SESAMm

Blueprints for Sustainability: Unmasking ESG Trends in Modern Infrastructure

An analysis of over 250,000 infrastructure projects worldwide, mapping where environmental, social, and governance risk concentrates and how it evolves over a project's lifecycle.

250,000+
INFRASTRUCTURE PROJECTS

2021–2026
ANALYSIS PERIOD

3
ESG PILLARS ASSESSED

CONTENTS

In this report

SECTION 01

Introduction

In an era where infrastructure serves as the backbone of global development, the integration of **Environmental, Social, and Governance (ESG)** criteria has shifted from a "nice-to-have" to a financial and ethical imperative. This research analyzes a massive dataset of over **250,000 infrastructure projects** worldwide. Our scope is broad and diverse, spanning traditional oil and gas ventures, critical airport constructions, and the rapidly expanding sectors of bioenergy and biothermal power.

Utilizing **SESAMm's** extensive natural language processing and data coverage, this project seeks to decode the complex risk profiles inherent in large-scale developments. We aim to move beyond surface-level metrics to answer three pivotal questions:

- **Risk Concentration:** Which specific infrastructure sectors are disproportionately associated with sustainability risks compared to their peers?
- **Pillar Dominance:** Within the ESG framework, which of the three pillars (Environmental, Social, or Governance) emerges as the most prominent driver of controversy or concern across the industry?
- **Controversy Lifecycles: Tracking ESG Mentions Over Time**: Which granular ESG topics are most closely correlated with these projects, and how do their controversy lifecycles unfold over time?

By identifying these trends, we provide stakeholders, from investors to policymakers, with the insights needed to build a more resilient and sustainable future.

SECTION 02

Methodology

This section outlines the temporal scope, data collection mechanics, and framework adjustments applied to evaluate Environmental, Social, and Governance (ESG) risks across the assessed infrastructure assets.

1. Scope & Timeframe

- **Analysis Period:** The evaluation spans a five-year period from **January 2021 through 2026 (Year-to-Date)**.
- **Data Continuity:** To maintain statistical integrity, 2026 figures reflect a partial-year snapshot. These are explicitly annotated in all time-series visualizations to ensure accurate trend interpretation.

2. Mentions: Definition & Measurement

- A "mention" is the core unit of measurement and is defined as any individual reference within a source document that links a specific project to an ESG controversy, risk event, or sustainability-related topic.
- Mentions are extracted using SESAMm's proprietary natural language processing engine, which continuously scans millions of unstructured data sources, including news outlets, NGO reports, regulatory filings.
- Each mention is classified across the three ESG pillars (Environmental, Social, Governance) and tagged with granular sub-topics (e.g., Water Pollution, Occupational Health and Safety, Corruption and Bribery) to enable multi-layered risk analysis.

3. Methodological Adjustments: Governance Pillar

To prevent data distortion and ensure the insights reflect actionable governance risks, specific parameters were established for the **Legal & Investigative Exposure (L&E)** sub-category.

A. Sector-Wide Analysis: L&E Exclusion

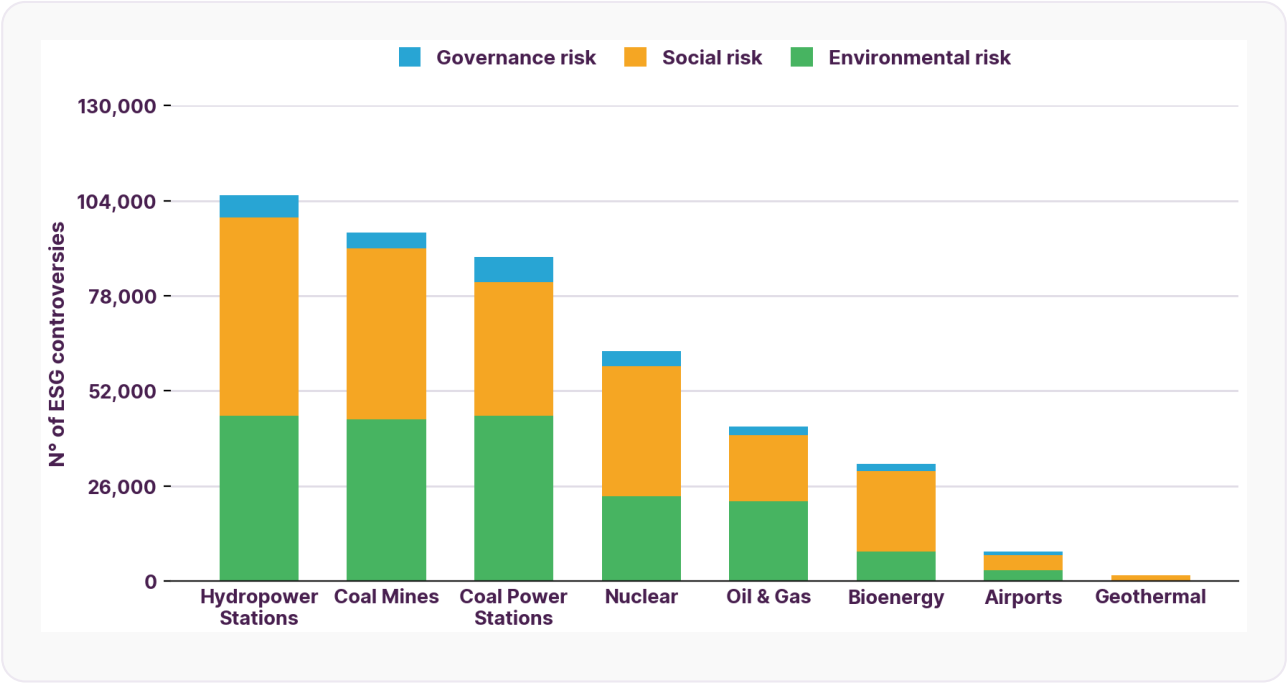
For the aggregate, sector-wide Governance breakdown, the L&E sub-category has been **intentionally excluded**.

- **Rationale:** L&E functions primarily as a downstream, reactive signal capturing the legal aftermath of *Environmental* or *Social* incidents, rather than a standalone, proactive governance failure.
- **Impact:** Including L&E would artificially inflate overall Governance metrics and mask core operational drivers, such as *Corruption & Bribery* or *Marketing & Communication*, which this study aims to surface.

SECTION 03

1- ESG Issues Across Infrastructure Projects

In this section, we begin by defining the baseline for infrastructure risk. Unlike standard corporate ESG, infrastructure is uniquely exposed due to its long-term lifecycles, massive physical footprints, and high levels of community impact. We categorize the 250,000+ projects into key sub-sectors to identify where the "noise" of ESG risk is loudest and where it is most often ignored.

