MALENA

MACHINE LEARNING ESG ANALYST

AN INNOVATION OF

IFC | International Finance Corporation
WORLD BANK GROUP

IN PARTNERSHIP WITH

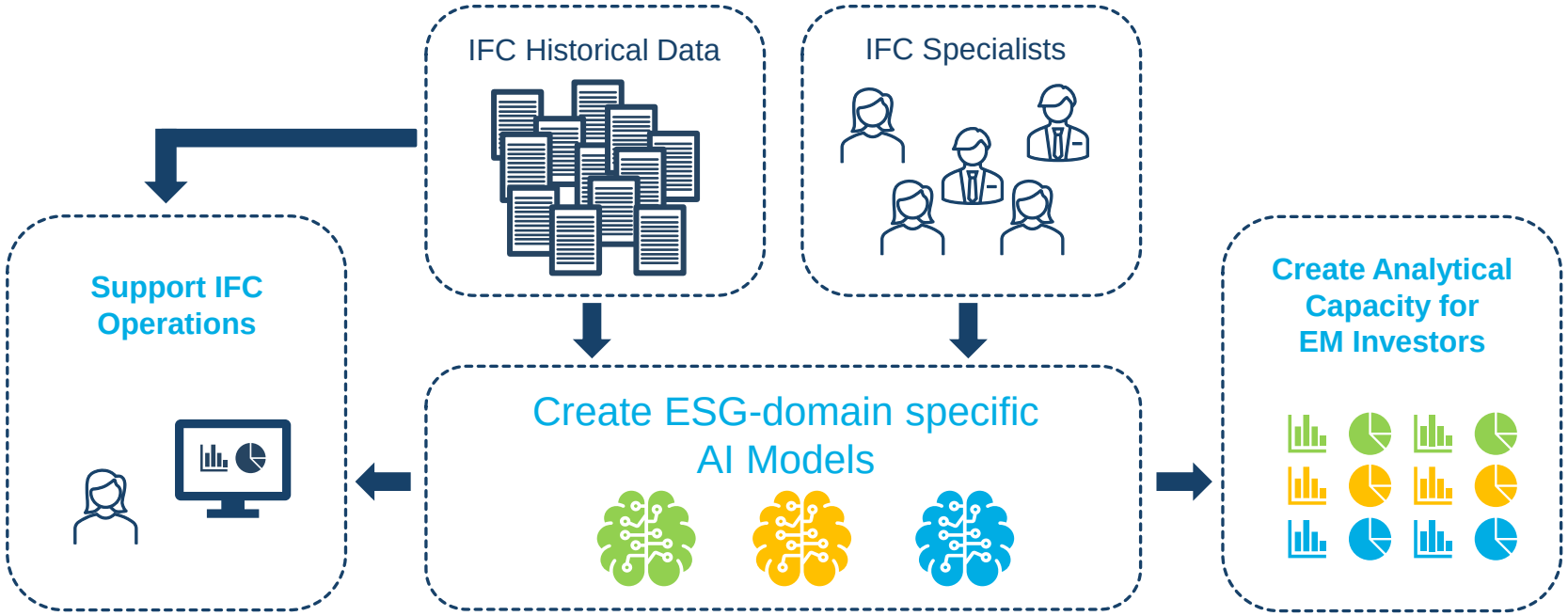
MINISTRY OF FOREIGN AFFAIRS OF DENMARK
Danida

Ministry of Economy and Finance

Fias | THE FACILITY FOR INVESTMENT CLIMATE ADVISORY SERVICES

Leveraging Artificial Intelligence for Development

Goal: Develop innovative ESG solutions leveraging disruptive technologies to drive sustainable investment in emerging markets



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GLOBAL TOP 100
GLOBAL TOP 100
PROMISING PROJECT
PROMISING PROJECT

MALENA: Natural Language Processing to unlock text

MALENA is an AI assistant to rapidly identify over 1,200 ESG risk terms and predict sentiments based on context

MALENA will predict a negative sentiment for risk terms that occur in an ESG risk or performance gap context

The main concerns amongst other issues raised included the effect of the project on the proposed location of the site which the appellants claimed was a residential estate, a rich marine environment and citing concerns that the terminal would endanger the lives of the **community**.

The ESIA identified the following key issues; (i) construction related impacts such as dust, **noise** and **fugitive emissions** emissions **emissions**; (ii) **wastewater** management; (iii) operational **hazards**; (iv) potential increase in traffic during construction and operation from trucks conveying LPG to rail heads and customers.

There are no “negative” words. MALENA makes predictions based on context, for example: “*no* **fatalities**” = positive sentiment

Based on information provided during appraisal, Robust did not incur over the last three years any material regulatory **penalties**, **fines** or sanctions for contraventions or **non-compliance** compliance **compliance** with statutory obligations, as well as not reported any **fatalities** on sites at any of its operations. Supply Chain RiskRiskRisk Assessment & Management.

