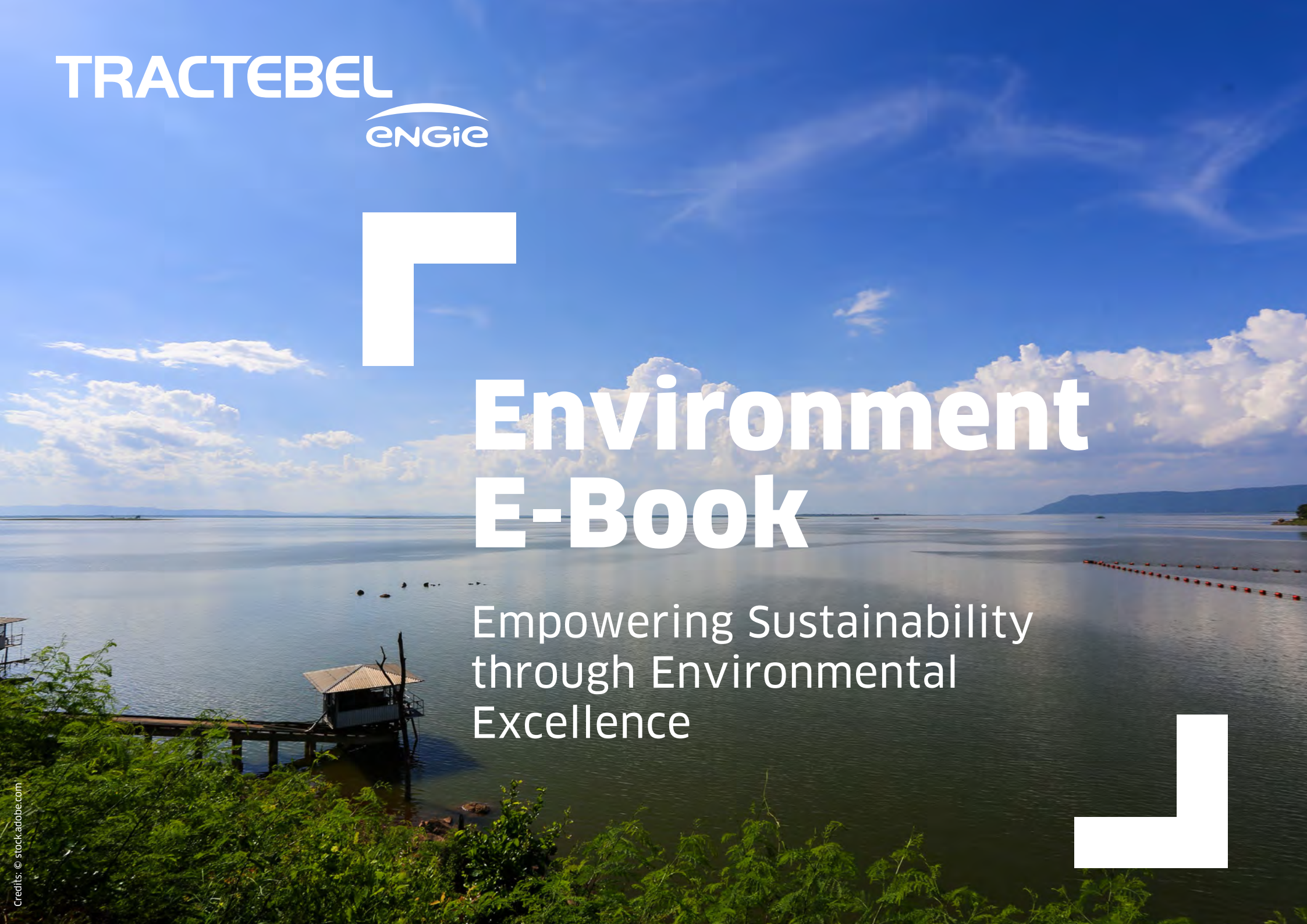
TRACTEBEL

ENGIE

Environment E-Book

Empowering Sustainability through Environmental Excellence

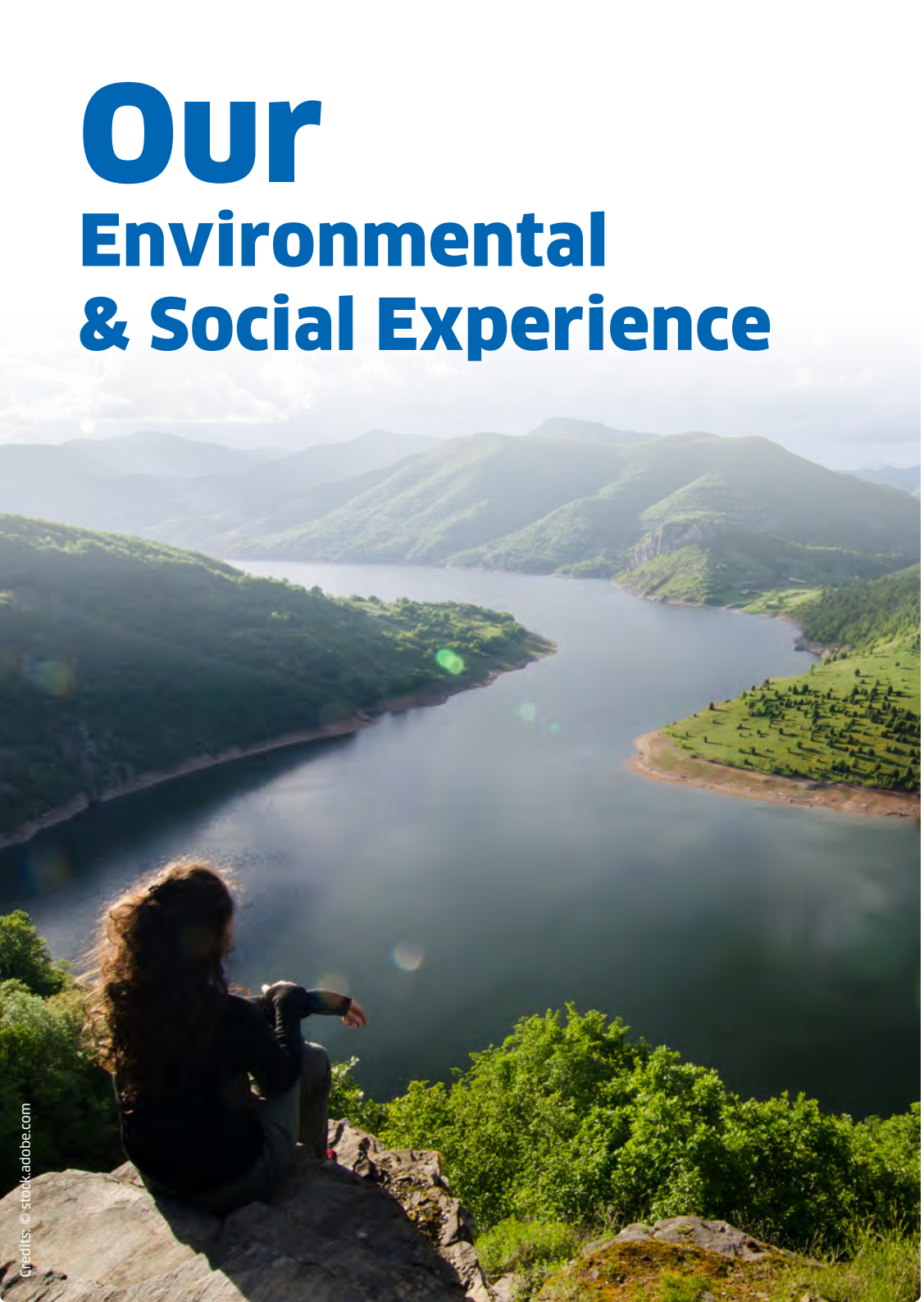


About Tractebel

Tractebel is a global community of passionate experts engineering a carbon-neutral future.

Turnover 2022	Employees	Countries
579 M€	**5,500**	**+ 70**

Our Environmental & Social Experience



Credits: © stock.adobe.com

TRACTEBEL ENGIE

Through our integrated solutions for sustainable energy and built environment projects, we partner with our clients to create a positive impact on people and planet.

Our engineering and environment experts work together to design environmental mitigation structures.

6 DEDICATED PRODUCTS

- E&S Management & Due Diligence
- E&S Field Supervision & Monitoring
- E&S Assessment & Permitting
- Brownfield Redevelopment
- Geomatics
- Environmental Modelling & Climate Change

In a nutshell
Environment & Social Expertise

High value expertise
with extended network of local partners across a large panel of E&S studies.

Differentiation
with combination of engineering and E&S services and expertise in complex and hybrid projects.

