perspective of the Eco-Industrial Park model, a collective wastewater treatment system (CETP/WWTP) is considered an essential element for the sustainable management of environmental impacts. Through such a system, centralized monitoring of pollutant parameters can be achieved, operating costs for businesses can be reduced, and opportunities for technical reuse of treated water can be created.

Another dimension that remains relatively underdeveloped in the documentation is stormwater management. In current planning, drainage infrastructure is conventionally addressed through sewer networks, but there is no evidence of the integration of nature-based solutions such as retention ponds, bioswales or natural infiltration systems.

In contemporary standards of sustainable industrial parks, these elements are considered important for adapting to climate change and reducing the risk of urban flooding.

4.3.3 Waste Management

Waste management constitutes another critical component of the functioning of the industrial park and its compliance with sustainable industrial development standards.

The feasibility study foresees that each industrial operator will provide space for temporary waste storage and cooperate with licensed operators for their treatment and transportation. This approach is in line with the legal framework for waste management in Kosovo and represents the standard management model at the company level.

In addition, the planning documentation foresees the creation of a joint waste management facility within the industrial park. This element is particularly important for the development of the park according to the Eco-Industrial Park concept, as it enables the organization of waste flows collectively and the creation of opportunities for recycling and reuse of materials.

The analysis of the documentation shows that this concept remains at the planning level and has not been accompanied by detailed analyses of the waste flows expected to be generated by the park's industrial activities. Also, mechanisms for the management of hazardous waste, which constitutes an important component in several industrial sectors, have not been identified.

In the context of developing a sustainable industrial park, waste management must evolve from the traditional landfill model towards a circular economy system, where waste from one industry can be used as raw material for another industry within the park.

4.3.4 Green Spaces and Ecological Infrastructure

The green spaces in the Lipjan industrial park have been treated mainly in terms of urban planning and aesthetics, as part of the spatial organization of the industrial area. The master plan foresees green areas and open spaces that contribute to the functional organization of the park and to the improvement of its visual quality.

From the perspective of developing sustainable industrial parks, green spaces should not be considered only as a decorative element, but as an integral part of the park's ecological infrastructure.

The existing documentation does not clearly define the minimum percentage of greenery, the ecological function of these spaces, or their role in managing stormwater and protecting biodiversity.

In international practices of ecological industrial parks, green spaces serve as buffer zones between industrial activities and residential areas, as well as contributing to the reduction of air and noise pollution.

4.3.5 Energy and Renewable Resources

The park's energy infrastructure is addressed in the feasibility study mainly in terms of electricity supply and the construction of a distribution network for industrial operators.

The documentation does not contain an analysis of the potential for renewable energy, energy efficiency, or carbon emissions reduction at the park level.

From a sustainable industrial development perspective, this represents an important opportunity for future advancement. The large surfaces of industrial facilities create considerable potential for the installation of rooftop photovoltaic systems (PV), while the shared energy network can create the basis for the implementation of energy micro-grids and intelligent energy management systems.

Analytical Conclusion for Lipjan Park

The analysis of the Industrial and Technological Park in Lipjan shows that the area represents one of the most structured industrial planning projects in Kosovo, with a clear legal, territorial and infrastructural basis. The greenfield concept of the park creates favorable conditions for the integration of modern standards of industrial development and for the potential implementation of the Eco-Industrial Park model.

The analysis also shows that the park is currently in a transitional phase between planning and operation. The beginning of the population of the park with industrial operators is a positive indicator of investor interest, but at the same time creates the need for the collective environmental infrastructure and the park management system to develop in parallel with the establishment of businesses.

If this balance is not maintained, there is a risk that industrial development will outpace infrastructural capacities and create environmental and management challenges in the future. For this reason, the current phase of the park's development should be used to establish clear operating standards, to functionalize the collective infrastructure and to gradually integrate the principles of Eco-Industrial Parks development.



Figure 3 Photo from the field - Lipjan Industrial Park (Qylagë)

4.4 Shtime Technology Park (RETROFIT)

4.4.1 General description of the park and municipal context

The Shtime Technology Park represents the most important **retrofit (brownfield) case** in the context of this study. Unlike parks in the planning or initial development phase, this park is already a functional industrial area with active manufacturing businesses, real employment and environmental impacts occurring on a daily basis. This makes the Shtime Technology Park a **practical reference case for the analysis of the transformation towards the Eco-Industrial Park (EIP) model**, because any gaps in governance, infrastructure or institutional coordination are directly reflected in the operational and environmental performance of the park.

According to **the Draft Municipal Development Plan of Shtime 2025–2033**, the park is located along the **Shtime–Ferizaj highway (M-25.3)** and covers an area of about **10.70 hectares**. Currently, about **12 businesses operate in the park**, which employ approximately **300 regular workers** and about **100 seasonal workers**, while the value of realized and planned investments in this area is estimated at about **9.97 million euros**.

In institutional terms, municipal documents link the establishment of the park to **the 2013 decision**, while initial infrastructure investments began in **2014** and were completed around **the end of 2017**, with the involvement of **the Municipality of Shtime** and the **Kosovo Investment and Enterprise Support Agency (KIESA)**. This period coincides with the phase of development of the park's basic infrastructure, including the internal road network and basic services for the establishment of economic operators.

From the point of view of industrial development and park management, this situation reflects two main characteristics of this park:

First, the park has achieved a **significant level of economic consolidation**. The presence of a relatively stable number of businesses and a clear employment base creates the conditions for the development of shared services at the park level, such as water management, waste management, energy efficiency improvements and environmental performance monitoring systems. In this context, the park also has the necessary economic basis for the distribution of investment costs among economic operators.

Secondly, the development of the park has taken place in the form of a **retrofit process**, where the infrastructure and the operation of the businesses have been developed in parallel. In practice, this situation often results in technical fragmentation of infrastructure solutions, in a lack of standardization between operators and in the absence of an integrated management system at the park level. This is a typical characteristic of many retrofit industrial zones in the region and in Europe.

From the perspective of industrial planning and international practices for the development of **Eco-Industrial Parks**, an industrial park should not be considered only as a group of plots for economic activities. On the contrary, it constitutes an **integrated functional system**, which includes not only business plots, but also common infrastructure and services such as water supply and sewage networks, road access systems, security management and coordination mechanisms between operators.

This dimension is essential for the implementation of the **Eco-Industrial Park (EIP) model**. If management remains only at the individual level of each economic operator, then the park functions **de facto as an industrial parcel area**, and not as an integrated managed park. It is at this point that the results of the questionnaires and interviews conducted with businesses in the field have highlighted one of the main structural gaps in the current functioning of the park.

In this sense, the Technological Park in Shtime represents a typical case where the economic basis of the park already exists, while the main challenge is related to **the transition from a fragmented operating model to an integrated park management model**, in accordance with the principles of the Eco-Industrial Park.

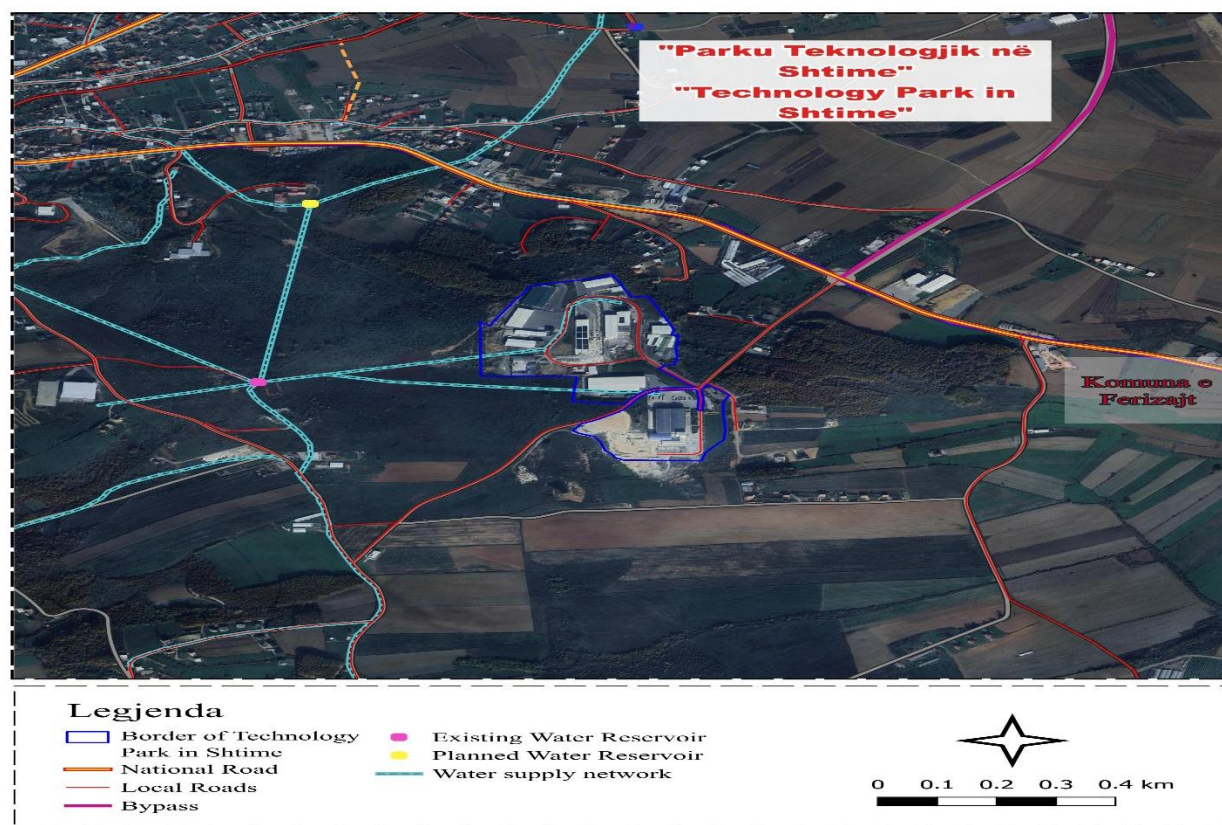


Figure 4 Location of the Shtime Technology Park

4.4.2 Water management (findings from questionnaires/interviews and implications for the Eco-Industrial Park)

The most important empirical finding for the Shtime Technology Park – confirmed by questionnaires, interviews with businesses and field observations – is that the functional separation of waters (sanitary, industrial and atmospheric waters) does not exist, while their management is mainly carried out individually by economic operators. This situation is treated in this report as a structural gap, and not only as a technical deficiency, because it simultaneously affects three essential dimensions of the park's functioning: environmental compliance, park governance and the monitoring, reporting and verification (MRV) system.

In practice, the lack of a separate and clear water management system creates serious difficulties in controlling and monitoring discharges, as well as increasing the risk of environmental impacts at the park level.

Why is this gap critical in a retrofit park?

In a retrofit industrial park, where infrastructure has been developed gradually and often without common standards, the lack of separation of water networks creates a chain of operational and environmental risks.

First, discharge control becomes unstable. When sanitary and industrial waters are mixed or connected in a non-standardized manner to the existing network, it becomes very difficult to identify the source of pollution and take targeted remedial measures. This increases the risk of non-compliance with environmental legislation requirements, even in cases where economic operators may possess environmental documents or permits at the company level.

Second, monitoring at the park level becomes practically impossible. The Eco-Industrial Park concept requires the systematic measurement and reporting of performance indicators, such as water consumption, discharge volumes, basic water quality parameters and potential environmental incidents. In the absence of measurement points, a clear network and common standards for connection and discharge, reporting remains largely declarative and unverifiable.