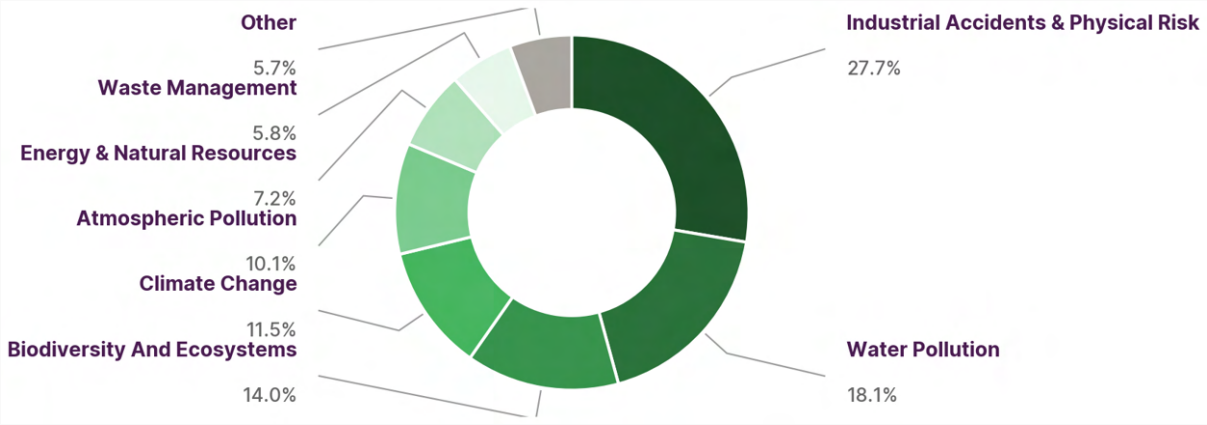


Our analysis categorizes infrastructure projects into eight distinct types: **Coal Mines, Nuclear, Coal Power Stations, Hydropower Stations, Oil & Gas, Airports, Bioenergy** , and **Geothermal.** When examining the cumulative volume of ESG controversies, a clear hierarchy emerges. **Hydropower stations, Coal Mines, and Coal Power Stations** rank as the top three most "at-risk" project types, respectively. However, a deeper dive into the individual ESG pillars reveals a more nuanced distribution of risk.

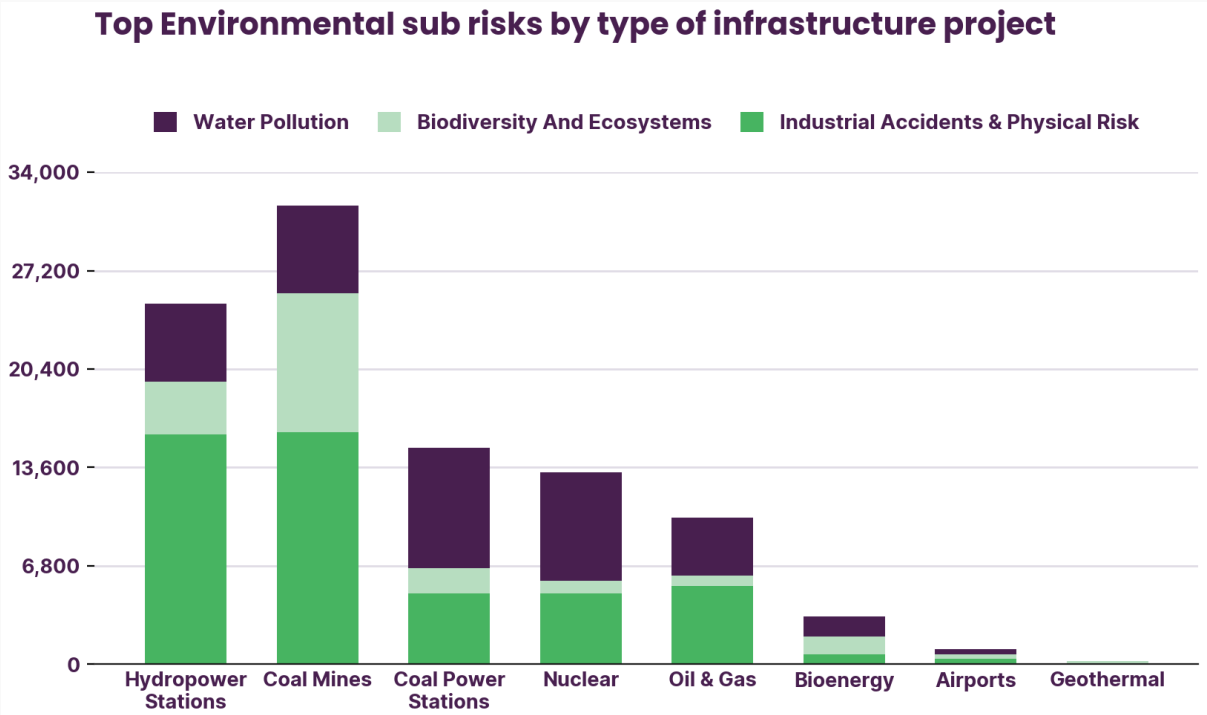
Risk Pillar	Leading Sector	Key Findings
Environmental	Hydropower, Coal Mines, Coal Power	These three sectors exhibit the highest proportion of environmental risks. Oil & Gas follows closely behind; while it ranks lowest among this high-risk group, its environmental footprint remains globally significant.
Social	Hydropower	Hydropower projects stand out as having the highest social controversy proportion across the entire dataset, often due to community displacement and land rights issues.
Governance	Universally Low	As a direct result of excluding downstream legal and investigative exposure, governance risks register as a minimal fraction of the controversy footprint across all analyzed sectors.

1. Mentions by Type of Risk

Environmental risks breakdown



Industrial accidents and physical risk, along with water pollution and biodiversity and ecosystems, are the main drivers behind environmental controversies.



The Top Three Environmental Drivers in Infrastructure

When we narrow our focus to specific environmental controversies, three dominant themes emerge: **Biodiversity Loss**, **Industrial Accidents**, and **Water Pollution**. Each theme is anchored by specific project types that demonstrate the unique physical risks inherent in large-scale infrastructure.

1. Biodiversity & Ecological Degradation

Hydropower stations represent the highest proportion of biodiversity-related controversies in our dataset. While often labeled as "green energy," the physical footprint of these projects frequently jeopardizes critical ecosystems.

- **Case Study: Las Cruces Hydroelectric Project.** This project faced significant backlash due to its potential to disrupt the delicate ecological balance of the **Marismas Nacionales**, a Ramsar-protected wetland.
- **Widespread Impact:** Our analysis identified systemic investigations into environmental impacts across various regions, including:
- **The Mekong River:** Significant declines in river health and fish populations.
- **The Doce River (Brazil):** Massive releases of toxic elements following infrastructure failures.
- **Regulatory Friction:** Frequent mentions of violations regarding the **Endangered Species Act** (Link) and disruptions to natural weather and rainfall patterns (Link).

2. Industrial Accidents & Physical Risks: Coal & Hydro

The most severe physical risks, often involving loss of life and total infrastructure failure, are most prevalent in **Coal Mining** and **Hydropower** projects.

- **Coal Mining:** Controversies here are largely defined by human tragedy and safety negligence. Our data shows frequent mentions of:
- **Fatalities:** Resulting from mine explosions (Link,Link) collapses, and fires.
- **Systemic Failures:** Violations of safety protocols and infrastructure damage caused directly by aggressive mining activities.
- **Hydropower:** In this sector, "Industrial Accidents" often involve catastrophic engineering failures.
- **Infrastructure Failure:** Mentions include massive pipe ruptures causing severe land erosion, oil leaks (Link,Link) and the collapse of dams leading to widespread fatalities and displacement.
- **Case Highlight:** Significant settlements, such as **PG&E's** agreement regarding damages to the Middle Fork American River Hydroelectric Project, and ongoing litigation in Brazil following dam collapses, underscore the massive financial and social liability of these accidents.