Key figures

+170 Experts worldwide

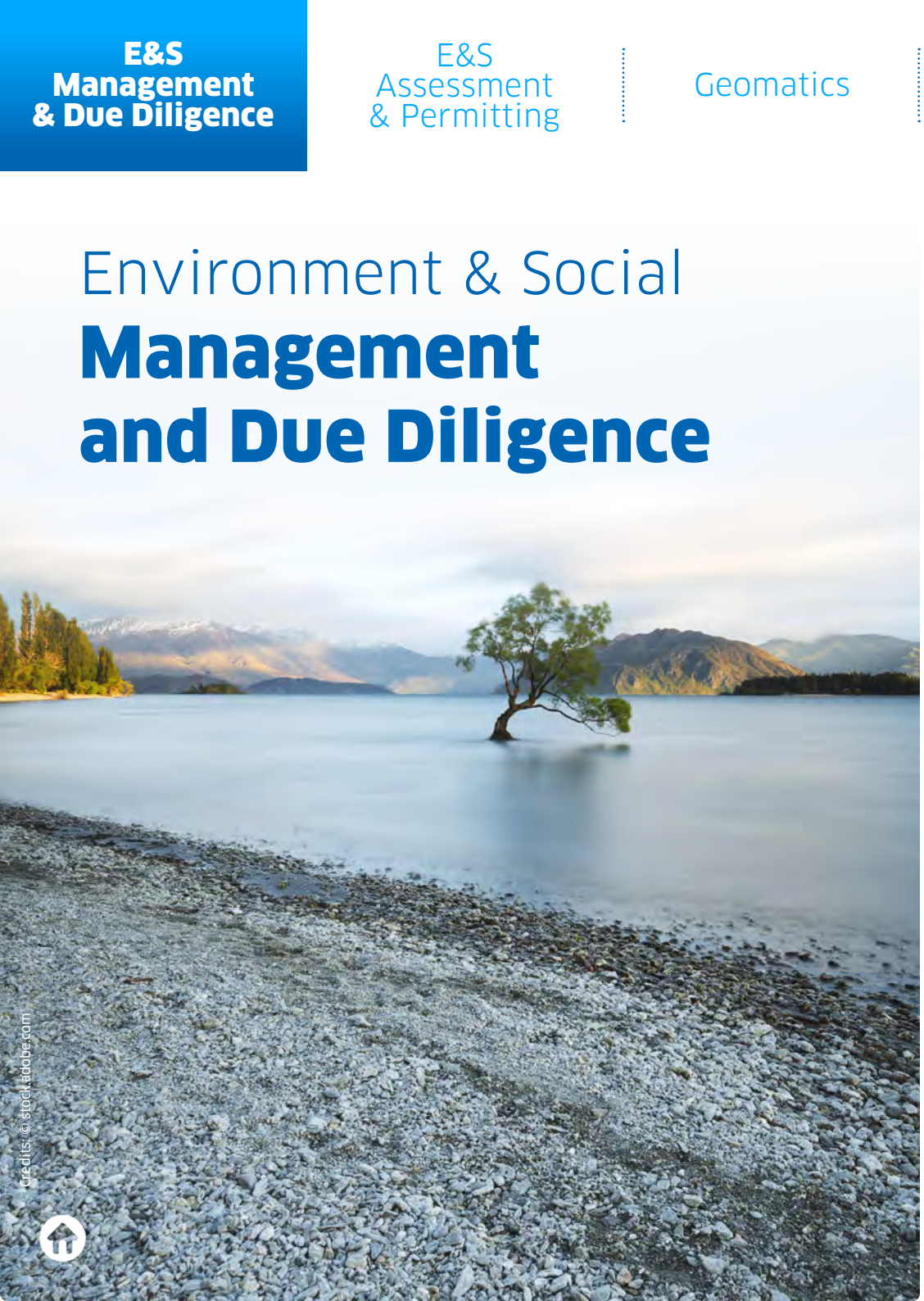
+100 On-going projects

+40 Countries presence

Sectors of Activity
Tractebel provides E&S consulting, engineering and project management services to public and private clients across various sectors.

1. Hydropower
2. Mining
3. Water
4. Energy
5. Waste managment
6. Climate Change

Environment & Social
Management and Due Diligence



credits: © stock.adobe.com

Nowadays businesses are driven to act on their environmental and social responsibility. **We conduct strategic analyses and studies to enable orientated decision-making** for the management of E&S aspects.

1. E&S Management Systems
Structuration of governance and means for an improved management of E&S aspects

2. Due Diligence
Productive risk management and guidance for decision making

3. Regulatory Audit/Analysis
Productive compliance with applicable legislations and improvement

4. Stakeholder Management
Creation of added value in the concept, design and implementation of an asset

Social Communication on a Gas Transport Project

PROJECT DESCRIPTION

The Social Communication Plan before the start of the gas transport project had the general objective of establishing a relationship and communicating with the communities in the areas of influence of the implementation of the GASFOR II Gas pipeline.