Third, the cost of infrastructure upgrades increases over time. The longer one operates with improvised or fragmented solutions, the more the so-called “technical blockage” of the system increases – i.e. the creation of various connections, interference with internal routes and conflicts with the daily operation of businesses. As a result, the subsequent separation of networks becomes more complex and costly.

Eco-Industrial Park model requirements for water management

Within the Eco-Industrial Park concept, water management is not limited to the construction of sewage networks, but includes the creation of an integrated water management system at the park level. This system usually includes several main elements:

- mapping and diagnostics of existing water networks;
- establishing common standards for connecting operators to the network and for pre-treatment of industrial waters;

- developing collective solutions for water treatment, especially in cases where there is an economy of scale for the construction of joint plants;
- Continuous monitoring of emissions through measurable indicators and network checkpoints.

Implication for the Technology Park in Shtime

In the case of the Technology Park in Shtime, the implementation of such a system should be carried out in a phased manner, because the park is already populated with active businesses and infrastructural interventions should minimize disruptions to their operations.

In this context, the process should begin with the establishment of a regulatory framework and monitoring system, including standards for grid connection and data reporting. In parallel, mapping and technical diagnostics of existing grids should be carried out to identify points where grids intersect or where pollution risks exist.

In the second phase, priority segments of the network can be intervened, gradually dividing the water networks and establishing monitoring points. In a more advanced phase, collective solutions for the treatment of industrial waters can also be developed, such as the construction of a joint treatment plant or the application of hybrid models that combine pre-treatment at the company level with collective treatment at the park level.

In this way, improving water management in the Shtime Technology Park can be transformed from an infrastructural challenge into a key element of the park's transformation towards the Eco-Industrial Park model, while simultaneously improving environmental performance, operational transparency and resource efficiency.

4.4.3 Waste management (findings from questionnaires/interviews and implication for Eco-Industrial Park)

One of the most important findings resulting from the questionnaires, interviews with businesses and field observations is related to waste management in the Shtime Technology Park. The results show that currently none of the operators has a structured and integrated waste management system, while at the park level there is no common organization for this issue. Specifically, basic elements of a management system at the park level are missing, such as a common center for waste collection and separation, unified rules for their treatment and traceability mechanisms.

This finding is particularly important in the context of the Eco-Industrial Park concept, because one of the main pillars of this model is the circular economy and the efficient use of resources. It is precisely in the area of waste management that an industrial park can create added value through cooperation between businesses, but this is impossible in the absence of an organized system at the park level.

The problem in retrofit parks: beyond individual solutions

In many cases of retrofit industrial parks, the main question often boils down to whether businesses have individual waste management contracts. However, in the logic of the Eco-Industrial Park model, the issue is not only whether individual solutions exist, but whether there is a common system that makes waste management structured and monitorable at the park level.

Such a system should ensure that waste management is:

- standardized, through waste separation at source and setting minimum requirements for operators;
- controllable, in order to enable inspection and verification of management practices at the park level;
- measurable, through recording the quantity, category and destination of waste;
- safe, especially for hazardous waste such as industrial oils, solvents, paints, industrial sludge and contaminated packaging;
- oriented towards recycling and industrial symbiosis, and not just towards waste disposal or disposal.

In the absence of these elements, waste management remains fragmented and difficult to monitor at the park level.

Why is waste stream analysis essential for EIP?

In the Eco-Industrial Park approach, waste is not only considered as a problem that must be eliminated, but also as a potential material resource that can be returned to the economic cycle as secondary material.

For this reason, one of the fundamental steps in transforming an industrial park towards the EIP model is to conduct a waste and material flow analysis. This analysis includes identifying the types of waste generated by businesses, their quantity, the current treatment method, and the potential for recycling or use by other industrial activities.

Without such an inventory of material and waste flows, the development of industrial symbiosis remains only a theoretical concept. For this reason, for the Technology Park in Shtime, the implementation of such an analysis should be considered a fundamental step in the transition from a reactive model of waste management to a circular model of resource use.

Implications for reputation and institutional risk

In a functioning industrial park, the lack of a common waste management system is not only a technical issue, but also a matter of reputation and public trust.

The local community and responsible institutions require verifiable assurance on how industrial waste is managed. If there is no common center for waste collection and separation, if there is no traceability and regular reporting at the park level, then the perception of uncontrolled industrial operation increases, even in cases where economic operators may have individual environmental permits.

In this sense, the development of an organized waste management system in the Shtime Technology Park is a key element not only for improving the environmental performance of the park, but also for increasing transparency and institutional trust.

4.4.4 Green spaces and ecological infrastructure

In retrofit industrial parks, green spaces are usually limited due to existing zoning and previous development of infrastructure and industrial facilities. However, in the Eco-Industrial Park approach, greenery is not considered only as an aesthetic or decorative element, but as a functional environmental infrastructure.

Green spaces can contribute to reducing dust and noise, improving the park's microclimate, managing rainwater, and increasing the social acceptability of industrial activities by the local community.

In the case of the Shtime Technology Park, a realistic approach is to avoid major structural interventions and focus on high-impact retrofit measures, which can be implemented without disrupting business operations.

These measures may include:

- creating linear green belts along the internal roads of the park, where sufficient space exists;
- developing green buffer strips on the park boundaries, especially in proximity to residential areas and where the park interacts with other functional spaces;
- integrating green solutions for rainwater management, where technically possible without major infrastructure interventions.

This dimension is directly related to the findings of the water management analysis. In cases where the separation of water networks is not complete and the drainage system is conventional, green infrastructure can serve as a practical solution for reducing runoff load and increasing the environmental resilience of the park.

4.4.5 Energy and renewable energy sources – rapid potential, but requires park-level governance

As a functional industrial park, **the Shtime Technology Park** has a real and continuous consumption of electricity for production processes and other operational activities of businesses. This situation creates a significant potential for rapid benefits through improved **energy efficiency** and increased use of **renewable energy sources**.

However, in the absence of a coordinated management mechanism at the park level, investments in energy and energy efficiency technologies tend to be implemented in a fragmented manner by each economic operator. Thus, although improvements can be made at the individual company level, they do not create a **common energy and environmental profile of the park**, as required by the **Eco-Industrial Park model**.

Field observations and interviews with businesses indicate that some operators in the park have already started investing in **installing solar panels on the roofs of their facilities** as a way to reduce energy costs and increase energy independence. However, these initiatives are currently **individual and uncoordinated at the park level**, and therefore do not create a common energy strategy for the entire park.

In the context of the Eco-Industrial Park model, the improvement of the park's energy performance should be developed in a structured manner and coordinated at the park level. To approach this model, interventions are needed at three main levels.

First, it is necessary to create **an energy database of the park**, which includes measuring energy consumption by businesses, analyzing load profiles and identifying losses or energy saving potential. This phase constitutes the basis for planning further interventions and setting energy performance improvement objectives.

Secondly, it is recommended to implement a package of measures called **immediate-benefit measures**, which can be implemented with relatively small investments and which bring immediate reductions in energy consumption. These measures may include replacing conventional lighting with LED lighting, using high-efficiency electric motors, optimizing compressor systems and improving energy load management in production processes.

Third, a more advanced step towards the Eco-Industrial Park model is the development of **joint projects for the production of energy from renewable sources**, in particular through the installation of photovoltaic systems on the roofs of industrial buildings. In this case, various cooperation models can be applied, such as collective procurement of equipment, development of a common financial model for energy investments, or coordination of installations in order to create a common energy profile for the park.

It is important to note that the Eco-Industrial Park model does not require all economic operators to invest in the same way or at the same time. However, it does require the existence of **a coordination mechanism at the park level**, which sets common objectives for energy performance, defines concrete measures for improvement and ensures periodic monitoring and reporting of progress.

In this way, renewable energy and resources can become one of the main elements for the gradual transformation of the Shtime Technology Park towards a **sustainable industrial development model**, in accordance with the principles of the Eco-Industrial Park.

4.4.6 Prerequisites for Eco-Industrial Park

The real problem in the Shtime Technology Park is not "permits", but "management"

One of the most important analytical messages emerging from the analysis of the Shtime Technology Park is the difference between the **individual compatibility of economic operators** and **the performance of the park as an integrated functional unit**.

On the one hand, many of the economic operators operating in the park possess individual environmental documentation and operate in accordance with the formal requirements of the relevant legislation. This means that at the company level there may be a certain level of compliance with legal requirements, including environmental permits and other regulatory obligations.

On the other hand, the **Eco-Industrial Park concept** does not focus only on the individual compliance of operators, but on **the overall performance of the park as a managed and coordinated system**. This includes the existence of common mechanisms for infrastructure management, for monitoring environmental performance and for coordinating activities between businesses.

The results of questionnaires and interviews conducted with businesses in the Shtime Technology Park show that, although operators may have individual documents and comply with certain legal

requirements, **there is no functional organization at the park level**. In practice, this means that the park operates more as a group of independent industrial plots, rather than as an integrated industrial unit with common management mechanisms.

In the absence of a **functional park management unit**, it is difficult to realize the basic elements of an Eco-Industrial Park. Such a structure is essential to create a coordinated management system and to guarantee the implementation of common standards at the park level.

Specifically, a park management unit must have the capacity to:

- **establish and implement common operating rules** related to infrastructure use, waste management, water discharges and other environmental practices;
- **standardize the operating practices of businesses**, in order to ensure a common minimum level of environmental and technical performance;
- **organize common services for the park**, such as waste management, water treatment, security services and infrastructure maintenance;
- **collect and analyze data on the park's performance**, through monitoring and reporting systems of environmental and economic indicators;
- **manage environmental and industrial risks**, as well as coordinate communication with public institutions and the local community.

In this context, the analysis of the Technology Park in Shtime shows that the main challenge for the transformation of the park towards the Eco-Industrial Park model is not necessarily related to the lack of legislation or individual permits, but to the **lack of a functional management structure at the park level**.

Therefore, the creation or formalization of a **dedicated park management unit** should be considered one of the main prerequisites for advancing the park towards an integrated industrial development model, which is based on institutional coordination, more efficient use of resources, and continuous improvement of environmental and economic performance.

Analytical conclusion for the Shtime Technology Park

The analysis of the current state of the Shtime Technology Park shows that this park represents a typical **retrofit (brownfield) case** in Kosovo, where the development of economic activities and infrastructure have grown in parallel, without an integrated management system at the park level. The park already has a consolidated economic base with active manufacturing businesses, sustainable employment and significant investments, which creates real potential for its development towards the **Eco-Industrial Park (EIP) model**. However, the findings from the questionnaires, interviews and field observations show that the main challenges are not related to the lack of economic activity, but to **the lack of common management structures and systems**.

The most prominent structural problem is related to the management of environmental infrastructure. There is no functional separation of sanitary, industrial and atmospheric water networks in the park, while their management is mainly carried out individually by operators. This situation creates difficulties in controlling discharges, identifying potential sources of pollution and monitoring environmental parameters at the park level. As a result, although businesses may have individual permits, **monitoring**

and reporting of environmental performance at the park level remains fragmented and insufficient, making it difficult to establish a complete MRV (monitoring, reporting and verification) system.

A similar situation is also present in the field of waste management. The analysis shows that there is currently **no organized system at the park level for the separation, collection and treatment of waste,** while management practices depend on the individual solutions of the operators. The lack of a common waste management center and a traceability system at the park level limits the opportunity to develop circular economy practices and to identify the potential for **industrial symbiosis**, where waste or by-products of one business can be used as resources for another business.