3. Water Pollution & Toxic Contamination: Coal Power & Nuclear

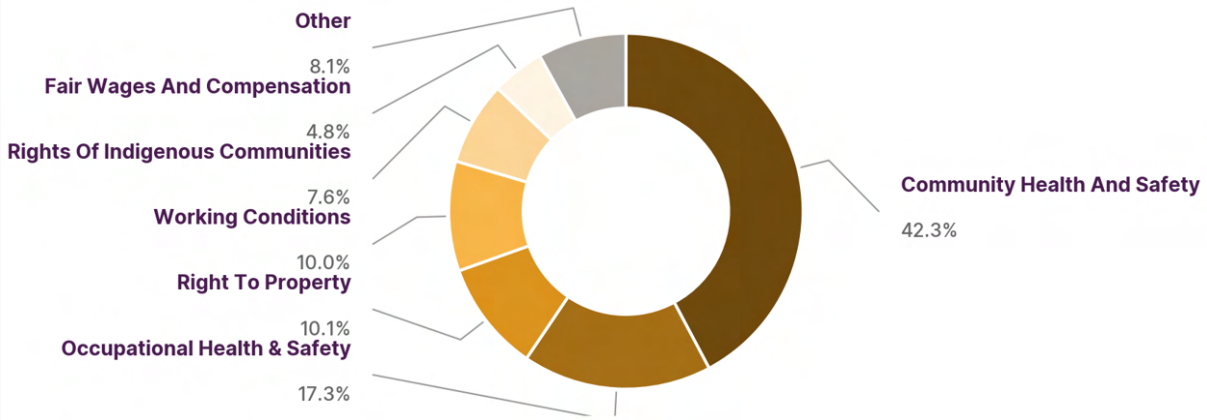
While all infrastructure interacts with water, **Coal Power Stations** and **Nuclear Power** projects are the primary drivers of contamination-related controversies.

- **Nuclear Infrastructure:** The risks here are high-stakes and long-lasting. Key mentions in our data include:
- **Radioactive Leakage:** Contamination of groundwater (Link,Link) , mineral oil leaks and the release of radioactive water into the sea.
- **Coal Power Stations:** Pollution in this sector is often a byproduct of daily operations or waste management.
- **Toxic Byproducts:** High frequencies of "fly ash" spills and the release of toxic pollutants into waterways, which have led to documented mass fish deaths and long-term groundwater degradation.

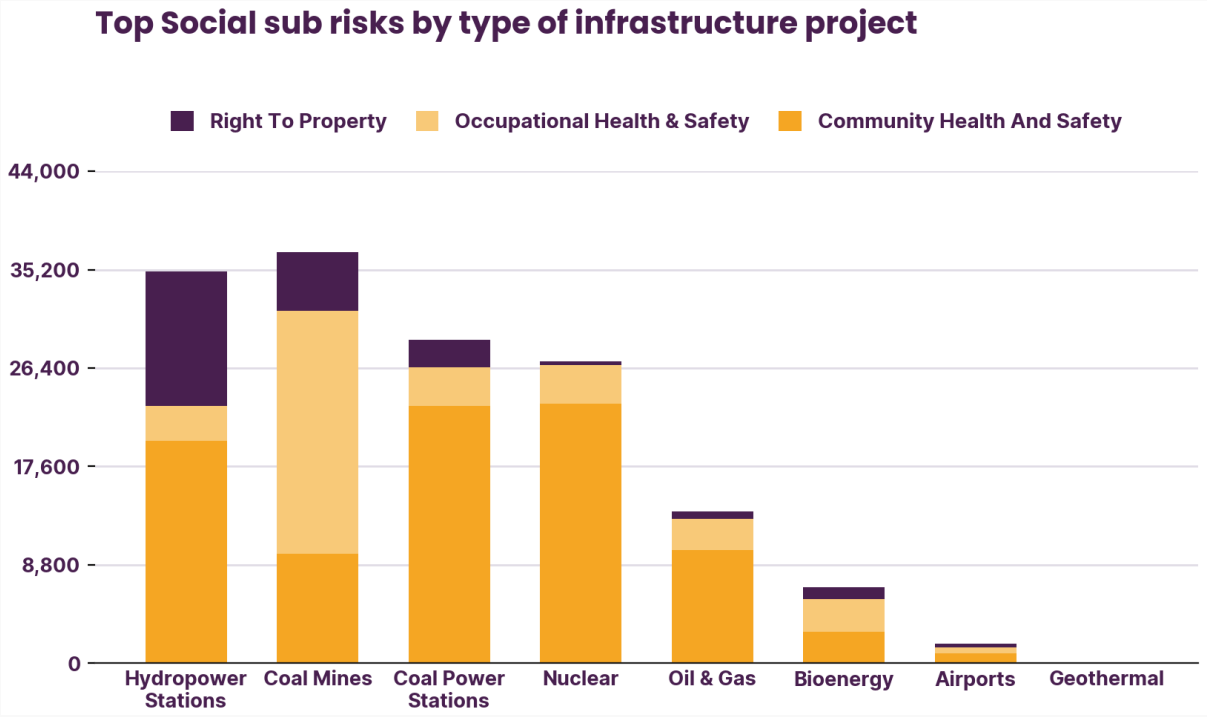
Summary of Environmental Risk Concentration

Environmental Issue	Primary Sector	Secondary Sector
Biodiversity Loss	Hydropower	—
Industrial Accidents	Coal Mines	Hydropower
Water Pollution	Coal Power	Nuclear

2. Social Sub Risks Breakdown



Community Health & Safety followed by Occupational Health & Safety and Right to Property are the main drivers of Social risks for infrastructure projects.



The Top Three Social Drivers in Infrastructure

When shifting from environmental to social impacts, the narrative moves from ecological damage to human consequences. Our data identifies three dominant social risk drivers: **Occupational Health & Safety**, **Community Health & Safety**, and **Property Rights & Displacement**.

1. Occupational Health & Safety: The Human Cost of Coal

Coal mining stands out as the sector with the highest volume of labor-related controversies. These risks are not merely regulatory; they represent systemic threats to worker life and longevity.

- **Systemic Fatalities:** Analysis reveals a tragic frequency of incidents, including fatal roof collapses and mine explosions (e.g., *Dongyu Coal Mine* and *Degari Collieries*).
- **Safety Negligence:** A recurring theme is the "penalty-to-incident" ratio. Some projects recorded over 1,800 MSHA penalties within a five-year span, signaling chronic safety violations and a culture of negligence.
- **Long-term Health & Neglect:** Beyond immediate accidents, the data highlights the prevalence of *dust pneumoconiosis* and the denial of medical treatment by employers.
- **Labor Unrest:** The combination of harsh working conditions, including extreme heatwaves, and safety failures has led to an uptick in strikes, fines and, in extreme cases, criminal manslaughter charges against operators.

2. Community Health & Safety: Pollution & Nuclear Anxiety

While workers face risks inside the project fence, local communities bear the brunt of operational externalities. This is most prevalent in the Coal, **Hydropower**, and **Nuclear** sectors.