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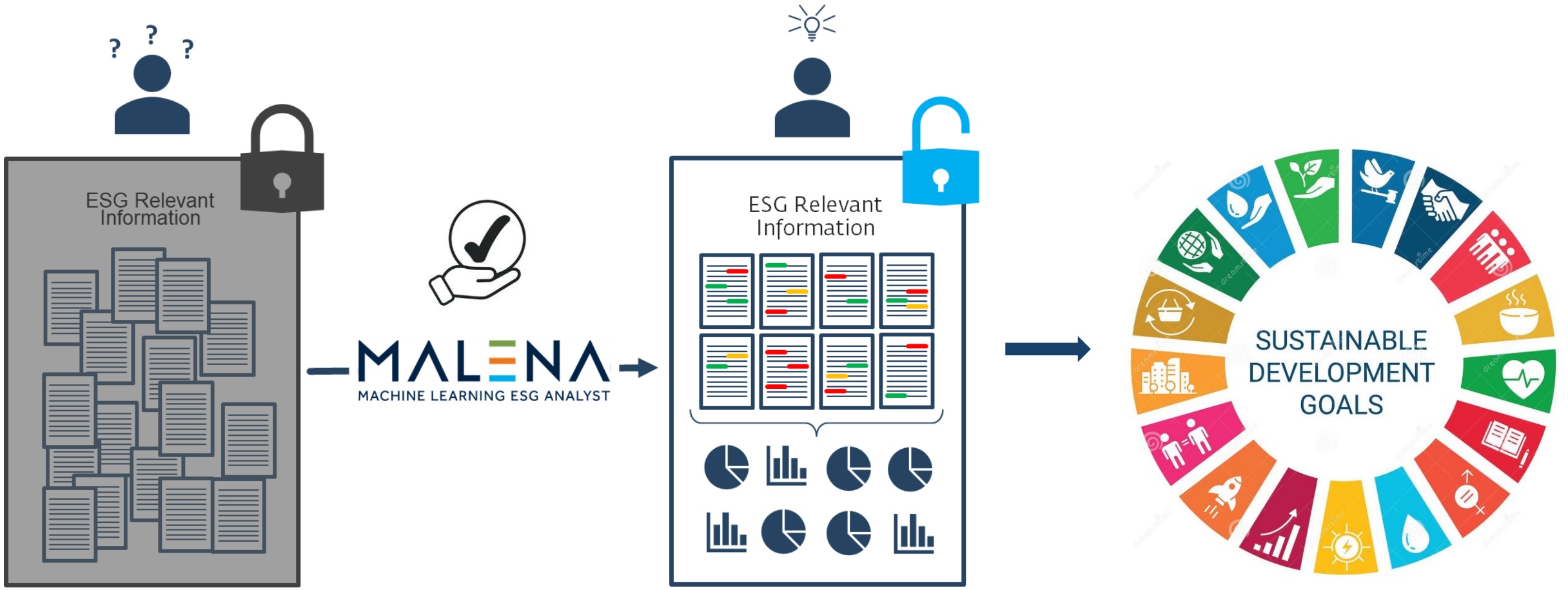
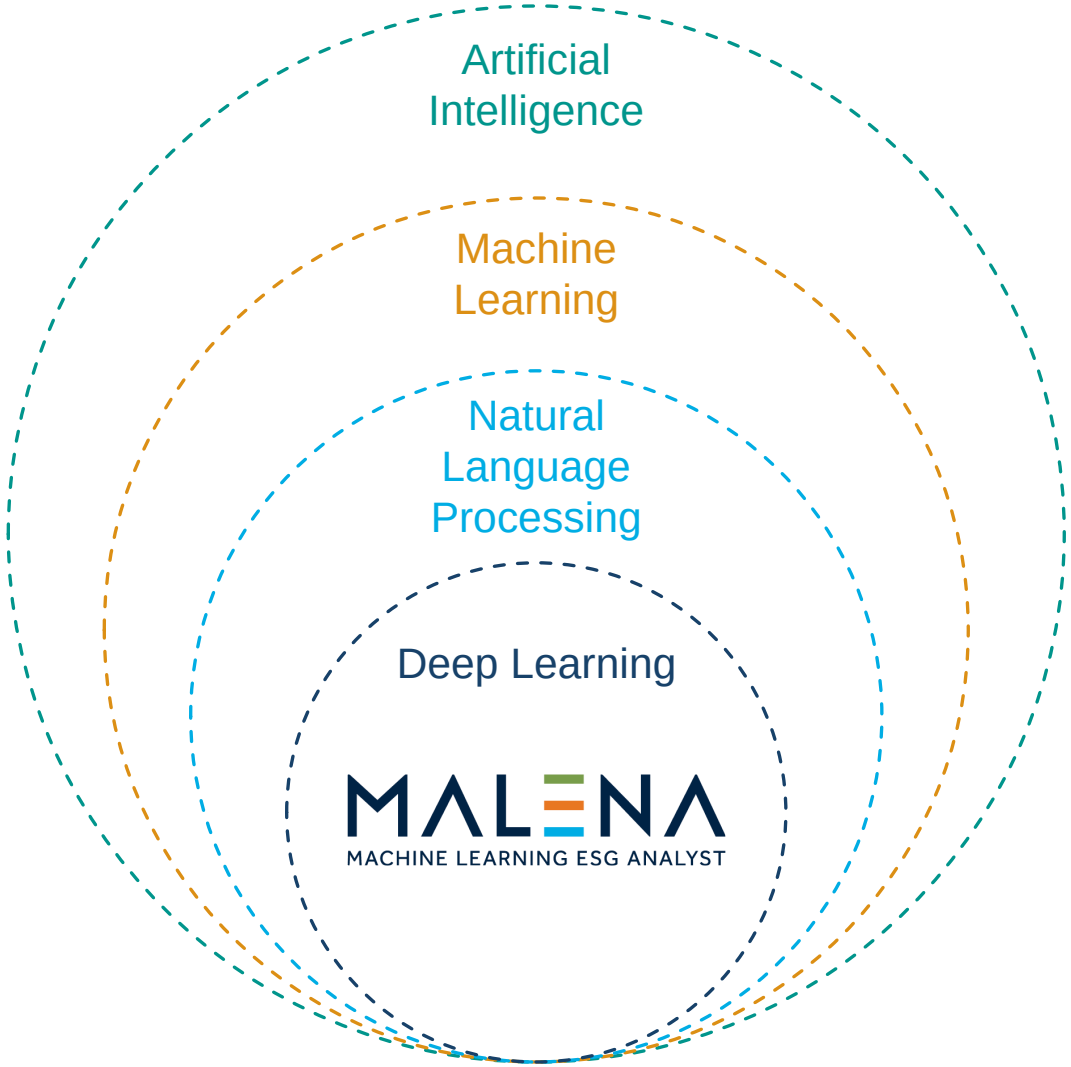
Trustworthy artificial intelligence to make investments