In terms of ecological infrastructure and green spaces, the park faces typical constraints for retrofit areas, where the existing parceling and previous development reduce the possibility of major spatial interventions. However, there are opportunities for targeted interventions, such as linear greening along internal roads, the creation of buffer strips, and the integration of green infrastructure elements for stormwater management and improvement of the park's microclimate.

From an energy and renewable energy perspective, the Shtime Technology Park has significant potential for improving energy efficiency and integrating solar energy systems. However, without coordination mechanisms at the park level, energy investments remain fragmented and do not create full collective benefits. For this reason, a coordinated approach at the park level – including the establishment of a baseline of energy consumption, the implementation of energy efficiency measures and the development of joint renewable energy projects – would be an important step towards transforming the park into a more sustainable industrial model.

In summary, the analysis shows that the main challenge for the Shtime Technology Park is not the lack of economic activity or individual business permits, but **the lack of a functional park management structure and integrated shared services systems.** Without a management unit to coordinate the park's operation, set common standards, and organize collective services, the park functions more like an industrial parcel zone than a managed industrial park.

Therefore, the transformation of the Shtime Technology Park towards the **Eco-Industrial Park model** requires, first of all, strengthening governance at the park level, through the creation or formalization of a management structure that will be responsible for coordinating shared services, setting environmental standards and organizing a system for monitoring and reporting on the park's performance. Only on this institutional basis can investments in environmental infrastructure, waste management, energy efficiency and industrial symbiosis be effectively developed, making the park a practical example of the transition towards a sustainable industrial park.



Figure 5 Field photo - Shtime Technology Park

5. DATA ANALYSIS

5.1 Results from interviews with businesses

Interviews with businesses were conducted with the aim of understanding the functioning of economic activities within or near industrial parks, current environmental management practices, and operators' perceptions of the further development of the parks towards the Eco-Industrial Park (EIP) model.

The number and distribution of interviews reflected the real state of development of each industrial park analyzed.

In the **Shtime Technology Park**, interviews were conducted with almost all active businesses operating within the park. This has enabled a relatively complete overview of the way the park operates and the current practices of businesses. The results show that most enterprises are focused on manufacturing and processing activities and operate with significant investments in infrastructure and equipment. Businesses have expressed interest in improving common infrastructure, especially in the areas of water, energy and waste management. However, the interviews also confirm that currently resource and waste management practices are mainly individual and there is no integrated system at the park level.

In the **Lipjan Industrial Park**, the interview was conducted with the only business currently operating in the park. Another business is in the establishment phase and is expected to start operating in the near future. Due to this low level of population, the analysis in this park has focused more on the development potential of the park and the need to create a functional management structure that will be able to organize shared services from the initial phase of development.

In the **Industrial Park in Rahovec**, an interview was conducted with a business operating in the vicinity of the park and directly affecting the economic and environmental activities of the surrounding area. Although this business is not formally part of the industrial park, its activity has an impact on the space where the park is planned to be developed. This situation reflects a typical challenge in the development of industrial zones in Kosovo, where the formal boundaries of the park and the surrounding economic activities can interact and create mutual impacts on the environment and on the use of infrastructure.

In general, interviews with businesses show that economic operators see the development of industrial parks as an opportunity to improve business conditions and expand their activities, but at the same time emphasize the need for better infrastructure and greater coordination at the park level. An important finding is that most businesses operate with individual approaches to environmental management, while cooperation at the park level is still limited.

5.2 Results from questionnaires

Questionnaires were conducted with residents living near the three analyzed industrial parks – in Shtime, Lipjan and Rahovec – in order to understand the local community's perception regarding the social, economic and environmental impacts of these projects.

The results of the questionnaires show that in general **there have been no significant complaints from the local community** regarding the current functioning of the industrial parks. The majority of respondents stated that they have not experienced any direct negative impacts from industrial activities so far.

However, some respondents expressed concern that environmental problems may arise in the future if industrial activities are not carried out in accordance with environmental standards and relevant legislation. These concerns are mainly related to air pollution, waste management and industrial water discharges.

On the other hand, a significant portion of respondents stated that they are informed about industrial park projects and see them as a positive development for the community. The most frequently cited benefit by residents is **local economic development and the creation of new jobs**, which is considered one of the most positive impacts of these projects.

This indicates that, at the community level, the perception of industrial parks is generally positive, but there is also a clear expectation that industrial activities be developed in a controlled manner and in accordance with environmental standards.

5.3 Results from focus groups and institutional consultations

Focus groups and consultations were held with representatives of relevant institutions at central and local levels, including the respective municipalities, institutions responsible for the development of economic zones, and institutions that have a role in environmental protection and economic development.

Discussions with institutions have confirmed that the development of industrial parks is considered one of the main instruments for stimulating investments and for the development of the private sector in Kosovo. The institutions have emphasized that the creation of these zones aims to provide organized infrastructure for businesses and contribute to increasing the competitiveness of the economy.

Institutional consultations have also highlighted several challenges in the development and management of industrial parks. One of the main challenges is related to institutional coordination and the park management model, as in some cases there is a lack of dedicated management structures that would organize shared services and monitor activities at the park level.

The institutions have also emphasized the need to improve common infrastructure, especially in the field of water, waste and energy management, as well as for the gradual integration of sustainable development principles into the functioning of industrial parks. A particular issue that was mentioned by representatives of **the Lipjan municipality is the designation of a location for a regional waste landfill in the vicinity of the industrial park. The proximity of a landfill constitutes a significant constraint to the development of the industrial park, negatively impacting the perception and decision-making of potential investors, the image of the park, as well as compliance with Eco-Industrial Park (EIP) standards.**

In general, the results of the focus groups and consultations show that there is institutional support for the further development of industrial parks, but at the same time, the need is identified to strengthen their governance and to develop common management systems that would enable their functioning according to the standards of sustainable industrial parks.

5.4 Comparison between the three parks

The comparative analysis of the three case studies – Rahovec Industrial Park, Shtime Technological Park and Lipjan Industrial Park – is an important element to understand not only the current state of these parks, but also the dynamics of the development of industrial zones in Kosovo in general. Each of these parks represents a different phase of the development cycle of an industrial zone: from the initial planning and development phase (Rahovec), to the consolidation phase with limited economic activities (Lipjan), to a functional park with consolidated industrial activity (Shtime).

This comparison is particularly relevant in the context of this study, as it provides insight into how industrial parks evolve from a territorial planning concept into a functional economic and institutional system. At the same time, the analysis shows that the challenges identified are not only related to the physical infrastructure, but also to the park's governance model and the way shared services are organized.

Analysis element	Rahovec Industrial Park	Shtime Technology Park	Lipjan Industrial Park
Development status	Park under development (greenfield)	Functional park (retrofit/brownfield)	Park in initial phase
Number of active businesses	There are no businesses within the park; one business operates nearby.	About 12 active businesses	1 active business, another in the process of being established
Economic activity	Potential for development; limited activity	Consolidated production and processing activity	Limited economic activity
Interviews with businesses	1 business interviewed (outside the park)	Almost all park businesses have been interviewed	1 business interviewed
Water management	Infrastructure still under development	There is no functional separation of networks.	System not yet developed
Waste management	There is no common system.	Individual management	Individual management

Energy and efficiency	Opportunity for integrated planning	Potential for collective action but no coordination	Opportunity for integration from the start
Community perception	Mostly neutral or positive	Mostly positive	Mostly positive
Management model	Not consolidated	Lack of a functional management structure	Early stage creation opportunity

Table 1 Comparative table of three industrial parks

Comparative analysis of park development

One of the most important differences between the three parks is related to their **level of economic and institutional development**. The Technology Park in Shtime is currently the most developed case among the three parks analyzed. The presence of a relatively large number of businesses and consolidated production activity create a real economic basis for the functioning of the park. In this sense, Shtime represents a functional industrial park, where economic and environmental impacts are real and daily. This makes this park a particularly important case for the analysis of current operating practices and for the identification of institutional and infrastructural gaps.

The analysis of interviews and field observations shows that the development of the park in Shtime has occurred gradually and not always in a coordinated manner. Infrastructure and economic activities have developed in parallel, creating a situation where individual operators have developed specific solutions for resource and waste management. As a result, the park functions more as a collection of industrial plots than as an integrated industrial management system.

In contrast, the Lipjan Industrial Park represents a much earlier stage of development. The limited number of businesses currently operating in the park indicates that the process of investor placement is still in its early stages. This situation also presents an important strategic opportunity. Unlike retrofit parks, where infrastructure and operational practices are already in place, in Lipjan there is an opportunity for park management standards and environmental infrastructure to be planned and established at an early stage. This can help avoid the problems that typically arise in parks that develop gradually without a clear management structure.

The Industrial Park in Rahovec represents another specific situation, where the park is still in the development phase and there are no businesses located within its formal boundaries. The field analysis and interviews show that in the vicinity of the park there are economic activities that interact with the area where the park development is planned. This interaction shows that the planning and management of the park cannot be limited only to the formal boundaries of the park plots, but must also take into account the economic and territorial context of the surrounding area.

Best models and lessons from analysis

From the comparative analysis of the three case studies, several important lessons can be drawn for the development of industrial parks in Kosovo.

First, the experience of the Shtime Technology Park shows that the economic development of the park can be achieved even without an integrated management system, but at a certain stage this lack begins

to create structural limitations for further development. The lack of a functional management structure at the park level limits the possibility of organizing joint services and coordinating activities between businesses.

Secondly, the case of the Lipjan Industrial Park shows the importance of early planning of the infrastructure and the park management model. If these elements are integrated from the initial stage of development, it is easier to create a functional and sustainable industrial management system.

Third, the case of the Industrial Park in Rahovec shows that the development of industrial zones should also consider the economic activities that exist in the area surrounding the park. Integrating these activities into a more organized structure can contribute to a more sustainable development of the park and to improved coordination between businesses and institutions.

In summary, the comparative analysis of the three parks shows that the development of industrial parks in Kosovo is a gradual process that requires not only investments in physical infrastructure, but also the creation of governance and coordination mechanisms at the park level. This is particularly important in the context of the transition towards the Eco-Industrial Park model, where cooperation between businesses, joint resource management and monitoring of environmental performance are essential elements of the park's functioning.

5.5 Key Challenges and Opportunities

The analysis of data collected from interviews with businesses, questionnaires with the local community and consultations with public institutions, combined with the analysis of planning documents and field observations, allows the identification of a number of challenges and opportunities that affect the development and functioning of industrial parks in Kosovo. These challenges and opportunities are related not only to the infrastructural aspects of the development of the parks, but also to the way they are governed, to the organization of shared services and to the relationships between businesses, institutions and the local community.

Main challenges

One of the most important challenges identified during the analysis is the lack of dedicated structures for the management of industrial parks at the operational level. Although industrial parks are established within the framework of economic development policies and have a defined legal basis, in practice their management remains fragmented. In some cases, responsibilities are divided between central institutions and municipalities, while at the park level there is no functional structure that coordinates activities, organizes shared services and monitors the performance of the park.

Another challenge is related to the fragmentation of environmental infrastructure management, especially in parks that already have active businesses. As has been particularly evident in the case of the Shtime Technology Park, the management of water, waste and other resources is carried out individually by economic operators. The lack of an integrated system at the park level makes it difficult to control environmental impacts and create common mechanisms for monitoring and reporting on environmental performance.

A significant challenge is also related to the gradual and uneven development of infrastructure within industrial parks. In some cases, infrastructure is developed in phases and is not always complete at the time of business establishment. This situation can create constraints on the operation of enterprises and increase the costs of later infrastructure improvements.