- **Coal & Hydropower (Operational Toxicity):**
- **Air & Water Quality:** Coal projects are heavily linked to PM2.5 emissions, displacement of local residents due to alarming levels of nickel and suspended solids in rivers , toxic emissions and mentions of groundwater contamination and these risks in extreme cases lead to higher local mortality rates.
- **Agricultural Impact:** In Hydropower, controversies often stem from water mismanagement (Link,Link,Link) , where over-consumption deprives farmers of their livelihoods and contaminated water affects local crops.
- **Nuclear Infrastructure (Legacy Risks): Decommissioning & Waste:** Unlike other sectors, Nuclear risks often peak during construction or decommissioning.
- **The "Invisible" Threat:** Community concerns are dominated by radioactive waste management (e.g., *San Onofre*) residual effects on the community's drinking water and documented spikes in childhood cancer rates near operational sites (Link,Link).

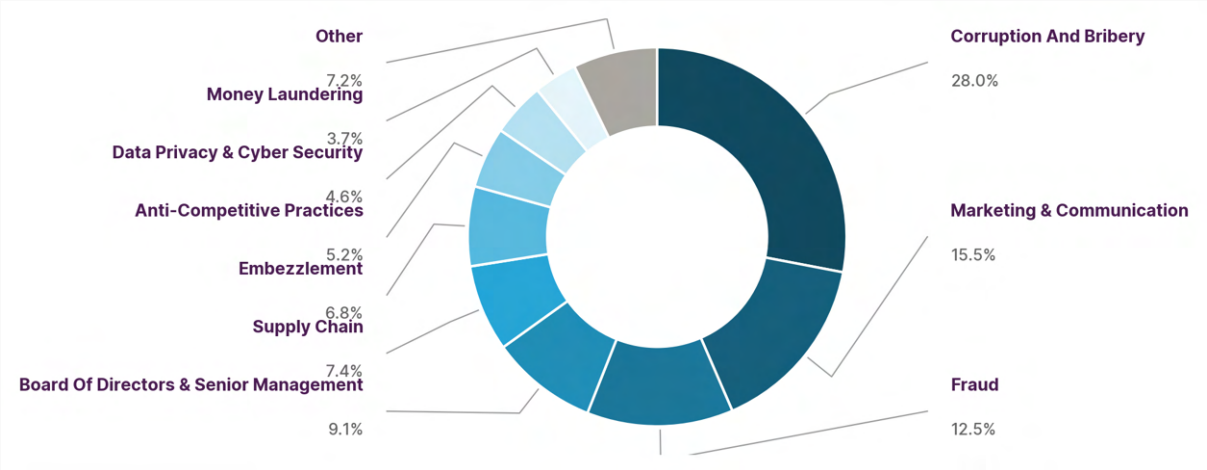
3. Right to Property: Displacement & Land Grabs

Hydropower projects rank highest for property-related controversies, primarily due to the massive physical footprint required for dams and reservoirs.

- **Involuntary Resettlement:** Our dataset identifies a pattern of "Land Grabs" and forced displacement. Many projects face backlash for failing to provide adequate compensation or failing to consult with local communities before breaking ground.
- **Structural Damage:** Beyond displacement, "heavy blasting" during construction has been reported to crack the foundations of nearby homes, rendering them unsafe and leading to lawsuits over improper land use (Link,Link).
- **Vulnerability:** These projects frequently impact marginalized groups who lack the legal resources to demand accountability for dam spillages or illegal land development.

Social Issue	Primary Sector	Key Risk Drivers
Occupational Health & Safety	Coal Mining	Fatalities, chronic lung disease, safety violations.
Community Health & Safety	Coal, Hydro, Nuclear	PM2.5 emissions, radioactive leaks, water scarcity.
Right to Property	Hydropower	Involuntary resettlement, land grabs, blasting damage.

3. Governance Sub Risks Breakdown

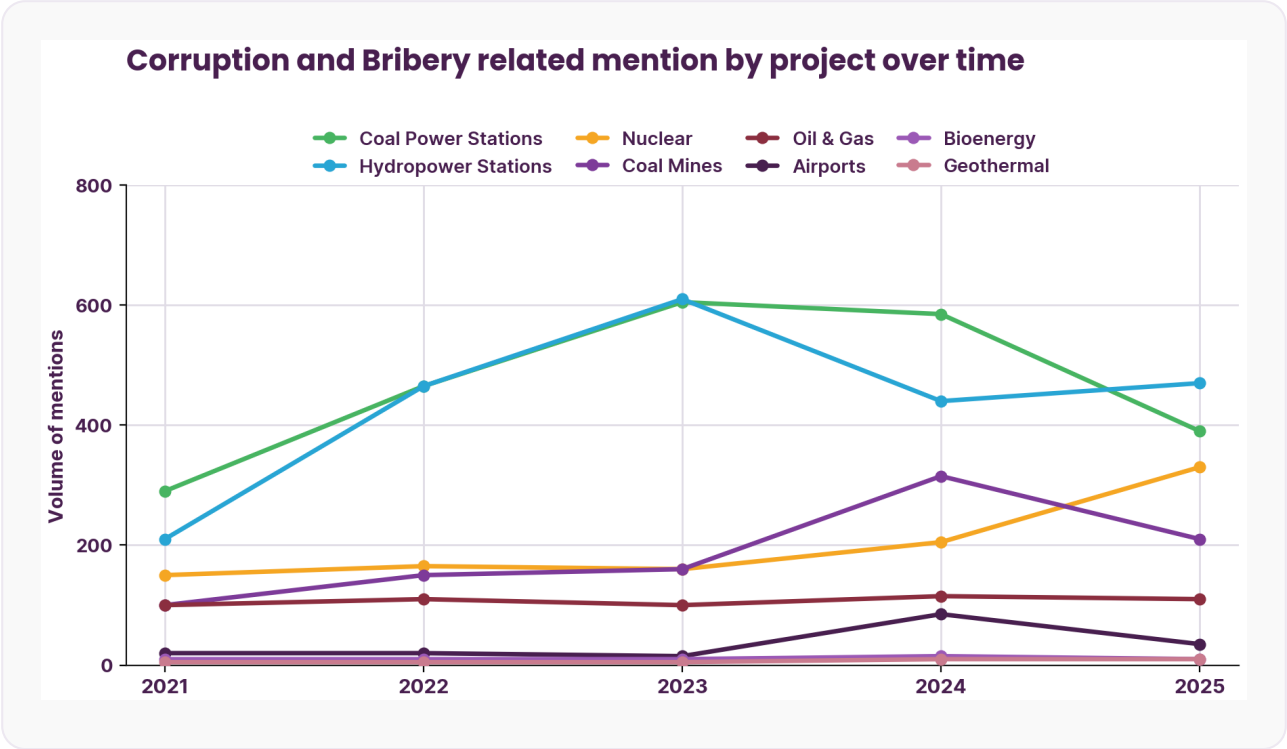


The Dominant Governance Driver: Corruption & Bribery

In contrast to Environmental and Social risks, where multiple issues compete for dominance, Governance risks within infrastructure are overwhelmingly defined by a single theme: **Corruption & Bribery**. This issue accounts for nearly **30% of all governance mentions**, overshadowing other factors like board diversity or executive pay.

While most governance categories remain secondary, **Marketing & Communication** and **Corruption** stand out as the primary friction points between infrastructure projects and regulatory bodies.

We take into consideration only until 2025 for the over time chart to get a continuous line chart.



1. The Anatomy of Corruption in Infrastructure

Our analysis indicates that corruption in this sector is rarely isolated to a single company; it is typically characterized by kickback schemes and the involvement of **public officials**.