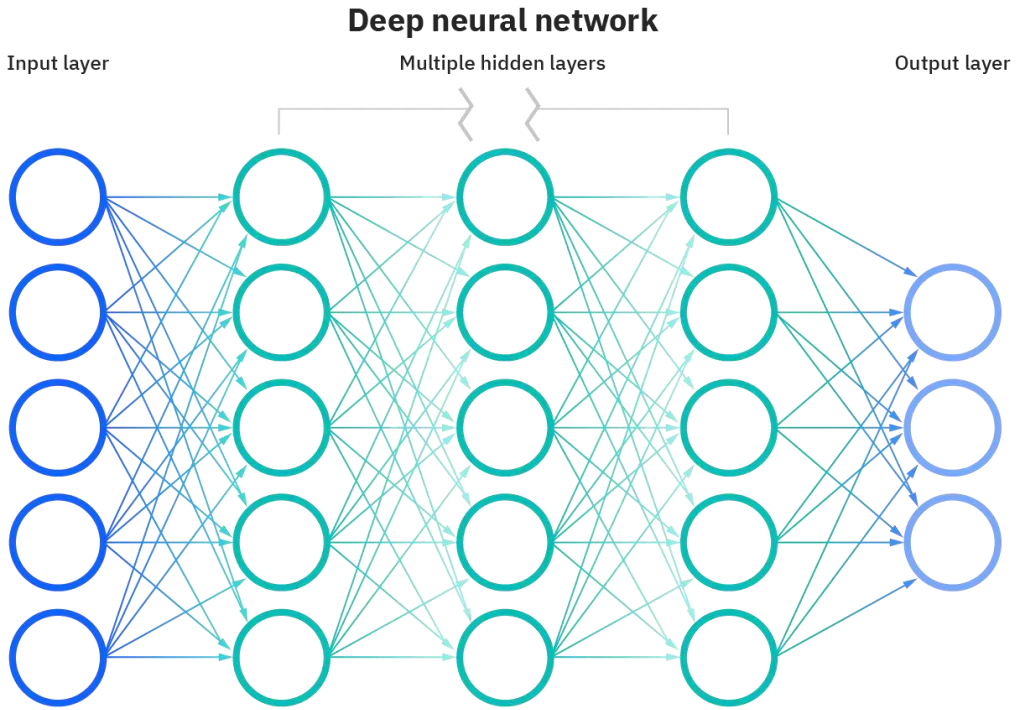


AI Overview



What is Deep Learning?

- Deep learning is comprised of artificial neural networks (ANNs). “Deep” in deep learning refers to a neural network comprised of more than three layers.