From an institutional perspective, another challenge is related to inter-institutional coordination between the central and local levels. The development of industrial parks involves a large number of institutions, including institutions dealing with economic development, spatial planning, environmental protection and infrastructure management. In the absence of clear coordination mechanisms, the process of park development and management can become more complex and less efficient.

At the local community level, although the perception of industrial parks is generally positive, there are potential concerns about future environmental impacts. Some residents living near the parks have expressed concern that industrial development could lead to environmental problems if industrial activities are not carried out in accordance with environmental standards and relevant legislation.

Main options

In addition to the identified challenges, the analysis has also highlighted a number of important opportunities for the development of industrial parks in Kosovo.

First, there is a **legal and institutional basis that supports the development of industrial parks**, including legislation on industrial and technological parks, as well as environmental legislation that regulates aspects of environmental impact, waste management and water protection. This legal basis creates an important framework for the development of industrial parks in accordance with European standards.

Secondly, there is **considerable interest from businesses in developing activities in industrial parks**. Interviews with economic operators show that businesses see locating in industrial parks as an opportunity to improve operating conditions and expand their economic activities.

Another opportunity relates to **the potential for the development of shared services at the park level**. Due to the concentration of economic activities in a given space, industrial parks create opportunities for the development of collective systems for resource and infrastructure management, such as wastewater management, waste management, energy efficiency and the use of renewable energy sources.

Another important opportunity is related to **the development of cooperation between businesses within the park**, especially in terms of more efficient use of resources and the development of forms of industrial symbiosis. In this context, industrial parks can become platforms for cooperation between enterprises, where waste or by-products of one activity can be used as resources for another activity.

Overall, the analysis shows that industrial parks in Kosovo have considerable potential for further development, but realizing this potential requires strengthening park management mechanisms, improving shared infrastructure, and integrating sustainable development practices into their operation.

6. ANALYTICAL FRAMEWORK AND ASSESSMENT INDICATORS

To assess the current state of industrial parks and their potential for development towards the **Eco-Industrial Park (EIP) model**, it is necessary to establish a clear analytical framework that enables the systematic analysis of their performance. This analytical framework is based on the principles of sustainable development and international practices for the development of integrated industrial parks. In this study, the analytical framework is built on several key dimensions of analysis, which reflect the essential elements of the functioning of an industrial park: institutional governance, physical infrastructure, environmental performance and relations with the local community.

6.1. Main dimensions of assessment

Park governance and management

This dimension analyzes the institutional structures and management mechanisms that govern the functioning of the park. It includes elements such as the existence of a park management unit, coordination between institutions, internal park regulations, and mechanisms for monitoring and reporting performance.

Shared infrastructure and services

This dimension relates to the condition of the physical infrastructure and the availability of shared services for businesses operating in the park. This includes road infrastructure, energy and water supply, sewage system, wastewater management, and other services that support business operations.

Environmental performance

This dimension assesses how industrial activities impact the environment and whether mechanisms are in place to manage and monitor these impacts. It includes indicators related to waste management, water use, air emissions, energy efficiency, and the use of renewable resources.

Social dimension and community relations

This dimension analyzes the relationship between the industrial park and the local community. It includes the community's perception of industrial activities, the impact on employment and local economic development, as well as mechanisms for communication and consultation with the community.

Evaluation indicators

For each of the mentioned dimensions, a series of indicators were used that enable the assessment of the current state of industrial parks and the identification of gaps in relation to sustainable development standards.

These indicators include elements such as:

- the existence of a park management structure
- level of development of common infrastructure

- water and waste management system
- level of cooperation between businesses
- mechanisms for monitoring and reporting environmental performance
- local community perception of the park's impacts.

The use of this analytical framework enables a structured and comparable analysis of the three industrial parks included in this study. At the same time, it creates the basis for identifying existing gaps and for formulating recommendations for the transformation of these parks towards the **Eco-Industrial Park** model, where cooperation between businesses, efficient use of resources and integrated management of environmental impacts are central elements of the park's functioning.

6.2 Main Categories of Analysis

In order to assess in a structured way the current state and development potential of the analyzed industrial parks – Rahovec, Shtime and Lipjan – this study uses an analytical approach based on three main dimensions of sustainable development: economic, environmental and social. These categories represent the main pillars of the performance analysis of an industrial park and are consistent with the approach used in international practices for the assessment of Eco-Industrial Parks (EIP).

The analytical framework used in this study aims to identify not only the current state of each park, but also structural gaps and opportunities for improvement towards a more integrated and sustainable model of industrial development. In this context, the analysis is not limited to the infrastructural aspects of the parks, but also includes the way economic activities operate, environmental impacts and the relationship between the park and the local community.

Economic dimension

The economic dimension focuses on the analysis of the role of industrial parks in local economic development and in creating conditions for productive activities and investments. In this context, the analysis takes into account factors such as the level of population of the park, the structure of economic activities, the potential for further industrial development and the capacity of the park to attract new investments.

The results of the analysis show that the studied industrial parks are at different stages of economic development. The Technological Park in Shtime represents a relatively consolidated level of economic activity, with a significant number of active businesses and investments made in the manufacturing and processing sectors. This makes this park one of the most important cases for the analysis of the economic impact of industrial parks at the local level.

On the other hand, the Lipjan Industrial Park is in an initial phase of economic development, with a very limited number of economic operators. However, this situation creates opportunities for better planning of the park's economic development in the future, especially if the infrastructure and park management model are established in an integrated manner from the early stage of development.

The Industrial Park in Rahovec represents a case where economic activity within the park is still limited, but there is potential for future development due to the location and spatial planning of the area. The presence of economic activities in the vicinity of the park indicates that the area has potential for industrial

development, but the realization of this potential depends on the development of infrastructure and the creation of suitable conditions for investors.

Overall, the economic analysis shows that industrial parks in Kosovo have considerable potential to contribute to local economic development and job creation. However, this potential can only be fully realized if the economic development of the park is accompanied by improved infrastructure, strengthened management mechanisms, and the creation of conditions for cooperation between businesses.

Environmental dimension

The environmental dimension is one of the most important components of the analysis of industrial parks, especially in the context of the transition towards the Eco-Industrial Park model. This dimension analyzes how industrial activities impact the environment and whether sufficient mechanisms exist to manage and control these impacts.

From the analysis of data collected in the field and from interviews with businesses, it results that the management of environmental issues in the studied industrial parks is carried out at the individual level by economic operators. There is no integrated system at the park level for monitoring and managing environmental impacts.

One of the most important findings in this regard is related to water management. In particular, in the Technology Park in Shtime, the lack of functional separation of sanitary, industrial and atmospheric water networks has been identified. This situation makes it difficult to control discharges and monitor water quality at the park level.

In the field of waste management, the analysis shows that there are no organized systems at the park level for waste separation and treatment. Current waste management practices are individual and depend on the organization of each economic operator. The lack of a common waste management center and a traceability system limits the possibility of developing circular economy practices and creating forms of cooperation between businesses.

From an energy and renewables perspective, the analysis shows that there is considerable potential for improving energy efficiency in industrial parks. However, in the absence of coordination mechanisms at the park level, investments in energy efficiency and renewables are made individually and do not create full collective benefits.

Overall, the environmental analysis shows that although economic operators may have individual obligations to comply with environmental legislation, the lack of integrated systems at the park level limits the opportunity for more efficient resource management and better control of environmental impacts.

Social dimension

The social dimension of the analysis is related to the relationship between industrial parks and the local community, as well as the impact of these parks on the socio-economic development of the surrounding areas.

The results of questionnaires conducted with residents living near industrial parks indicate that the community's perception of these projects is generally positive. Most respondents stated that they have not experienced any direct negative impacts from industrial activities so far and see the development of industrial parks as an opportunity to improve the economic conditions of the area.

One of the most frequently cited benefits by the local community is the creation of new jobs and increased economic activity in the areas surrounding industrial parks. In this sense, industrial parks are perceived as an important factor for local economic development.

A number of respondents expressed concern that future industrial activities could create environmental problems if environmental protection standards and legislation are not rigorously implemented. These concerns are mainly related to air pollution, waste management and industrial water discharges.

In this context, the social dimension of the analysis shows that the development of industrial parks should be accompanied by clear mechanisms for communication and consultation with the local community, as well as reliable systems for monitoring and reporting environmental impacts. This is particularly important for maintaining community trust and ensuring the social acceptability of industrial projects in the long term.

In conclusion, the analysis of the three dimensions – economic, environmental and social – shows that the development of industrial parks cannot be assessed solely on the basis of economic activity. On the contrary, the sustainable functioning of these parks requires an integrated approach that combines economic development with responsible resource management and sustainable relations with the local community. This approach also constitutes the conceptual basis for the gradual transformation of industrial parks towards the Eco-Industrial Park model.

6.3 Key Performance Indicators (KPIs)

To systematically assess the performance of industrial parks and measure progress towards the **Eco-Industrial Park (EIP) model**, it is necessary to establish clear and measurable performance indicators. These indicators – known as **Key Performance Indicators (KPIs)** – serve as a tool for monitoring resource use, identifying gaps in infrastructure management and measuring the environmental impacts of industrial activities.

In this study, performance indicators have been selected based on international practices for the development of Eco-Industrial Parks and have been adapted to the context of the industrial parks analyzed in Kosovo. Due to the characteristics of the industrial activities in these parks and the data available from interviews and field analyses, the assessment has focused on four main areas: **water management, waste management, energy use and green infrastructure**.

Water management indicators

Water management is one of the most critical components of the environmental performance of industrial parks. Manufacturing and processing activities use significant amounts of water and at the same time generate wastewater that must be treated in a controlled manner.

In this context, the main indicators for assessing performance in water management include:

- **total water consumption at the park level**, which indicates the pressure that industrial activities exert on water resources;
- **water consumption per unit of production**, which enables the assessment of the efficiency of water use by economic operators;
- **the level of separation of water networks** (sanitary, industrial and atmospheric);
- **the existence of wastewater treatment systems** at the individual or collective level;
- **monitoring of discharged water quality parameters.**

The analysis of the case studies shows that in the analyzed parks, especially in the Technological Park in Shtime, the lack of functional separation of water networks and common treatment systems makes it difficult to monitor and control environmental impacts in this area. For this reason, the establishment of clear indicators for water management is an important step towards the creation of an integrated monitoring system at the park level.

Waste management indicators

Waste management constitutes another important component of the environmental performance of industrial parks. Manufacturing activities generate various types of waste, which must be managed in a controlled manner to avoid negative impacts on the environment and to enable resource recovery.

The main indicators for assessing performance in this area include:

- **the total amount of waste generated at the park level ;**
- **separation of waste by categories** (hazardous and non-hazardous);
- **the level of waste separation at source ;**
- **the percentage of waste that is recycled or recovered ;**
- **the existence of a traceability system for waste.**

The analysis of interviews with businesses and field observations shows that waste management is carried out individually by economic operators. The lack of a common waste management center and an organized system at the park level limits the opportunity for the development of circular economy practices and the creation of forms of industrial symbiosis between businesses.

Energy indicators

Energy is a key factor in the functioning of industrial activities and one of the main sources of environmental impacts of industry. For this reason, improving energy efficiency and using renewable energy sources are important elements of the Eco-Industrial Park model.