- **Public Figure Involvement:** A significant portion of controversies involves the arrest or investigation of high-ranking officials (e.g., Ministers of Public Works) for contract modifications that unfairly favor specific construction firms.
- **Contract Irregularities:** Misappropriation of funds often occurs through "emergency declarations," which allow companies to bypass standard bidding processes.

2. Sector-Specific Trends & Emerging Volatility

Bioenergy and Geothermal record negligible corruption and bribery mentions, which aligns with the universally low governance risk profile established for these sectors (Section 1).

Instead, the volume of corruption-related discourse is overwhelmingly concentrated within traditional asset classes and heavy transit hubs. Rather than following a uniform pattern, these sectors exhibit highly distinct data lifecycles, ranging from sudden, event-driven narrative surges to persistent, chronic baseline risks over the five-year period.

Airports: The 2023–2024 Surge

Airport infrastructure saw a significant increase in controversies starting in 2023.

- **The "Jurmala" Effect:** A major bribery case involving the Jurmala airport and the Lithuanian Air Force triggered a surge in media attention.
- **Military-Construction in Grazzanise airport:** Investigations in 2024 targeted 17 public officials and 21 construction firms, highlighting the systemic nature of corruption in large-scale transit hubs.

Nuclear & Coal: The Escalation of 2024–2025

While Oil & Gas corruption levels remained stable, the Nuclear and Coal sectors saw dramatic shifts:

- **Nuclear Power:** Mentions have surged since 2024, largely due to the Rooppur Nuclear Power Plant probe in Bangladesh, which gained massive international traction. This was compounded by FirstEnergy's $20 million settlement regarding the Davis-Besse and Perry plants and recent ministerial resignations in Ukraine (Energoatom) and Argentina.
- **Coal Power & Mining:** Coal mining peaked in 2024, driven by the Adani Group's $265 million bribery allegations, which led to major project cancellations. Other drivers included the prosecution of top executives at the Shanxi Coking Coal Group for coercive payment schemes, mentions of solicitation of bribes and falsifying mining records.

Hydropower: The Chronic Risk

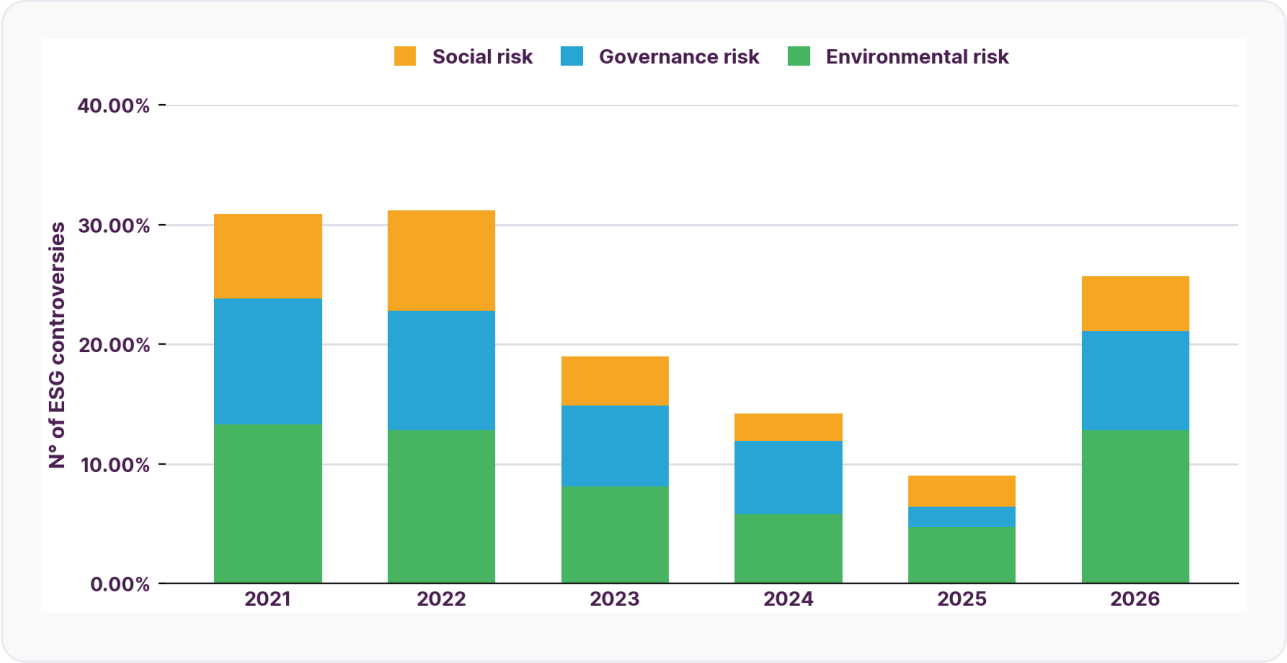
Hydropower remains one of the two highest-volume sectors for corruption. Unlike the recent spikes in Nuclear, Hydropower controversies are **persistent and fluctuating**, consistently linked to investigations into falsified records and bribery of local authorities to secure land and water rights. **(**link**,** link**,** link**,** link**,**link **)**

Governance Issue	Primary Sector	Risk Characteristics
Corruption & Bribery	Hydropower & Coal Power	Kickbacks, public official bribery, and bid-rigging.
Project Transparency	Airports	Contract modifications and emergency declaration abuse.
Regulatory Compliance	Nuclear	High-stakes settlements and international probes.

SECTION 04

3 - Case Study

3.1 - The Controversy Lifecycle of the Turów Coal Mine



To understand how ESG risks evolve over a project's lifecycle, we analyzed the controversy volume for the **Turów Coal Mine** between 2021 and 2026. This asset serves as a benchmark for how intense, multi-pillar controversy can be systematically reduced through intervention, legal settlements, or operational shifts.

1. 2021: The Peak of Contention

The period began with a significant "risk explosion." In 2021, Turów recorded approximately **1,300 controversy mentions**, the highest in its recent history.

- **Environmental Dominance:** Nearly **50% of the total volume** was driven by environmental risks. These were primarily linked to transboundary water disputes and ecological concerns that drew international legal scrutiny.
- **Complex Risk Profile:** During this peak, the mine was a "triple threat," exhibiting high volumes across Environmental, Social, and Governance pillars simultaneously.

2. 2022–2023: The Intervention Phase

Following the 2021 peak, the data shows a **rapid and sustained decline**.

- **The "Cooling" Effect:** The sharp drop-off in mentions suggests a period of significant intervention. This often corresponds with the resolution of international lawsuits (such as the settlement between Poland and the Czech Republic) and the implementation of new environmental safeguards.

- **Reporting Shifts:** The decline also reflects a transition from "active crisis" to "monitored compliance," where the volume of negative media and NGO reports begins to stabilize.