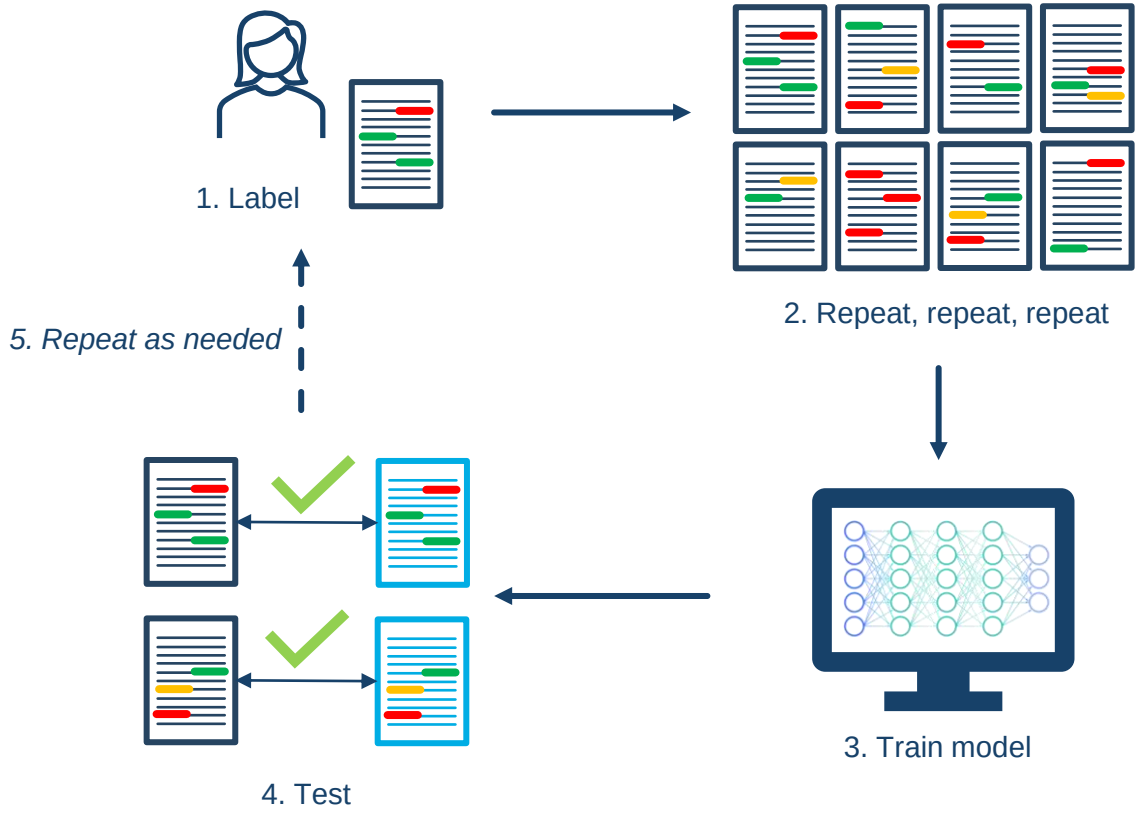
How to Train a Model

Supervised vs Unsupervised

- **Supervised learning** leverages labeled training data to “learn” the relationships between input data and the desired output. MALENA is a supervised machine learning algorithm, trained on over 125,000 labeled data points.
- **Unsupervised learning** involves a machine transforming data into useful information without the need to train the model on labeled data. Common methods include clustering and association. For MALENA we used an unsupervised algorithm called Word2Vec to expand our ESG taxonomy

How to train a … (supervised) model

- **High quality** training data in **large quantities** is a key success factor for supervised machine learning models



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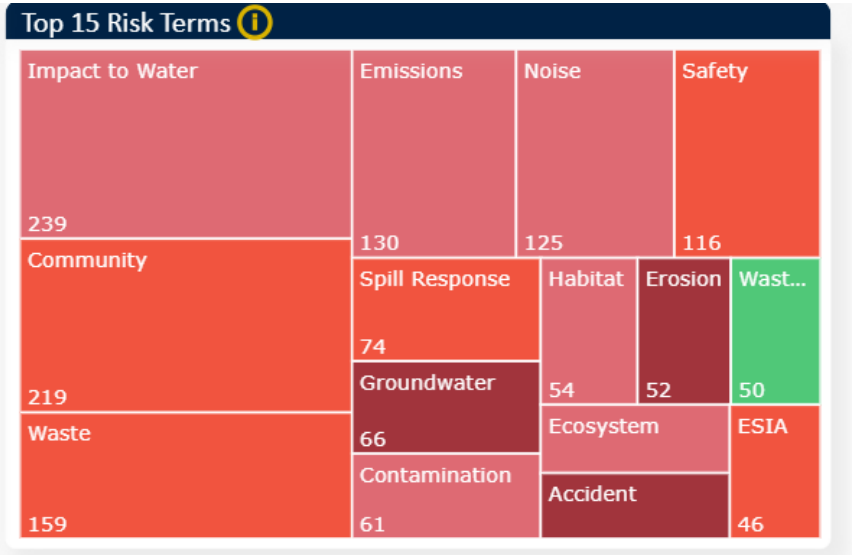
ESIA Analysis