The main indicators for assessing energy performance include:

- **total energy consumption at the park level ;**
- **energy consumption per unit of production ;**
- **the level of implementation of energy efficiency measures** in the enterprise;
- **the percentage of energy produced from renewable sources ;**
- **the existence of collective energy projects at the park level.**

The analysis shows that in the studied industrial parks, investments in energy efficiency and renewable sources are carried out individually by businesses. The concentration of industrial activities in a common space creates potential for the development of collective projects, such as the installation of photovoltaic systems in industrial buildings or the development of joint programs for energy efficiency.

Indicators for greenery and ecological infrastructure

Green spaces and ecological infrastructure are important elements of sustainable planning of industrial parks. In addition to the aesthetic function, these elements contribute to improving environmental quality, reducing air and noise pollution, and improving stormwater management.

Key indicators in this area include:

- the percentage of the park's surface area dedicated to green spaces;
- the existence of green buffer zones;
- the use of green infrastructure solutions for stormwater management;
- the level of integration of green elements in park planning.

In retrofit parks, such as the Shtime Technology Park, the opportunities for creating green spaces are more limited due to the existing parceling and development. However, even in these cases there are opportunities for targeted interventions, such as greening along the park's internal roads and creating green belts at the park's borders.

In conclusion, the use of performance indicators creates an important basis for monitoring the functioning of industrial parks and for identifying areas where interventions are needed to improve resource management and environmental performance. These indicators also create the basis for the development of a system of **monitoring and reporting performance at the park level**, which is one of the essential elements of the transformation of industrial parks towards the Eco-Industrial Park model.

6.4 Summary of Inputs from Stakeholders

An important component of the analysis in this study is the integration of inputs received from key stakeholders involved in or affected by the development of industrial parks. These stakeholders include businesses operating within or near the parks, public institutions at central and local levels, and the local community living in the areas surrounding the industrial parks. The collection and analysis of these inputs was carried out through interviews with businesses, questionnaires with residents, and consultations with relevant institutions.

The approach used aims to create a balanced picture of the different perceptions and interests related to the development and functioning of industrial parks. For this reason, the compilation of inputs from stakeholders focuses not only on identifying existing problems, but also on highlighting opportunities for improving the management of the parks and for their development towards more advanced industrial management models.

Inputs from businesses

Businesses represent the main economic actors in industrial parks and therefore their perceptions and experiences are essential to understanding the real functioning of the parks. Interviews conducted with economic operators show that most businesses see locating in industrial parks as an opportunity to improve operating conditions and expand their economic activities.

In particular, businesses interviewed in the Shtime Technology Park have emphasized the importance of shared infrastructure for the efficient functioning of the park. They have identified as important issues the improvement of water management, the organization of waste management and the development of energy efficiency measures. At the same time, the interviews have shown that currently most of these issues are addressed individually by economic operators, due to the lack of an organized system at the park level.

In the Lipjan Industrial Park, interviews with the only business currently operating in the park indicated that the further development of the park depends largely on the establishment of new investors and the improvement of infrastructure and shared services. Meanwhile, in the Rahovec Industrial Park, interviews with businesses operating in the vicinity of the park highlighted the importance of coordination between existing economic activities and the development of the industrial park.

In general, inputs from businesses show that economic operators are interested in developing industrial parks and improving their infrastructure, but at the same time there is a need for greater coordination at the park level and for the creation of mechanisms that enable the development of shared services.

Inputs from the local community

Questionnaires conducted with residents living near industrial parks have provided important information about the local community's perception of the development of these industrial areas.

The results of the questionnaires show that in general the local community has not expressed many complaints regarding the current functioning of the industrial parks. The majority of respondents stated that they have not experienced any direct negative impacts from the industrial activities taking place in these areas so far.

Some respondents expressed concern that environmental problems may arise in the future if industrial activities are not carried out in accordance with environmental protection standards and legislation. These concerns are mainly related to the possibility of air pollution, waste management and industrial water discharges.

On the other hand, a significant portion of residents have stated that they have been informed about the industrial park development projects and see them as a positive development for the area. The most commonly cited benefit by the community is the creation of new jobs and increased economic activity at the local level.

These results show that the local community's perception of industrial parks is generally positive, but at the same time there is a clear expectation that industrial activities be developed in a controlled manner and in accordance with environmental standards.

Inputs from institutions

The consultations conducted with public institutions have provided an institutional perspective on the development and management of industrial parks in Kosovo. The institutions involved in the consultations have emphasized that the development of industrial parks is considered an important instrument for promoting investments and for the development of the private sector.

Discussions with institutions have also highlighted several challenges in the management and development of these industrial zones. One of the main challenges is related to inter-institutional coordination and the division of responsibilities between central institutions and municipalities. In addition, the need to create dedicated structures for the management of industrial parks at the operational level has been highlighted.

The institutions have also emphasized the importance of improving the common infrastructure of industrial parks and integrating sustainable development standards into their planning and operation.



Figure 6 Photos from meetings with institutions

Synthesizing inputs from stakeholders

The analysis of inputs from businesses, the local community and institutions shows that there is a general consensus on the importance of developing industrial parks for the economic development of the respective areas. At the same time, the inputs from the stakeholders highlight the need to improve the management of the parks, to develop shared infrastructure and to strengthen the mechanisms for monitoring and controlling environmental impacts.

In this sense, the summary of inputs from stakeholders reinforces the findings of the previous analysis and shows that the development of industrial parks should be based on an integrated approach that combines economic development with responsible resource management and continuous dialogue between institutions, businesses and the local community.

7. RECOMMENDATIONS AND MEASURES FOR ADVANCEMENT

Based on the analysis of the current situation of the industrial parks in Rahovec, Shtime and Lipjan, as well as the results of interviews with businesses, questionnaires with the local community and consultations with institutions, this chapter presents the main recommendations for improving the management and functioning of these industrial parks. The recommendations are oriented towards creating conditions for the development of industrial parks in accordance with the principles of sustainable development and the **Eco-Industrial Park (EIP) concept**.

The approach of the recommendations is based on the idea that improving the performance of industrial parks requires not only investments in physical infrastructure, but also strengthening park governance, developing shared services and creating mechanisms for cooperation between businesses. In this context, the proposed measures aim to address the gaps identified during the analysis and create a sustainable basis for the further development of these industrial zones.

Strengthening the park management structure

One of the main recommendations resulting from the analysis is the creation or formalization of a **functional park management unit**. In all three cases analyzed, industrial parks operate without a dedicated management structure that coordinates activities and services at the park level. This situation creates fragmentation in infrastructure management and limits the opportunity for the development of shared services.

The park management unit should have a role in coordinating the activities of economic operators, organizing shared services, and monitoring the park's performance. In addition, it should serve as a connecting point between businesses, public institutions, and the local community.

Development of common infrastructure

Another important recommendation relates to the development of shared infrastructure in industrial parks. The analysis has shown that in some cases the infrastructure has been developed gradually and is not integrated at the park level.

In this regard, it is recommended to improve water management systems, including the functional separation of sanitary, industrial and atmospheric water networks, as well as the development of collective solutions for the treatment of wastewater. It is also recommended to create joint waste management systems, which could include waste collection and separation centers at the park level.

Developing shared infrastructure not only improves the environmental performance of the park, but can also reduce operating costs for businesses operating in the park.

Improving resource management and energy efficiency

Another area where measures for improvement can be taken is related to more efficient management of resources, especially energy and water. Industrial parks offer good opportunities for the development of collective projects for energy efficiency and the use of renewable energy sources.

It is recommended that programs be developed at the park level to improve energy efficiency in enterprises, and that opportunities for installing solar energy systems in industrial buildings be examined. This can reduce energy consumption and improve the environmental performance of the park.

Developing cooperation between businesses

An important element of the Eco-Industrial Park concept is the cooperation between businesses operating in the park. The concentration of industrial activities in a common space creates opportunities for the exchange of materials and for more efficient use of resources.

In this regard, it is recommended to create mechanisms that enable cooperation between economic operators, for example through the development of platforms for the exchange of information on resources and waste generated by industrial activities. This could create opportunities for the development of **industrial symbiosis practices**, where the by-products of one activity can be used as resources for another activity.

Strengthening performance monitoring and reporting

To ensure the sustainable development of industrial parks, it is important to establish clear mechanisms for monitoring and reporting on the park's performance. This includes collecting data on resource use, waste management, and the environmental impacts of industrial activities.

Establishing such a monitoring system would enable the assessment of the park's progress towards improving environmental and economic performance and would create a reliable basis for reporting results to institutions and the local community.

Improving communication with the local community

The development of industrial parks should also be accompanied by improved communication and consultation with the local community. Although the results of the questionnaires show that the community's perception of industrial parks is generally positive, there is also concern about possible environmental impacts in the future.

For this reason, it is recommended that the park management and responsible institutions create mechanisms for regular communication with the local community and for informing it about the activities and impacts of the industrial park.

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In conclusion, the recommendations presented in this chapter aim to create a sustainable basis for the further development of industrial parks in Kosovo. The implementation of these measures can contribute to improving the economic and environmental performance of the parks, increasing cooperation between businesses and strengthening relations with the local community.

In the longer term, these measures could create the conditions for the gradual transformation of industrial parks towards the **Eco-Industrial Park model**, where economic development and environmental protection are integrated into a common management system.

7.1 Strategic Recommendations for the Rahovec Industrial and Technological Park (Opterushë)

entry

The Industrial and Technological Park in Opterushë, Municipality of Rahovec, represents one of the most important industrial development projects in Kosovo in recent years and is conceived as a planned economic zone for the manufacturing, processing and logistics industry. The park has an area of about **35 hectares** and is currently in the phase of developing the basic infrastructure, including the internal road network, the sanitary and stormwater sewer system and the design of a joint wastewater treatment plant.

greenfield character of the park represents an important strategic advantage, as it enables the integration of sustainable industrial development standards from the planning and design phase. Unlike existing industrial parks that require retrofit interventions to improve environmental performance, in Rahovec there is the possibility for the infrastructure, governance and management systems to be designed from the outset in accordance with the principles of the **Eco-Industrial Park (EIP)**.

The analysis of the current development of the park shows that although the physical infrastructure is being built, there are several important institutional and operational gaps that need to be addressed before the park can be populated with industrial operators. These gaps are mainly related to the lack of a park management structure, the lack of a common system for industrial waste management, and the need to establish environmental monitoring mechanisms and coordination between responsible institutions.