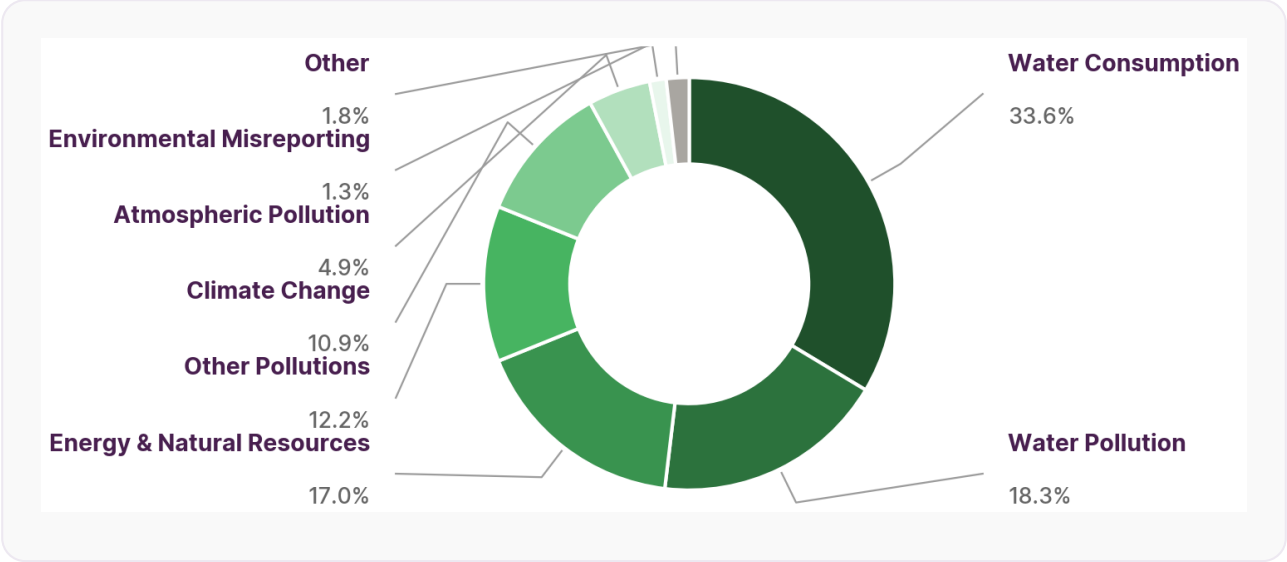
3. 2024–2026: Residual Risks & Resolution

By the latter half of the decade, the risk profile of Turów had been almost entirely transformed.

- **Governance Persistence:** As the total volume shrank to a fraction of its 2021 levels, **Governance** remained the most persistent pillar. This indicates that while the physical environmental issues were mitigated, the long-term oversight and administrative obligations continued to generate minor mentions.
- **A "Clear" Horizon:** By 2026, the mine reached its lowest level of controversy. While 2026 data reflects a year-to-date snapshot, the trajectory confirms a successful transition from a high-controversy asset to one with a stabilized ESG profile

Mentions by Type of Risk

1.1. Environmental Risk Breakdown



While the previous chapters identified general sector trends, the **Turów Mine** provides a vivid example of how environmental risks cluster in real-time. The discourse is overwhelmingly defined by **physical impacts** rather than administrative or regulatory hurdles.

The Water Crisis: The Primary Friction Point

Water issues account for over **51% of all environmental mentions**, making it the single most significant threat to the project's "Social License to Operate."

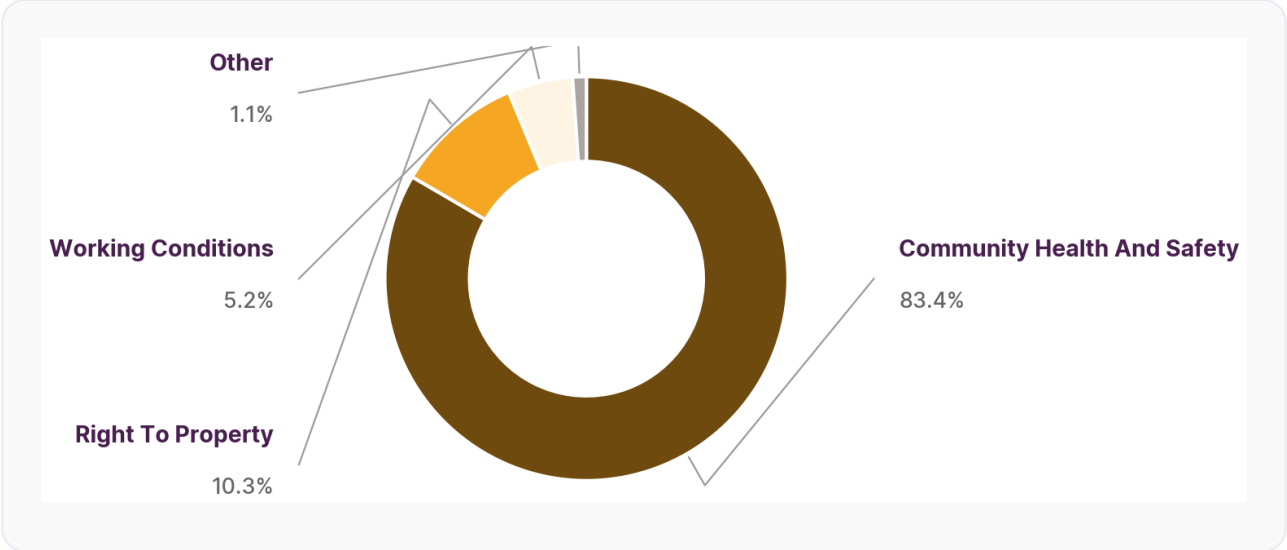
- **Water Consumption (33.6%):** The dominant concern. This is driven by massive drainage and the depletion of groundwater levels along the Czech-Polish border, which directly threatened the drinking water supply of neighboring communities.
- **Water Pollution (18.3%):** Beyond volume, the quality of local watersheds is a major flashpoint, with concerns focusing on the runoff and heavy metal contamination inherent in open-pit lignite mining.

Operational Footprint & Macro-Risks

Beyond water, the physical scale of the operation drives a significant portion of the controversy:

- **Energy & Natural Resources (17.0%):** This category captures the sheer scale of extraction and the depletion of lignite reserves, which has become a focal point for regional resource management debates.
- **Physical Degradation (Other Pollutions - 12.2%):** Unlike typical industrial projects, Turów faces specific localized risks like transboundary soil subsidence and constant noise pollution, affecting the quality of life in cross-border settlements.
- **Climate Change (10.9%):** While significant, greenhouse gas emissions often take a backseat in local discourse compared to immediate physical impacts, though they remain a core driver for international NGO pressure.

1.2. Social Risk Breakdown



While environmental risks focus on the land and water, the **Social** profile of Turów highlights the geopolitical and human tension caused by a massive open-pit operation positioned at the intersection of three nations (Poland, Czechia, and Germany).

1. Community Health & Safety: An International Crisis (83.4%)

The vast majority of social controversy is centered on the well-being of surrounding populations. This is not merely a "local" issue, but a transboundary crisis.

- **The Water-Security Nexus:** The primary driver is the severe groundwater drainage that left neighboring Czech villages without reliable drinking water. This transformed a technical mining issue into a high-profile human rights and safety concern.
- **Respiratory Hazards:** Persistent exposure to toxic coal dust and smog continues to fuel health-related grievances, keeping this category at the forefront of the public discourse.

2. Right to Property: The Cost of Subsidence (10.3%)

Property-related risks at Turów are physical and measurable.

- **Structural Damage:** Residents in German border towns, such as Zittau, have documented significant structural damage to their homes.
- **Land Subsidence:** The massive scale of earth removal has led to land subsidence, resulting in cracked foundations and rapidly depreciating property values, creating a long-term liability for the operator.