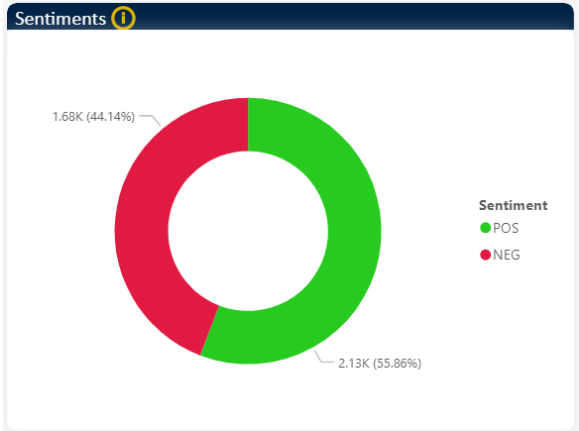
Analysis of an ESIA for a cement project in the Democratic Republic of Congo



This would have the advantage of a shorter haul distance, but would mean establishing a crossing in the flowing portion of the Yuku **River**, and associated impacts on riverine vegetation, impacts on agricultural lands, and dust impacts on **water quality** (see Figure 4-17), and impacts on Yuku village.

Topics

Name	Pos(+)	Neg(-)	%Neg
Resource Efficiency & Pollution			
Impacts to Water Sources	148	246	62%
Pollution Risks	129	137	52%
Air Pollution	106	99	48%
Climate - Weather	48	99	67%
Waste Management	160	90	36%
GHG Emissions	37	29	44%
Resource Efficiency	19	15	44%
Water Pollution	31	15	33%
Pollution Prevention	4	0	
Labor & Working Conditions			
Worker Health and Safety	165	145	47%
Occupational Health	43	92	68%
Transparent Working Conditions	45	26	37%



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Case Study: ESIAs as ESG Performance Predictor*

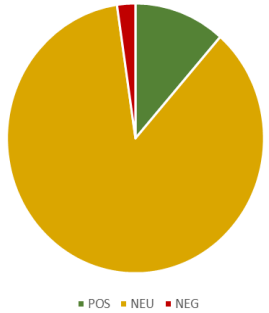
NLP to predict ESG performance of projects based on early-stage due diligence

Sample:

530 IFC projects

1,316
ESIAs & related Documents

1.4M
ESG Signals



Neutral	1.1M
Positive	210K
Negative	112K

Results:

Correlation between ESIA Sentiment Score and project E&S performance

ESIA documents the best predictor in sample

Predictions most accurate for riskier projects

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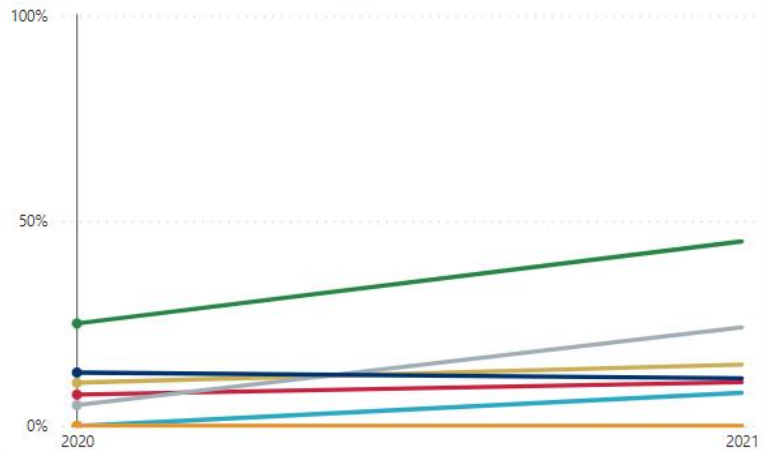
* These research findings are from the chapter "Artificial intelligence solutions for environmental and social impact assessments" in *Handbook of Environmental Impact Assessment* edited by Alberto Fonseca, 2022, Edward Elgar Publishing.