SCOPE OF WORK

- Stakeholders' identification
- Social Communication material
- Stakeholders' consultations
- Recommendations on mitigation measures

CLIENT Transportadora Associada de Gás – TAG

LOCATION Ceará State, Brazil

PERIOD 2021 - 2022

ADDED VALUE Facilitated implementation of the project raising awareness of the whole concerned communities

Gain in efficiency and quality for the Client having one unique team conducting the E&S assessment and following implementation

TRACTEBEL ENGIE

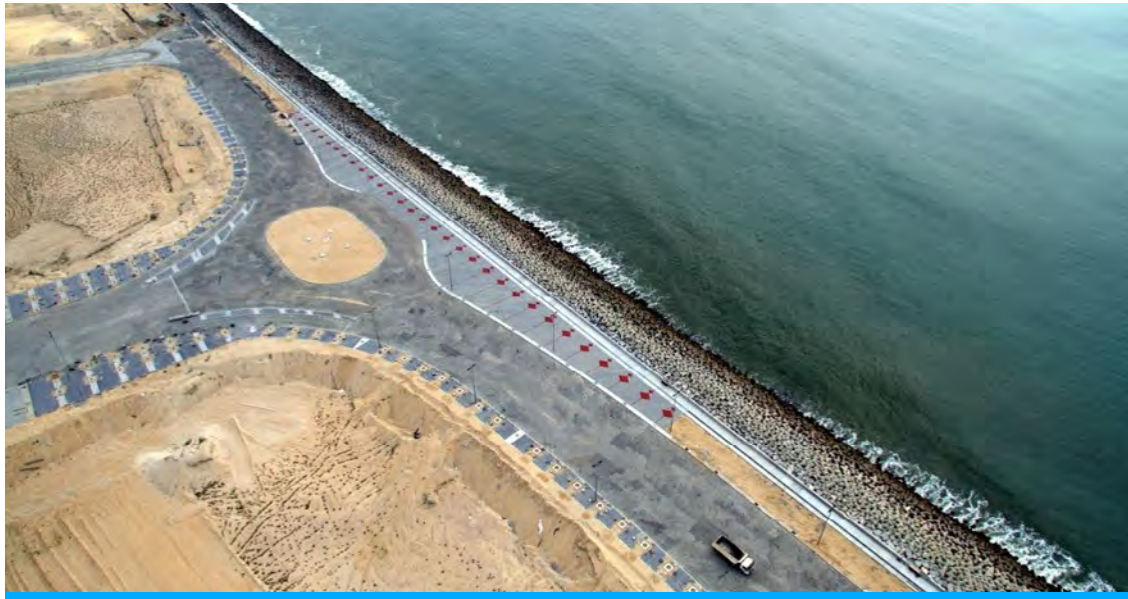
Eco-Atlantic shoreline protection project

PROJECT DESCRIPTION

The Eko Atlantic Project near Lagos aims at a long-term coastal defence solution by creating land offshore Victoria Island, to be protected by a sea wall.

SCOPE OF WORK

- Environmental Social Management Plan
- Update of E&S Impact Assessment, incl. a detailed evaluation against IFC Performance Standards
- Strategic Export Credit Agency Credendo
- Preparation of Stakeholder Engagement Plan
- Preparation of Roadmap for Grievance Redress Mechanism



CLIENT	Novadeal Eko FZE
LOCATION	Nigeria
PERIOD	2022 - 2023
ADDED VALUE	Restore some of the land lost to the sea and protect it from erosion. Competences in analysing and applying international E&S safeguard guidelines and standards as instructed by OECD, World Bank and other institutions for international funding.

TRACTEBEL ENGIE

Wildlife Management Project after minning dam collapse

PROJECT DESCRIPTION

Actions for the rescue and conservation of wild and domestic fauna have been carried out in the affected watersheds. Large volume of data that needed to be managed and analyzed.

SCOPE OF WORK

- The data from the programs for monitoring ichthyofauna, water quality, conservation of bees and managing facilities for receiving and keeping animals were structured into dashboards
- Monitoring dashboard
- Indicators that assess progress of environmental recovery

CLIENT	Vale
LOCATION	Brazil
PERIOD	2021 - 2023
ADDED VALUE	Increased local involvement in the biodiversity recovery efforts and improved access to environmental information after the dam's collapse.