3. Working Conditions: The Job Insecurity Paradox (5.2%)

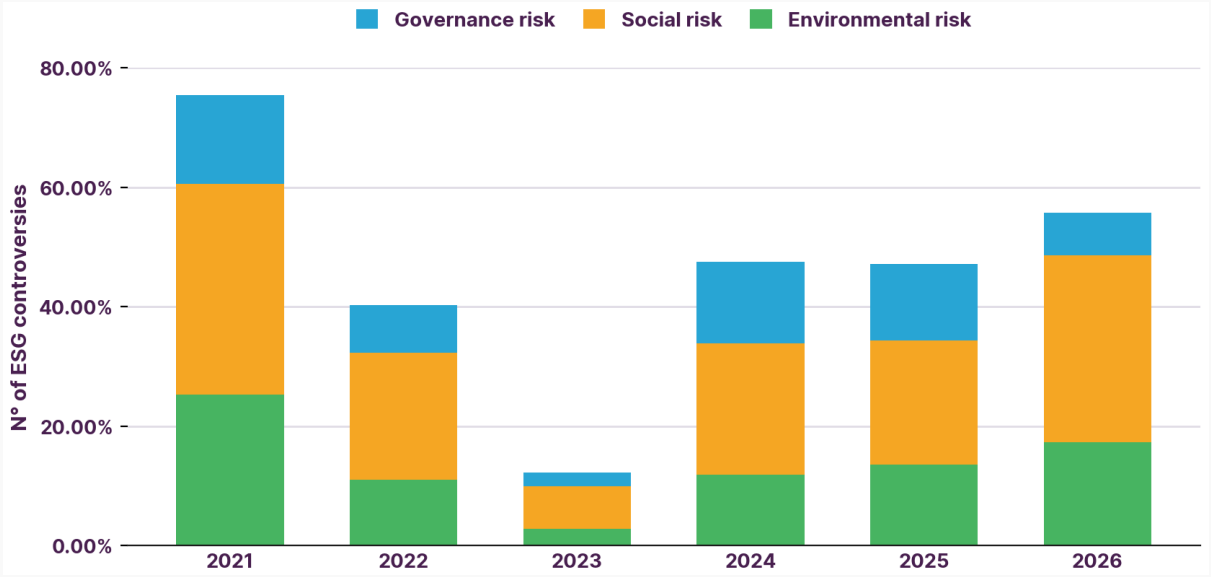
While smaller in volume, the labor discourse is intense and politically charged.

- **The Threat of Closure:** Unlike many mines where labor risks involve safety, the Turów discourse is dominated by **extreme job insecurity**. Polish miners and unions have engaged in fierce protests and strikes, driven by the existential threat of sudden unemployment due to EU court orders and international legal battles.

3.2 Cerrejón Coal Mine: The "Risk Rebound" at Cerrejón Coal Mine

The Cerrejón mine—one of the largest open-pit coal operations in the world—presents a highly volatile ESG profile. Unlike assets that show a linear reduction in risk, Cerrejón demonstrates how **Social risks**, if left unaddressed at their root, can cause controversy volumes to resurge even after periods of operational quiet.

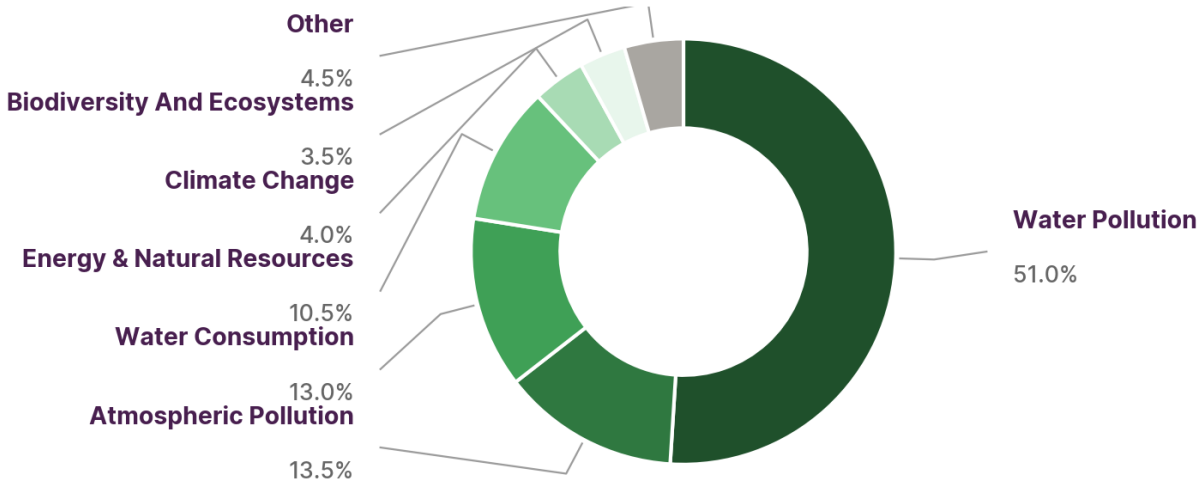
1. The Five-Year Trajectory: Volatility and Resurgence



The data reveals a "U-shaped" risk curve between 2021 and 2025:

- **The 2021 Flashpoint:** The period opened with an extreme peak driven almost entirely by a humanitarian crisis and social unrest.
- **The Brief Lull (2022–2023):** Volumes plummeted to a historic low of fewer than 50 incidents in 2023. However, this was a "false floor," as the underlying drivers remained unresolved.
- **The 2024–2025 Rebound:** Controversy began a steady climb back up, reaching **160 mentions by 2025**. Crucially, the internal composition remained consistent: **Social risk** stayed the dominant driver, proving to be the mine's most persistent and systemic challenge.

Environmental Risks



The environmental risk discourse surrounding the Cerrejón mine is overwhelmingly dominated by immediate, life-threatening impacts on local hydrology, with **Water Pollution** (44.7%) making up nearly half of the entire conversation. This staggering figure directly reflects the severe contamination of the Ranchería River basin and local aquifers with heavy metals and toxic coal runoff.

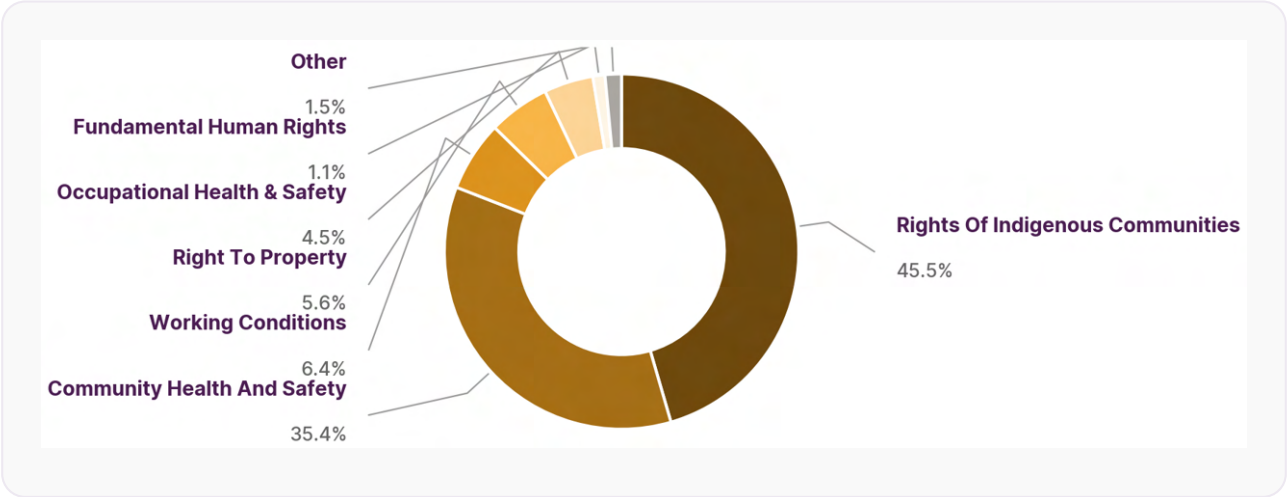
Secondary concerns are relatively evenly distributed across the tangible physical tolls of the massive open-pit operation: **Other Pollutions** (13.6%) encompassing soil degradation and noise, **Atmospheric Pollution** (11.8%) driven by the hazardous clouds of coal dust blanketing the region, and **Water Consumption** (11.4%), which points directly to the highly controversial diversion of the Arroyo Bruno in the arid La Guajira desert.