Use Case: Corporate Annual Report

Negative Sentiment Timeline



Top Topics

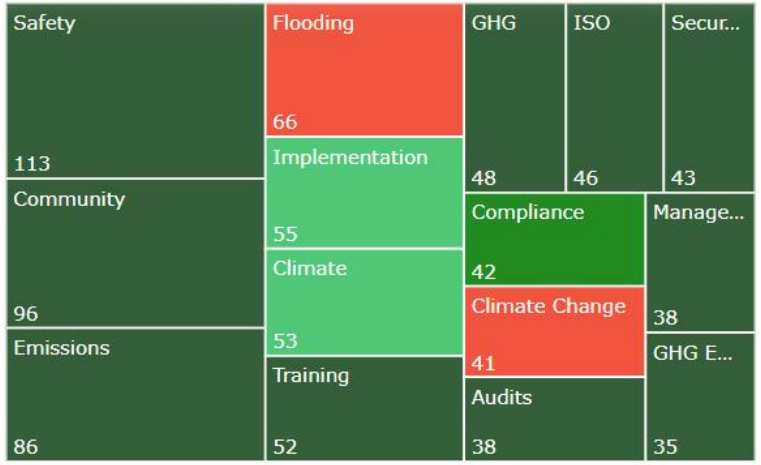
Name	Pos(+)	Neg(-)	%Neg
Air Pollution	85	2	2%
Climate - Weather	114	79	41%
Commitment to ESG performance	57	0	0%
Community Engagement, Feedback and Recourse	101	6	6%
Contribution to Health Impacts Upon a Community	2	3	60%
E&S Management Programs and Action Plans	6	0	0%
Emergency Preparedness	36	2	5%
Forced and Child Labor	0	1	100%
Gender Issues	5	0	0%

Word Cloud

Performance Standards

Name	Pos(+)	Neg(-)	%Neg
ESG Risk Management	505	52	9%
Labor & Working Conditions	280	42	13%
Resource Efficiency & Pollution	467	99	17%
Community Health, Safety & Security	58	8	12%
Land Acquisition & Resettlement	20	12	38%
Biodiversity Conservation	73	3	4%
Indigenous Peoples	10	0	0%

Top 15 Risk Terms



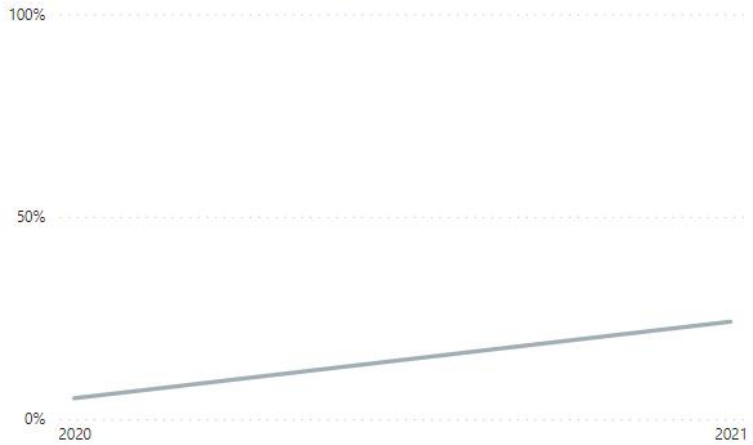
Climate Hazard Information

Project ID (Blank)

**Not MALENA output. For illustration purposes only.*

Topic: Climate & Weather

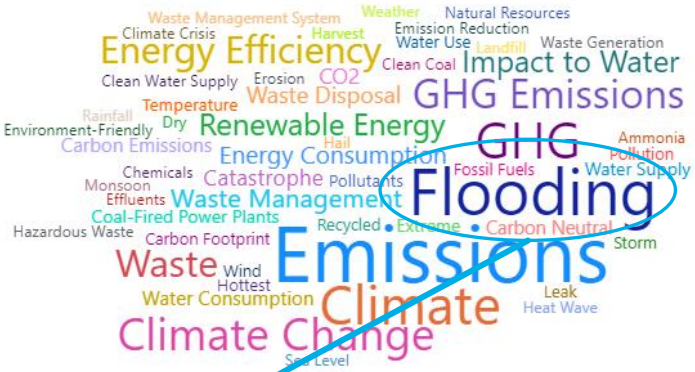
Negative Sentiment Timeline



Top Topics

Name	Pos(+)	Neg(-)	%Neg
Climate - Weather	114	79	41%
Impacts to Water Sources	23	5	18%
Resource Efficiency	68	5	7%
GHG Emissions	109	3	3%
Waste Management	58	3	5%
Air Pollution	85	2	2%
Pollution Risks	9	2	18%
Pollution Prevention			