For this reason, the recommendations for the Rahovec Industrial Park focus primarily on **preventing environmental and operational problems before the park begins to be populated**, by establishing an integrated industrial management system that combines physical infrastructure, institutional governance, and environmental monitoring.

priority	Strategic Intervention	Analytical Description	Responsible institutions	Implementation deadline
SHORT-TERM	Establishing the park management structure	Establishing an operational structure for park management that coordinates operators, manages shared infrastructure and monitors environmental performance according to EIP principles.	MINT, Municipality of Rahovec, CHURCH	0–12 months
SHORT-TERM	Setting criteria for accepting businesses	Drafting criteria for the placement of industrial operators taking into account infrastructure capacity and the potential for industrial cooperation.	MINT, Municipality, CHURCH, park operator	6–18 months
SHORT-TERM	Operationalization of the water treatment plant	Operationalization of the collective system for the treatment of industrial and	MESP, Municipality,	1–2 years

priority	Strategic Intervention	Analytical Description	Responsible institutions	Implementation deadline
		sanitary waters to ensure discharge control and environmental protection.	MINT, park operator	
SHORT-TERM	Creation of a waste management center	Creating a common area for the collection and separation of industrial waste and contracting licensed operators for their treatment.	Municipality, park operator, MESP	1-2 years
SHORT-TERM	Basic environmental monitoring system	Establish a system for monitoring water, air and noise and for collecting data on energy and water use in the park.	Park operator, MESP	1–2 years
MEDIUM-TERM	Blue-green infrastructure integration	Development of green corridors and retention systems for stormwater management and improvement of the park's microclimate.	Municipality, park operator, CHURCH	2–3 years
MEDIUM-TERM	Energy efficiency program	Implementation of LED lighting systems, intelligent energy management and optimization of industrial processes.	Park operator, businesses, ME	2–3 years
MEDIUM-TERM	Platform for industrial symbiosis	Creating a collaboration platform between businesses for the exchange of industrial materials and resources.	Park operator, businesses	2–3 years
LONG TERM	Renewable energy integration	Development of projects for the installation of photovoltaic systems and the use of clean energy in the park.	Park operator, private investors, ME, ERO	3–5 years
LONG TERM	Certification according to EIP standards	Applying for certification according to international Eco-Industrial Park standards to increase the attractiveness for green investments.	MINT, the park operator	4–7 years

Table 2 Priority Table of Recommendations for the Rahovec Industrial Park

Strategic Interpretation of Recommendations

The recommendations for the Rahovec Industrial Park aim to ensure that the development of the park follows a sustainable industrial model that combines economic development with environmental protection. In this context, the current phase of the park's development is the most appropriate moment to establish the institutional and infrastructural foundations of an Eco-Industrial Park.

Critical interventions should focus on establishing the park's management structure and establishing environmental monitoring and control mechanisms. These measures are necessary to ensure that the park's population process develops in a controlled manner and does not create environmental or operational problems in the future.

In the medium and long term, the development of the park should focus on the integration of the circular economy, the use of renewable energy and the development of industrial symbiosis between operators. These measures will enable the park to gradually evolve towards a full Eco-Industrial Park model and serve as an example for the development of sustainable industrial parks in Kosovo.

7.2 Recommendations for the Lipjan Industrial and Technological Park (Qylagë)

The analysis of the current state of the Industrial and Technological Park in Lipjan shows that the area has a strong planning basis and a considerable development potential, but at the same time it is in a critical phase of transition from planning to operation. The beginning of the deployment of industrial operators shows that the park has started to function as an active economic space, but this situation requires that the responsible institutions take rapid measures to ensure that its development follows an organized and sustainable model.

An issue raised by representatives of the Lipjan municipality that should be taken into consideration is that the location for the construction of a regional sanitary landfill for waste has been designated near the park, and the proximity of a landfill constitutes a significant limitation for the development of the industrial park, as emissions such as unpleasant odors, gases and dust affect the quality of the environment and working conditions, reducing its attractiveness to potential investors, damaging the image of the park and making it difficult to comply with Eco-Industrial Park (EIP) standards.

The recommendations for the industrial park in Lipjan are structured in several priority levels that aim to address the main gaps identified in the gap analysis and create the conditions for the gradual development of the park according to the principles of Eco-Industrial Parks.

Creation of a dedicated structure for park management

One of the most important institutional interventions for the Lipjan industrial park is the creation of a dedicated structure for the management of the park. In the absence of a management entity with a clear operational mandate, the development of the park risks following a fragmented model where each operator operates individually, without coordination with other operators and without a common mechanism for the management of infrastructure and environmental impacts.

The park management structure should be responsible for coordinating shared services, monitoring environmental performance, administering operating rules for businesses, and communicating with

public institutions and the local community. Within the Eco-Industrial Park model, this structure is considered the key element that ensures the functioning of the park as an integrated economic and environmental system.

For this reason, it is recommended that the responsible institutions formalize as soon as possible the creation of a park operator or a management unit that will be responsible for the daily administration of the industrial zone.

Parallel development of collective infrastructure with the process of population of the park

One of the main risks identified in the analysis of the Lipjan park is related to the possibility that the establishment of businesses will occur faster than the construction of the collective environmental infrastructure. Given that one industrial operator has already been established and another is in the process of being established, it is important that the development of the park continues in a controlled and coordinated manner.

If businesses are placed before the operationalization of collective water treatment and waste management systems, there is a risk that operators will create individual temporary solutions, which may later be difficult or costly to integrate into the common park system.

For this reason, it is recommended that the process of granting plots and permits for the establishment of industrial operators be directly linked to the development of the park's collective infrastructure, especially in terms of water and waste management.

Construction and operationalization of the collective wastewater treatment system

Industrial wastewater management constitutes one of the most critical components for the sustainable operation of the industrial park. Analysis of the planning documentation shows that wastewater treatment is envisaged at a conceptual level, but the technical details of the treatment system or the plant capacities have not been determined.

In line with Eco-Industrial Parks standards, it is recommended that the industrial park in Lipjan develop a joint plant for the treatment of industrial and sanitary wastewater. This system would enable better control of discharges, reduce operating costs for individual operators, and improve environmental monitoring.

In addition to the construction of the treatment plant, it is important to design and build separate networks for industrial, sanitary and atmospheric waters. The separation of these networks is one of the main requirements for sustainable water management in modern industrial parks.

Organizing a waste management system at the park level

Another important component for the functioning of the industrial park is the organization of the waste management system. Although the feasibility study foresees the creation of a waste management space within the park, the mechanisms for organizing this system have not been defined.

It is recommended that the industrial park establish a joint center for the collection, separation and treatment of industrial waste. This center can serve as a coordination point for the management of waste produced by operators and for cooperation with licensed operators for their treatment.

In the medium term, the waste management system could evolve towards the development of circular economy practices and industrial symbiosis, where waste from one industry can be used as raw material for another industry within the park.

Establishing an environmental performance monitoring system

One of the main gaps identified in the park analysis is the lack of planning for an integrated system for monitoring environmental performance. Without such a system, it becomes difficult to assess the real impact of industrial activities and identify the interventions needed to improve environmental performance.

It is recommended that the industrial park develop a system for measuring, reporting and verifying key environmental indicators. This system should include monitoring water and energy consumption, waste generation, and key industrial emissions parameters.

Establishing such a monitoring system not only improves transparency and institutional control, but also creates the basis for attracting international funding for the development of sustainable industrial parks.

Integration of renewable energy and energy efficiency

In addition to water and waste management, industrial park development should also include measures to improve energy efficiency and integrate renewable energy sources.

Due to the large surface areas of industrial buildings and favorable solar exposure, the industrial park in Lipjan has considerable potential for the development of photovoltaic systems on the roofs of industrial buildings. The installation of such systems can contribute to reducing energy costs for businesses and reducing carbon emissions.

It is also recommended that the park's public lighting infrastructure be designed with energy-efficient technology and that in the future the possibility of creating energy micro-grids at the park level be considered.

Development of functional green spaces and ecological infrastructure

Green spaces in the industrial park should be treated not only as an aesthetic element, but as part of the ecological infrastructure of the park. For this reason, it is recommended that in the further development of the park, functional green areas be integrated that can contribute to the management of atmospheric waters, the reduction of air pollution and the improvement of the microclimate of the industrial area.

These spaces may include buffer zones between industrial activities and residential areas, ecological green corridors, and natural systems for stormwater management.

Strategic conclusion of recommendations

The recommendations for the Industrial and Technological Park in Lipjan aim to address the key gaps identified in the park analysis and create a strong foundation for its development according to contemporary standards of sustainable industrial development.

The current phase of the park's development, in which the area has begun to be populated with industrial operators, represents a crucial moment for the orientation of the park's development. If the collective infrastructure, management system and monitoring mechanisms are developed in parallel with the establishment of businesses, the industrial park in Lipjan has the potential to become a reference model for the development of Eco-Industrial Parks in Kosovo.

On the contrary, if industrial development precedes infrastructural and institutional capacities, there is a risk that the park will face environmental and management challenges that may be difficult to correct in later stages of development.

priority	Strategic Intervention	Analytical Description	Responsible institutions	Implementation deadline
SHORT-TERM	Creation of the park management unit	Establish an operational structure for park management that coordinates economic operators, manages shared infrastructure and monitors environmental performance in accordance with EIP principles.	MINT, Municipality of Lipjan, CHURCH	0–12 months
SHORT-TERM	Establishing operational rules for setting up businesses	Drafting rules and criteria for the placement of industrial operators, including environmental standards and integration into common park systems.	MINT, CHURCH, Park Management Unit, Municipality	6–18 months
SHORT-TERM	Establishing a baseline monitoring system (MRV baseline)	Establishing an initial system for measuring and reporting water, energy consumption and waste generation by industrial operators.	Park Management Unit, MESP	1–2 years
SHORT-TERM	Design and construction of separate water networks	Development of infrastructure for separation of industrial, sanitary and atmospheric waters to ensure sustainable management of discharges.	MINT, Municipality, CHURCH, investors	1-2 years
SHORT-TERM	Study and design of the water treatment plant	Drafting the technical project for a joint industrial and	CHURCH, MINT, Municipality	1–2 years

priority	Strategic Intervention	Analytical Description	Responsible institutions	Implementation deadline
		sanitary water treatment plant for the park operators.		
SHORT-TERM	Creation of a waste management center	Creating a common system for the collection and separation of industrial waste and contracting licensed operators for their treatment.	MINT, CHURCH, Municipality, MESP, park operator	1–2 years
MEDIUM-TERM	Implementation of a complete MRV system	Development of an advanced system for monitoring the environmental and energy performance of the park through reporting and digital platforms.	Park management unit	2–3 years
MEDIUM-TERM	Green infrastructure integration	Development of green corridors and ecological systems for managing stormwater and improving the park's microclimate.	CHURCH, Municipality, park operator	2–3 years
MEDIUM-TERM	Energy efficiency program	Implementation of measures to reduce energy consumption through LED lighting, smart metering and energy management in industrial buildings.	ME, Park operator, industrial operators	2–3 years
LONG TERM	Renewable energy development	Installation of photovoltaic systems and development of clean energy solutions to supply the park.	ME, ERO, Park Operator, private investors	3–5 years
LONG TERM	The development of industrial symbiosis	Creating mechanisms for the exchange of materials and energy between industrial operators to promote the circular economy.	Park operator, businesses	3–5 years
LONG TERM	Certification according to EIP standards	Conducting international audits and assessments to certify the park according to Eco-Industrial Parks standards and increase its attractiveness for green investments.	MINT, the park operator	4–7 years

Table 3 Priority Table of Recommendations: Lipjan Industrial and Technological Park (Qylagë)

Strategic interpretation of the priority table

The priority table clearly shows that the development of the industrial park in Lipjan should follow a gradual and coordinated approach between institutions and industrial operators.

Critical interventions are mainly related to the establishment of a management structure and the establishment of basic mechanisms for monitoring and regulating the operation of the park. These measures are necessary to ensure that the process of population of the park develops in a controlled and sustainable manner.

Short- and medium-term interventions are related to the development of collective infrastructure for water, waste and energy management, which constitute the main elements of the park's environmental performance.

Long-term interventions aim to gradually transform the park towards a complete Eco-Industrial Park model, where cooperation between industries, the use of clean energy and resource optimization become an integral part of the park's operation.

7.3 Prioritized Recommendations – Shtime Technology Park

Based on the analysis carried out on the ground, interviews with economic operators and the review of institutional documents, the recommendations for the Shtime Technology Park are structured according to the principles of the development of **the Eco-Industrial Park (Eco-Industrial Park)**. The recommended approach aims at the gradual transformation of the park from an industrial zone with fragmented operations into a **managed and integrated system**, which relies on cooperation between businesses, more efficient use of resources and continuous improvement of environmental and economic performance.