In contrast, broader macro-ecological issues like the sheer scale of extraction under **Energy & Natural Resources** (9.2%), global **Climate Change** (3.5%), localized **Biodiversity and Ecosystems** (3.1%) and **Other Pollutions** occupy a much smaller fraction of the discourse. This underscores that for Cerrejón, immediate survival threats regarding toxic water and breathable air absolutely eclipse longer-term environmental debates.

At Cerrejón, the environmental discourse is not about global climate targets; it is about **immediate survival** in an arid landscape.

- **Water Pollution (44.7%):** Nearly half of the discourse focuses on the contamination of the Ranchería River basin. Heavy metals and toxic coal runoff have turned a vital water source into a life-threatening hazard.
- **Water Consumption (11.4%)** is tied to the highly controversial diversion of the Arroyo Bruno. In the desert region of La Guajira, diverting a stream is viewed as a direct threat to the regional ecosystem.
- **Atmospheric Hazards (11.8%):** Hazardous clouds of coal dust blanket the region, making "breathable air" a primary concern that eclipses broader debates like Climate Change (3.5%) or Biodiversity (3.1%).

Social Risk



The social risk discourse surrounding the Cerrejón mine is heavily defined by a profound humanitarian crisis, with **Rights Of Indigenous Communities (45.5%)** dominating the conversation due to the forced displacement of the Wayúu and the cultural disruption Afro-Colombian populations whose ancestral lands have been overtaken by the operation.

Closely following is **Community Health And Safety (35.4%)**, which highlights the catastrophic public health impacts, specifically linking the mine's massive water diversion and toxic coal dust to severe dehydration, malnutrition, and tragic mortality rates among local indigenous children. Internal and structural issues make up a secondary tier of concerns, including **Working Conditions (6.4%)** driven by frequent, massive union strikes over intense shift demands with the immediate fallout of the massive, 91-day strike by the Sintracarbón workers union, job restoration walks, and layoffs in retaliation for blockades and the **Right To Property (5.6%)**, reflecting the physical expropriation of land for the mine's ever-expanding open-pit crater and railway infrastructure.

Finally, **Occupational Health & Safety (4.5%)** addresses the acute physical dangers and hazardous particulate exposure faced by the miners themselves, while broader umbrella labels like **Fundamental Human Rights (1.1%)** make up a negligible fraction, as these severe abuses are almost entirely captured by the much more specific indigenous and health categories.

SECTION 05

Key Takeaways

1. The Hierarchy of Risk Concentration

The cumulative volume of ESG controversies is heavily concentrated within traditional, high-impact asset types. **Hydropower stations, Coal Mines, and Coal Power Stations** consistently emerge as the top three most volatile sectors across the global dataset. While emerging sectors like Bioenergy and Geothermal maintain a comparatively quiet data footprint, traditional energy and heavy transit infrastructure remain the primary battlegrounds for public and regulatory friction.

2. The Dominance of Environmental & Social Realities

When downstream legal and investigative exposure is methodologically isolated, a stark reality surfaces: **Environmental and Social friction points completely overwhelm the infrastructure discourse.**

- **Environmental** mentions are driven by tangible, immediate physical impacts: primarily biodiversity loss in Hydropower, catastrophic industrial accidents in Coal Mining, and acute water contamination in Coal Power and Nuclear sectors.
- **Social** controversies shift the narrative to human consequences, dominated by severe occupational hazards in mining, property displacement in large-scale dam construction, and direct community health anxieties tied to toxic operational externalities.

3. Governance as an Event-Driven Volatility Trigger

Under a refined framework that surfaces proactive operational issues, traditional corporate governance metrics (such as executive pay or board diversity) prove negligible. Instead, the Governance pillar is almost exclusively defined by **Corruption & Bribery**, which accounts for nearly 30% of all governance mentions. Rather than following a steady baseline, this risk manifests as sharp, unpredictable data spikes triggered by high-profile international contract probes, bid-rigging allegations, and public-figure investigations across sectors like Airports, Nuclear, and Coal.

Understanding Divergent Controversy Trajectories

The asset-level case studies demonstrate that tracking data footprints over time is essential, as identical baseline risks can unfold into entirely opposite controversy lifecycles:

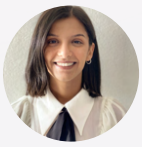
- **The Descending Trajectory (The Case of Turów):** Represents a compressed lifecycle where an initial "risk explosion" across all three pillars, heavily driven by transboundary water disputes, steadily cooled over a five-year period. The data illustrates a clear transition from an active, high-volume crisis to a stabilized, minor tracking profile.
- **The Volatile Rebound (The Case of Cerrejón):** Illustrates a dangerous "U-shaped" curve. A dramatic collapse in controversy volume in 2022–2023 created a deceptive "false floor." Because the core humanitarian frictions (namely the rights of indigenous communities and survival threats to local hydrology) remained unaddressed, the data experienced a sharp resurgence by 2025.

SECTION 06

Conclusion

By mapping the data footprints of over 250,000 infrastructure projects from 2021 through 2026, this whitepaper demonstrates that ESG controversy is deeply concentrated, highly volatile, and heavily driven by tangible environmental and social realities. Traditional, high-impact sectors like hydropower and coal consistently anchor the highest volumes of public discourse, while the governance pillar is characterized not by standard corporate metrics, but by sharp, event-driven surges in corruption and bribery across heavy transit hubs and nuclear power. Ultimately, tracing these multi-year controversy lifecycles reveals that surface-level data lulls can be profoundly deceptive. While some assets see their mention volumes steadily and permanently quiet down over time, others experience intense data rebounds when deep-seated community and ecological frictions are left unresolved, proving that tracking long-term data trajectories is essential for understanding the true operational lifecycle of global infrastructure.

Authors



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About SESAMm

SESAMm is a global leader in controversy data, leveraging advanced large language models and generative AI to uncover ESG, reputational, and supplier risks in seconds. Our AI-powered platform surfaces real-time insights, even in low-disclosure markets, on millions of companies and infrastructure projects, supporting more informed decisions, enhanced due diligence, and regulatory alignment at scale. We work with leading firms, including Allianz Commercial, Ares Management, Natixis, Oddo, Sustainable Fitch, Warburg, and others. SESAMm has raised $50M from renowned investors and operates across four continents.