Word Cloud



Performance Standards

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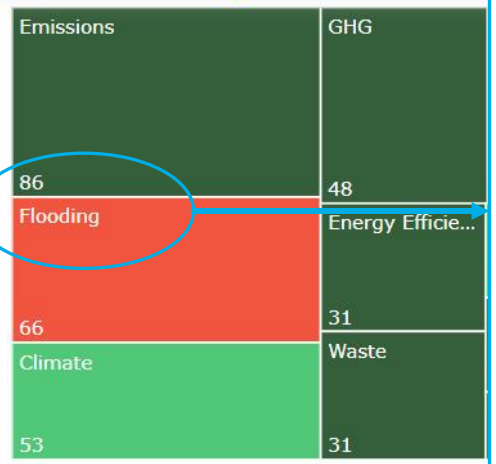
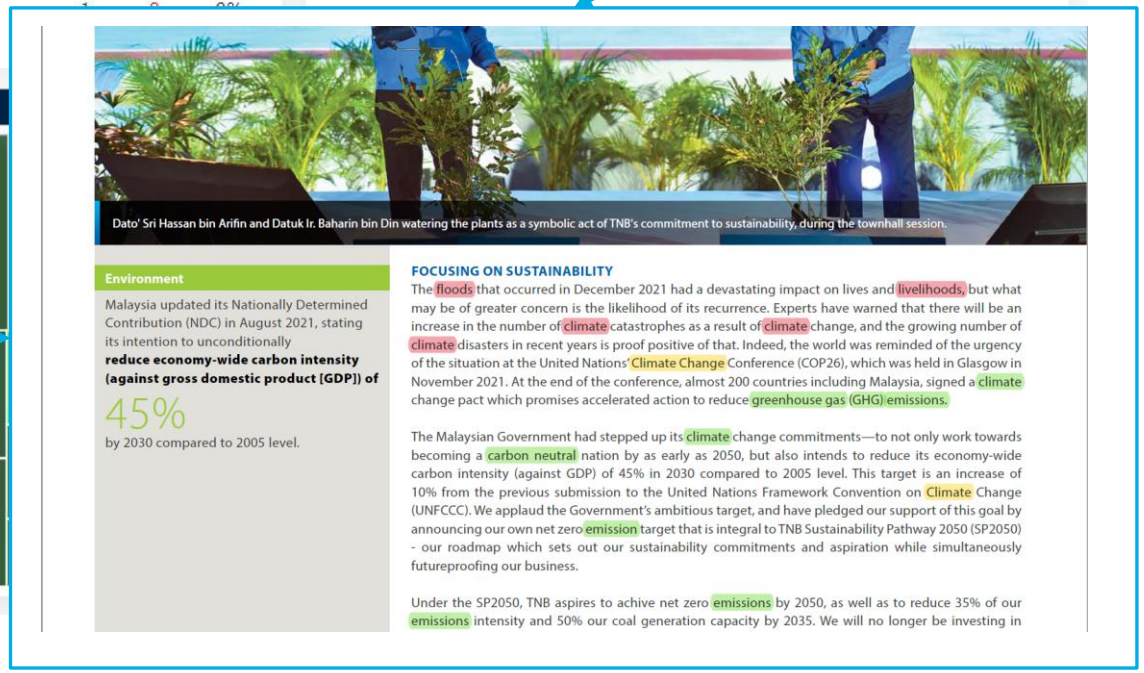
Resource Efficiency & Pollution	467	99	17%

Top 15 Risk Terms





Climate & Weather topics in Annual Reports

Dato' Sri Hassan bin Arifin and Datuk Ir. Baharin bin Din watering the plants as a symbolic act of TNB's commitment to sustainability, during the townhall session.

Environment

Malaysia updated its Nationally Determined Contribution (NDC) in August 2021, stating its intention to unconditionally **reduce economy-wide carbon intensity (against gross domestic product [GDP]) of**

45%

by 2030 compared to 2005 level.

FOCUSING ON SUSTAINABILITY

The floods that occurred in December 2021 had a devastating impact on lives and livelihoods, but what may be of greater concern is the likelihood of its recurrence. Experts have warned that there will be an increase in the number of climate catastrophes as a result of climate change, and the growing number of climate disasters in recent years is proof positive of that. Indeed, the world was reminded of the urgency of the situation at the United Nations' Climate Change Conference (COP26), which was held in Glasgow in November 2021. At the end of the conference, almost 200 countries including Malaysia, signed a climate change pact which promises accelerated action to reduce greenhouse gas (GHG) emissions.

The Malaysian Government had stepped up its climate change commitments—to not only work towards becoming a carbon neutral nation by as early as 2050, but also intends to reduce its economy-wide carbon intensity (against GDP) of 45% in 2030 compared to 2005 level. This target is an increase of 10% from the previous submission to the United Nations Framework Convention on Climate Change (UNFCCC). We applaud the Government's ambitious target, and have pledged our support of this goal by announcing our own net zero emission target that is integral to TNB Sustainability Pathway 2050 (SP2050) - our roadmap which sets out our sustainability commitments and aspiration while simultaneously futureproofing our business.

Under the SP2050, TNB aspires to achive net zero emissions by 2050, as well as to reduce 35% of our emissions intensity and 50% our coal generation capacity by 2035. We will no longer be investing in

**Prototype under development*

High ESG Risk Terms

Performance Standards

Name	Pos(+)	Neg(-)	%Neg
ESG Risk Management	505	52	9%
Labor & Working Conditions	280	42	13%
Resource Efficiency & Pollution	467	99	17%
Community Health, Safety & Security	58	8	12%
Land Acquisition & Resettlement	20	12	38%
Biodiversity Conservation	73	3	4%
Indigenous Peoples	10	0	0%
Cultural Heritage	2	0	0%