Formalization of the Park Management Unit with a mandate for the Eco-Industrial Park

The main recommendation and fundamental prerequisite for the development of the park according to the principles of Eco-Industrial Park is **the formalization of a functional unit for the management of the park**. Without such an institutional structure it is not possible to establish and implement common standards, coordinate collective services and monitor the performance of the park.

The Park Management Unit should have a clear mandate to:

- drafting and implementing park operating rules;
- coordination of shared infrastructure and environmental services;
- collecting and analyzing data on park performance;
- periodic reporting of environmental and economic indicators;
- environmental risk management and communication with institutions and the local community.

Drafting and approving the park regulations

One of the main instruments of park governance should be **the park operating regulations**, which define the obligations and minimum standards for all economic operators.

The regulation should include, among other things:

- requirements for waste separation at source;
- rules for the safe storage and handling of materials and waste;
- procedures for responding to accidental spills or environmental incidents;
- standards for pretreatment of industrial waters, where applicable;
- the obligation to periodically report data on resource consumption and waste generation.

Establishing such a regulation is a key step in moving from a fragmented operating model to a **standardized park management model**.

Establishing a system for monitoring, reporting and verification at the park level

To support decision-making and enable continuous improvement of park performance, it is necessary to establish a structured system for **monitoring, reporting and verification**.

This system should include the collection and analysis of data on:

- water and energy consumption;
- the quantity and categories of waste generated;
- waste treatment destination;
- environmental and operational incidents.

In this context, it is also recommended to conduct an **analysis of the flow of materials and waste in the park**, which enables the identification of opportunities for recycling, for the use of secondary materials and for the development of industrial symbiosis between businesses.

Technical audit of water networks and functional separation planning

Another important step is to conduct a **technical audit of existing water networks**, with the aim of identifying points where sanitary, industrial and atmospheric water networks mix or do not function according to the required standards.

Based on this analysis, a phased plan should be drafted for the functional separation of networks, identifying priority segments for intervention and ensuring that infrastructure interventions are carried out with minimal disruption to business operations.

Creation of a joint waste management center

To improve waste management in the park, it is recommended to create a **common center for waste collection and separation**. This center should include areas dedicated to different waste fractions and

controlled spaces for hazardous waste, such as industrial oils, solvents, paints and contaminated packaging.

, **collective contracting with licensed operators for waste treatment and recycling** can also be achieved, increasing traceability and reducing costs for economic operators.

Developing integrated solutions for water management

In the context of a retrofit park such as the Technology Park in Shtime, the most appropriate approach to water management is a combined model that includes:

- setting standards for pretreatment of industrial waters at company level;
- systematic monitoring of emissions;
- the gradual development of a collective solution for industrial water treatment, such as a joint plant or a hybrid treatment model.

Improving energy efficiency and developing energy from renewable sources

In the field of energy, it is initially recommended to implement measures to improve energy efficiency, which can be achieved with relatively low investments and immediate benefits.

In a second phase, projects for the production of energy from renewable sources could be developed, in particular through the installation of photovoltaic systems on the roofs of industrial buildings. These investments could be realized through collective procurement of equipment or through a common financial model coordinated at the park level.

Developing a platform for industrial symbiosis

After conducting a material and waste flow analysis, a **platform can be created to identify opportunities for collaboration between businesses**. This platform can enable the exchange of secondary materials, the joint use of services, the optimization of logistics processes and, in certain cases, the exchange of energy or water resources between operators.

Annual public reporting of park performance

To increase transparency and public trust, it is recommended to publish an **annual report on the park's performance**. This report should include key environmental and economic performance indicators, progress in implementing improvement measures, and objectives for the coming period.

Regular performance reporting not only increases transparency and community trust, but also improves **the park's capacity to attract future green investment and financing**.

Main Measure/Action	Description of the measure	Expected result	Responsible institutions	Implementation deadline
SHORT-TERM	Formalization of the Park Management Unit (PMU)	Establish a management structure that coordinates the development of the park, manages shared infrastructure, and oversees environmental performance according to EIP principles.	Municipality of Shtima, KIESA, MINT	0–12 months
SHORT-TERM	Drafting and approval of the Park Regulation	Establishing rules for the operation of the park, including environmental standards and obligations of industrial operators.	Park Management Unit, Municipality, MINT, CHURCH	6–18 months
SHORT-TERM	Establish a Monitoring, Reporting and Verification (MRV) system at the park level.	Establish a system for monitoring and reporting water, energy and waste generation usage at the park level.	Park Management Unit, Municipality, park businesses, MESP	1–2 years
SHORT-TERM	Technical audit of water networks and functional separation plan	Evaluation of existing networks and planning of functional separation of sanitary, industrial and atmospheric waters.	Municipality, Park Management Unit, public water supply enterprise, MESP	1-2 years
MEDIUM-TERM	Creation of a joint waste management center	Creation of a common system for the collection, separation and transfer of industrial waste in the park.	Park Management Unit, Municipality, park businesses, licensed waste operators	1–3 years
MEDIUM-TERM	Setting standards for pre-treatment at the company level and	Implementation of standards for water pre-treatment at the	Municipality, Park Management	1–3 years

Main Measure/Action	Description of the measure	Expected result	Responsible institutions	Implementation deadline
	gradually developing a common system for treating industrial waters (collective plant or hybrid solution).	company level and development of a common system for their treatment.	Unit, water utility, ME, MESP	
MEDIUM-TERM	Implementation of energy efficiency measures and installation of photovoltaic systems on the roofs of buildings with collective procurement or joint financing models.	Implementing measures to reduce energy consumption and promote the use of renewable energy in the park.	Park Management Unit, park businesses, ME, ERO, private investors	1–3 years
LONG TERM	Creating a platform for the exchange of materials and resources between companies based on the analysis of material and waste flows.	Increasing resource efficiency and creating synergies between park businesses.	Park Management Unit, park businesses, KIESA	3–7 years
LONG TERM	Annual public reporting of park performance	Increasing transparency, public trust and opportunities for green financing.	Park Management Unit, Municipality, MINT	3–7 years

Table 4 Recommendations for the technological park in Shtime/Measures for the development of the Eco-Industrial Park

Analytical conclusion on recommendations – Shtime Technology Park

The proposed recommendations for the Shtime Technology Park directly reflect the findings of the field analysis, interviews with businesses and consultations with institutions. The analysis has shown that the park has a consolidated economic base with active businesses and real productive activity, but at the same time faces structural gaps in the governance of the park and in the organization of shared services. For this reason, the recommendations do not focus only on infrastructural interventions, but first and foremost on the creation of a functional management system at the park level.

The most critical element of the recommendations is **the formalization of the Park Management Unit**, which should serve as the central structure for coordinating the development and operation of the park. Without such an institutional structure, it is difficult to set common standards, organize collective services, and ensure monitoring of park performance. In this sense, the establishment of a structured management is a prerequisite for the implementation of all other proposed measures.

Other recommendations directly address the gaps identified in the analysis, particularly in the area of water and waste management. The establishment of a **monitoring, reporting and verification (MRV) system** and the implementation of a material and waste flow analysis provide the basis for investment planning and the development of circular economy practices in the park. At the same time, the development of a joint waste management center and the establishment of standards for the pre-treatment of industrial waters represent concrete steps towards improving the environmental performance of the park.

In terms of resource use, the recommendations emphasize the importance of improving energy efficiency and the use of renewable energy sources. The implementation of collective energy efficiency measures and the installation of photovoltaic systems at the park level can contribute to reducing operating costs for businesses and improving the environmental performance of the park.

In a longer term perspective, the creation of a platform for **industrial symbiosis** and public reporting of the park's performance aim to increase transparency and cooperation between businesses, as well as to improve the park's reputation in relation to institutions and the local community. These measures are in line with the principles of the Eco-Industrial Park model, where the park functions as an integrated economic and environmental system.

In conclusion, the proposed recommendations for the Shtime Technology Park present a phased and realistic approach for the gradual transformation of the park towards the **Eco-Industrial Park model**. By combining strengthening the park's governance with investments in infrastructure and the development of cooperation mechanisms between businesses, these measures create the basis for a more efficient, more transparent and more sustainable industrial park in the long term.

7.4 Horizontal Recommendations (common to all three parks)

In addition to specific recommendations for each industrial park, the analysis of Rahovec, Shtime and Lipjan shows that there are several structural challenges that are common to all industrial parks in Kosovo. These challenges are mainly related to the governance of the parks, institutional coordination, access to financing and the lack of standardized management and monitoring systems. For this reason, a series of horizontal measures are recommended that aim to create a common framework for the development of industrial parks and for the gradual advancement towards the **Eco-Industrial Park (EIP) model**.

Supportive policy for the development of industrial parks

One of the key elements for the sustainable development of industrial parks is the creation of a clear political and institutional framework that supports their management and development. Although legislation in Kosovo provides for the establishment and functioning of industrial and technological parks, in practice concrete mechanisms for joint management and the development of collective services are often lacking.

In this regard, it is recommended that responsible institutions at central and local level develop policies and guidelines that promote the integrated management of industrial parks, including minimum standards for infrastructure management, environmental protection and coordination between businesses. These policies should also support the gradual transformation of existing parks towards the

Eco-Industrial Park model, integrating the principles of resource efficiency and circular economy into industrial development.

Financial mechanisms for infrastructure development and innovation

A significant challenge for the development of industrial parks is securing financing for infrastructure investments and for improving environmental performance. In many cases, municipalities and economic operators have limited financial capacity to implement such projects.

For this reason, it is recommended to create financial mechanisms that can support investments in shared infrastructure, energy efficiency and green technologies. These mechanisms could include funds dedicated to the development of industrial parks, subsidy schemes for investments in renewable energy and financial instruments that support cooperation between businesses on joint projects. Such an approach would enable the acceleration of the transformation of industrial parks towards more sustainable development models.

Standardization of procedures and management practices

The analysis of three industrial parks has shown that park management and operation procedures often differ from one park to another and are not always standardized. This creates difficulties in coordinating activities and monitoring park performance.

It is therefore recommended to develop a standard set of procedures that can be applied to all industrial parks. These procedures could include rules for waste management, water management, energy use, environmental data reporting and the organization of shared services. Standardization of procedures would create a common basis for the management of the parks and would facilitate the monitoring and comparison of their performance.

Digitalization of industrial park management

Another important element for improving the management of industrial parks is the use of digital technologies for monitoring and coordinating park activities. Digitalization can help in collecting and analyzing data on resource use, waste generation, and environmental impacts of industrial activities.

In this regard, it is recommended to develop digital platforms that enable real-time monitoring of key park performance indicators and facilitate communication between businesses and responsible institutions. Such a system would contribute to increasing transparency, improving planning and supporting decision-making for the development of industrial parks.

The last recommendation, but not in terms of importance, is the designation of a dedicated space for the Park Management Unit within the industrial park, which will serve for the construction of administrative offices, training rooms and spaces for coordination with businesses, enabling efficient management, provision of shared services and structured functioning of the park.

CONCLUSION

The horizontal recommendations presented in this chapter aim to create a common institutional and operational basis for the development of industrial parks in Kosovo. By combining supportive policies, financial mechanisms, standardization of procedures and digitalization of management, these measures can contribute to improving the economic and environmental performance of industrial parks and their gradual advancement towards the **Eco-Industrial Park model**.

8. CONCLUSIONS AND NEXT STEPS

This study has analyzed the current state of three industrial parks in Kosovo – Rahovec, Shtime and Lipjan – focusing on the economic, environmental and institutional dimensions of their functioning, as well as on the potential for their development according to the principles of the **Eco-Industrial Park (EIP) model**. The analysis is based on the review of strategic and planning documents, interviews with businesses, questionnaires with the local community and consultations with relevant institutions.

The results show that industrial parks in Kosovo are at different stages of development and are characterized by different operating models. The Industrial Park in Rahovec represents a **greenfield case**, where the development of the park is still in its initial stages and where there is an opportunity to integrate environmental and organizational standards already in the planning phase. The Technology Park in Shtime represents a **retrofit case**, with active businesses and consolidated economic activity, but with gaps in governance and the organization of shared services. While the Industrial Park in Lipjan is a park in gradual development, where economic activity is still limited, but where there is potential for more structured planning of future development.

Analysis conducted on the ground and through consultations with key stakeholders shows that one of the main common challenges for these parks is related to the lack of a functional management structure at the park level. In many cases, industrial parks function more as parceled areas for economic activities than as integrated industrial management systems. This situation limits the possibility for the development of collective services, for the coordination of activities between businesses and for the monitoring of the environmental and economic performance of the park.

From an environmental perspective, the analysis has identified several challenges related to water management, waste management and efficient energy use. In some cases, environmental infrastructure is not fully integrated or is developed in a fragmented manner, which can create difficulties in controlling and monitoring the environmental impacts of industrial activities. However, the results of the questionnaires and consultations also show that local communities generally see the development of industrial parks as a positive factor for economic development and job creation, although there is a potential concern about future environmental impacts if industrial activities are not managed in accordance with legal standards.

In this context, the **Eco-Industrial Park concept** provides an appropriate framework for the further development of these industrial parks. This model is based on the integration of economic development with environmental protection and on cooperation between businesses for the more efficient use of resources and the reduction of environmental impacts. The implementation of this model requires not only investments in infrastructure, but also the strengthening of park governance mechanisms, the

development of monitoring and reporting systems and the creation of platforms for cooperation between economic operators.

Next steps

Based on the findings of this study and the recommendations presented in the previous chapters, the next steps for the development of industrial parks in Kosovo should focus on several key directions.

First, it is necessary to strengthen **the governance of industrial parks**, through the creation or formalization of dedicated park management units. These structures should have a clear mandate to coordinate park activities, organize shared services, and monitor park performance.

Second, **integrated monitoring and reporting systems should be developed** that enable the collection and analysis of data on resource use and environmental impacts of industrial activities. These systems would provide the basis for setting measurable objectives for improving the park's performance.

Third, **cooperation between businesses** operating in the park should be promoted, especially in the area of resource and waste management. The development of industrial symbiosis practices can contribute to increasing resource efficiency and reducing operating costs for businesses.

Fourth, it is important to create **financial and institutional mechanisms** that support investments in shared infrastructure, energy efficiency, and green technologies. This would enable the acceleration of the transformation of industrial parks towards more sustainable development models.

In conclusion, the development of industrial parks in Kosovo represents an important opportunity for strengthening economic development and increasing the competitiveness of the industrial sector. However, to ensure that this development is sustainable in the long term, it is necessary for industrial parks to evolve from simple business location areas to **integrated industrial management systems**, where economic development, environmental protection and social welfare are balanced and coordinated in a sustainable manner.

8.2 Summary of Key Findings

The analysis conducted in this study on three industrial parks – Rahovec, Shtime and Lipjan – has highlighted several key findings related to the current state of their development, the management structure and the environmental and economic performance of these industrial zones. These findings are based on the analysis of planning and strategic documents, interviews with businesses operating in the parks, questionnaires with the local community and consultations with relevant institutions.

One of the main findings is that **industrial parks in Kosovo are at different stages of development**, which also reflects different levels of organization and infrastructure. The Industrial Park in Rahovec represents a case of early-stage development, where infrastructure is planned but economic activity is still limited. The Technology Park in Shtime is a functional park with active businesses and a direct impact on the local economy, but with gaps in the organization of management and coordination of shared services. While the Industrial Park in Lipjan is a park in gradual development, where economic activity is still limited and its full potential has not yet been exploited.

Another important finding is related to **the lack of a formalized management structure at the park level**. In the cases analyzed, park management is fragmented and responsibilities are often divided between public institutions and individual economic operators. This situation makes it difficult to coordinate activities in the park and limits the possibility of developing shared services, such as waste management, water treatment or environmental performance monitoring.

From an environmental perspective, the analysis has identified several challenges related to **water and waste management at the park level**. Water management systems are not integrated and there is no clear separation between sanitary, industrial and atmospheric waters. Similarly, waste management is carried out individually by economic operators and collective mechanisms at the park level for the organization and monitoring of this process are lacking.

The analysis has also shown that **the efficient use of energy and the integration of renewable energy sources** are still at a limited stage in the analyzed industrial parks. However, the physical structure of these parks and the concentration of industrial activities create good opportunities for the development of collective projects in the field of energy efficiency and renewable energy.

From a social perspective, the results of the questionnaires with the local community show that **the overall perception towards industrial parks is positive**, especially regarding their impact on economic development and job creation. However, some residents have expressed concerns about potential future environmental impacts, especially if industrial activities are not properly monitored and managed.

Another important finding relates to **the potential for cooperation between businesses operating in the park**. Although currently cooperation between operators is limited and largely informal, the concentration of industrial activities in a common space creates opportunities for the development of industrial symbiosis practices and for more efficient use of resources.

In conclusion, the findings of this study show that industrial parks in Kosovo have a significant potential for economic development and transformation towards more sustainable industrial development models. However, to realize this potential, it is necessary to strengthen the parks' management structures, develop shared infrastructure services, and create mechanisms for monitoring and continuously improving their environmental and economic performance.

8. 3 Green Industrial Parks Implementation Path

Eco-Industrial Park (EIP) model requires a structured and gradual process that combines institutional, technical and financial interventions. Based on the analysis of the three industrial parks in Rahovec, Shtime and Lipjan, as well as the findings from interviews, questionnaires and consultations with institutions, the implementation path should be based on a phased approach that starts with the creation of the institutional base and data and then continues with the development of infrastructure and cooperation between businesses.

Phase One: Establishing the Institutional and Organizational Base

The first step in developing green industrial parks is to establish a functional management system at the park level. Without a dedicated management structure, it is difficult to coordinate business activities, set common standards, and develop collective services.

the park management unit should be formalized, which will be responsible for coordinating economic operators, implementing park regulations and organizing shared services. In parallel, **the park regulation should be drafted and approved**, which sets out the minimum obligations for operators regarding waste, water, energy management and environmental data reporting.

This phase creates the institutional basis for the transition from a fragmented industrial park to an integrated management system.

Phase Two: Database Creation and Monitoring

After establishing the management structure, an important step is to develop a **monitoring, reporting and verification (MRV) system** at the park level. This system should enable the collection of data on resource use, waste generation, energy consumption and environmental impacts of industrial activities.

, **waste flow mapping** should also be carried out, which helps identify opportunities for recycling, reuse and collaboration between businesses. Such a database is essential for setting measurable objectives and planning investments in shared infrastructure.

Phase Three: Developing Shared Infrastructure and Improving Resource Management

In the third phase, industrial parks should develop infrastructure solutions that improve the environmental performance of the park. This includes improving water management systems, developing joint waste management centers, and implementing energy efficiency measures.

renewable energy can also be developed, such as the installation of photovoltaic systems in industrial facilities or the development of joint schemes for the supply of green energy.

The development of shared infrastructure creates opportunities for reducing operating costs for businesses and improving the environmental performance of the park.

Phase Four: Developing industrial symbiosis and cooperation between businesses

The most advanced phase of the transformation of industrial parks towards the Eco-Industrial Park model is the development of **industrial symbiosis**. In this phase, businesses operating in the park collaborate for the most efficient use of resources and the exchange of materials and energy.

This may include using the by-products of one industrial activity as a resource for another activity, organizing joint logistics services, or developing joint energy and water management projects.

For the development of industrial symbiosis, it is important that the park creates platforms for information exchange and for coordinating cooperation between businesses.

Long-term perspective

In the long term, the implementation of the Eco-Industrial Park model should be accompanied by a regular system of **monitoring and reporting on the park's performance**, which enables the assessment of progress and the continuous improvement of management practices.

This process should be supported by cooperation between central and local institutions, the active involvement of businesses, and the development of financial mechanisms that support investments in green technologies and sustainable infrastructure.

In this way, industrial parks in Kosovo can gradually evolve from areas of localization of economic activities into **integrated platforms of sustainable industrial development**, where economic development and environmental protection are intertwined in a common management system.

8.4 Monitoring and Reporting Progress

Monitoring and reporting progress are essential elements for the effective implementation of the **Eco-Industrial Park (EIP) concept** and for ensuring continuous improvement of the performance of industrial parks. Without a structured monitoring and reporting system, it is difficult to objectively assess the progress of the park, identify problems in a timely manner and plan the necessary interventions for improvement.

In the context of the industrial parks analyzed in Rahovec, Shtime and Lipjan, monitoring should be conducted at the **park level**, and not only at the level of individual economic operators. This approach is in line with the logic of the Eco-Industrial Park model, where environmental and economic performance is assessed for the entire park as an integrated system.

Establishing a park-level monitoring system

The first step in this process is to establish a structured **monitoring, reporting and verification (MRV) system** at the park level. This system should be coordinated by the Park Management Unit and based on regular data collection from economic operators operating in the park.

The monitoring system should cover key performance indicators related to resource use and environmental impacts of industrial activities. This includes in particular water consumption, waste generation and treatment, energy consumption, use of renewable energy sources and development of green spaces in the park.

The collection of this data should be carried out in a standardized manner, so that the results are comparable between years and between different industrial parks.

Periodic reporting of park performance

Based on the data collected by the monitoring system, it is recommended that **an annual industrial park performance report be prepared at the park level**. This report should include an analysis of key

performance indicators, progress in implementing recommended measures, and identification of challenges that may require additional interventions.

The performance report should serve not only as an internal park management instrument, but also as a mechanism for informing public institutions and the local community about the development of the park and its economic and environmental impacts.

Transparency in reporting is an important element for building trust between economic operators, institutions and the local community.

The role of institutions and inter-institutional coordination

The monitoring and reporting process also requires a certain level of coordination between responsible institutions at local and central level. Municipalities where industrial parks are located should play an active role in supporting the monitoring process and integrating the reporting results into local planning processes.

At the central level, institutions responsible for industrial development and environmental protection should use data reported by industrial parks to assess the overall progress of industrial development and improve public policies in this sector.

Use of technology and digitalization of monitoring

To increase the efficiency and transparency of the monitoring process, it is recommended that the reporting system be supported by a **digital data management platform**. The digitalization of this process enables faster data collection and analysis, as well as creating opportunities for real-time monitoring of key performance indicators.

Such a platform could also serve as a tool for information exchange between economic operators and park management, contributing to improved coordination and the development of cooperation between businesses.

The perspective of continuous improvement

In conclusion, monitoring and reporting progress should be considered as a continuous process that supports the gradual improvement of industrial parks' performance. Through systematic data collection, indicator analysis and transparent reporting, industrial parks can identify challenges in a timely manner and develop more effective strategies for sustainable development.

In this way, the monitoring and reporting system becomes a key instrument for the transformation of industrial parks into **integrated platforms of sustainable industrial development**, in accordance with the principles of the Eco-Industrial Park model.

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