Topics

Name	Pos(+)	Neg(-)	%Neg
Plans			
Labor & Working Conditions			
Worker Health and Safety	168	17	9%
Transparent Working Conditions	45	12	21%
Non-Discrimination & Equal Opportunity	25	8	24%
Protection of Contract Workers	25	2	7%
Forced and Child Labor	0	1	100%
Worker Protection	0	1	100%
Worker Safety Hazards	1	1	50%
Gender Issues	5	0	0%
Occupational Health	3	0	0%
Worker Feedback and Recourse	2	0	0%
Workers Organizations	6	0	0%
Land Acquisition & Resettlement			
People/Communities Involuntary Resettled or Evicted Through Force	9	8	47%
Negative Impact on Peoples' Livelihoods	11	4	27%
Community Health, Safety & Security			
Security Force Impacts to a Community	54	5	8%

Risk Terms

Risk Terms	Pos(+)	Neg(-)	%Neg
Environmental Risks	1	0	0%
Environment-Friendly	1	0	0%
Equal Pay or Remuneration	1	0	0%
Erosion	0	1	100%
Evacuation	1	0	0%
Exposure to Hazmat	1	3	75%
Extreme	2	2	50%
Fatalities	11	3	21%
Feasibility	3	0	0%
Fire	0	1	100%
Flooding	42	24	36%
Footprint	5	1	17%
Forced	0	1	100%
Forest Fire	0	1	100%
Fossil Fuels	1	1	50%
Freedom of Association	1	0	0%
Gender	2	0	0%
GHG	47	1	2%

12), which has received a record-high allocation of RM400 billion for its initiatives, Malaysia aims to increase its RE capacity to account for 31% of the nation's generating capacity by 2025, as well as provisions outlining the development of green, or low-carbon, mobility, including electric vehicle (EV) adoption in urban settings. At the same time, the Government has also committed itself to become a carbon neutral nation as early as 2050.

We are fully supportive of our government's efforts to put the country on a more sustainable footing, which is aligned with the long-term strategy that we have put in place for TNB. Our hope is that together, we will attain our aspiration, to be a leading provider of sustainable energy solutions while delivering on our purpose to make Malaysian lives better and brighter.

PERFORMANCE HIGHLIGHTS

TNB reported a total revenue of RM52.63 billion for 2021 representing a year-on-year (yoy) increase of 19.7% from RM43.98 billion a year ago. Electricity sales had increased 19.3% yoy to RM51.56 billion from RM43.20 billion for the same period in tandem with the resumption of economic activity in the country, which

In terms of the standards of our operational performance, TNB continued to maintain world-class network standards despite the challenging operating environment. Our power plants continued to operate efficiently and reliably, with the average domestic and international plant availability exceeding 80% while our Transmission System Minutes, a benchmark for the minutes of interruption caused by transmission per year, scored 0.09 minutes. Meanwhile, the System Average Interruption Duration Index (SAIDI) scored 45.25 minutes while our Customer Satisfaction Index came in at 87%. These metrics put us squarely among the best power producers in Southeast Asia, and on par with systems in developed countries.

As for TNB's workplace safety performance, we continued to improve on our safety record with our Loss Time Injury Frequency (LTIF) improving to 1.03 in 2021 from 1.29 in the previous year. While we have done our utmost to reduce work-related fatalities, we unfortunately recorded eight incidences during the year. The loss of these lives is regretted and we resolve to do more in the coming years to prevent injuries towards our goal of zero fatalities.

Operating Profit

RM8.08 billion

up **9.8%** from RM7.36 billion a year ago

PAT

grew

6.9%

yoy to **RM3.86 billion** from RM3.62 billion due to the increase in operating profit and the increase in the share of results of associates, as well as accounting gains on the fair value of financial instruments.

MALENA Product Pipeline

API

- API access to ESG sentiment analysis model
- Can analyze large amounts of documents
- Output can be customized and plugged into in-house applications

Upload

- Allow users to create ESG sentiment analysis profiles for companies using MALENA
- Users can upload custom set of documents
- Access via web-portal

Add-in

- Word / PDF add-in
- Highlights ESG sentiments in the original document
- Document can be saved with the sentiment highlights
- Sentiment analytics in document pane

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Beta testing

IFC is engaging with a diverse group of institutions to beta test MALENA:

Multilateral Investment Guarantee Agency

- IFC's sister organization integrating MALENA into internal ESG analysis
- Delivered via API access to seamlessly integrate MALENA into MIGA's ESG applications
- Visualizations and output tailored to MIGA's needs

European Export Credit Agency

- Design thinking sessions in process workshop to define use case
- Focus on ESG due diligence and portfolio monitoring

IFC

Version 1.0 released June 2022. In testing internally with IFC specialists for ESG due diligence, portfolio monitoring, and insights.

Top 5 global Asset Manager

- Iterative design thinking sessions to define asset manager use case
- Joint research on MALENA application to address the ESG information gap in emerging markets
- Beta testing by ESG analysts underway

Regional Development Bank

- Joint research and publication in pipeline using publicly available data user portfolio information
- Proof of concept to expand language capabilities

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Thank you!

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