TRACTEBEL ENGIE

Economic strengthening plan for the community in the Xingu river

PROJECT DESCRIPTION

The Belo Monte HPP on the Xingu River, created a 100 km stretch of riverbank with controlled water flow to the powerhouse. In this stretch, the amount of water has been reduced, and the natural flood and drought processes have been altered.

SCOPE OF WORK

- Promotion of the socioeconomic and cultural potential of the riverside communities of Volta Grande do Xingu
- Reports to the regulatory agency
- Income generation projects elaboration and implementation

CLIENT	Norte Energia S.A.
LOCATION	Brazil
PERIOD	2019
ADDED VALUE	Improvement of the living conditions of families who benefited from the income increase projects, promotion of families' self-sufficiency, and increased technical knowledge capacity of the local community.

TRACTEBEL ENGIE

Monet E&S Diligence

PROJECT DESCRIPTION

The facilities included in the Monet project are part of the Douro river system. Miranda, Picote and Bemposta dams and hydropower plants are on the Douro river itself while Baixo Sabor, Feiticeiro and Foz Tua facilities are on right bank tributaries of the Douro river, namely the Sabor river and the Tua river.

SCOPE OF WORK

- Execution of technical and environmental & social due diligence to support ENGIE in the possible acquisition of hydropower facilities in Portugal
- Environmental and social Due diligence

CLIENT	ENGIE
LOCATION	Portugal
PERIOD	2019
ADDED VALUE	Identification of main E&S drivers such as biodiversity hotspots and cultural heritages sites. Project compliance with national and international regulations, including Equator principles
KEY FIGURES	6 hydropower totaling 1700 MW

TRACTEBEL ENGIE

Environmental & Social Due Diligence for 400MW RTC project

CLIENT	Consortium of EPFIs lead by Rabo Bank
LOCATION	India
PERIOD	2021

PROJECT DESCRIPTION

Development and operation of 400 MW Round The Clock (RTC) power capacity located across 4 sites in India. The project comprises development of two 300MW wind power projects in Karnataka, one 300 MW wind power project in Maharashtra and 400 MW Solar with 100 MWh BESS System in Rajasthan.

SCOPE OF WORK

- Environmental and Social Due Diligence
- E&S Monitoring during Construction phase
- E&S Monitoring during Operation phase

TRACTEBEL ENGIE

ESIA Strategy development for Song Mbengue dam

CLIENT	Fortescue Future Industries International
LOCATION	Cameroon
PERIOD	2022
ADDED VALUE	Optimization of the permitting process for a multi-component project, including resettlement activities.

PROJECT DESCRIPTION	Song Mbengue dam, auxiliary structures and hydropower facilities, Energy transmission infrastructure from dam to Port, Green Industry Products production facility, and Marine export terminal.
SCOPE OF WORK	Formulating a strategy to achieve the environmental impact assessment of the project, with detailed activities, schedule, risk analysis and costs. • ESIA strategy, • list of activities & • deliverables required to complete the ESIAs for the Project

TRACTEBEL ENGIE

Environment & Social **Assessment and Permitting**

Undertaking environmental and social assessments of business operations is key to optimise the decision-making process and maximise the project positive impacts.

1. **Scoping and Screening studies**
2. **E&S Impact Assessment Studies and Permitting**
3. **Resettlement Action Plans**
   Livelihood Restoration Frameworks and Plans
4. **Biodiversity Action Plans**
5. **Emergency Preparedness and Response Management Plan**

ESIA update of Tebaga wind farm

PROJECT DESCRIPTION

The 20 wind turbines farm project located on the mountain range of Djebel Tebaga, providing an average of 300 GWh per year. The estimated total area of the park for the power plant, for the 150 kV power line with the installation of the wind turbines of around 100 hectares.

SCOPE OF WORK

- Update of the ESIA with the requirements of Tunisian regulations and with AFD standards.
- ESIA was carried out within the framework of study mission and support for STEG in finalizing the feasibility study and carrying out the Tebaga wind power plant project.

CLIENT	Agence Française de Développement (AFD) Société Tunisienne de l'Electricité et du Gaz (STEG)
LOCATION	Tunisia
PERIOD	2018 - 2021
ADDED VALUE	The public consultations carried out have shown good acceptability of the project by the local populations despite some demands (including the drop in the price of electricity).

TRACTEBEL ENGIE

Solid Waste Management Consultancy

CLIENT	Urban Public and Environmental Health Unit
LOCATION	Bangladesh
PERIOD	2012 - 2016
ADDED VALUE	Creating jobs, minimizing environmental impact, promotion of clean technologies and products.

PROJECT DESCRIPTION

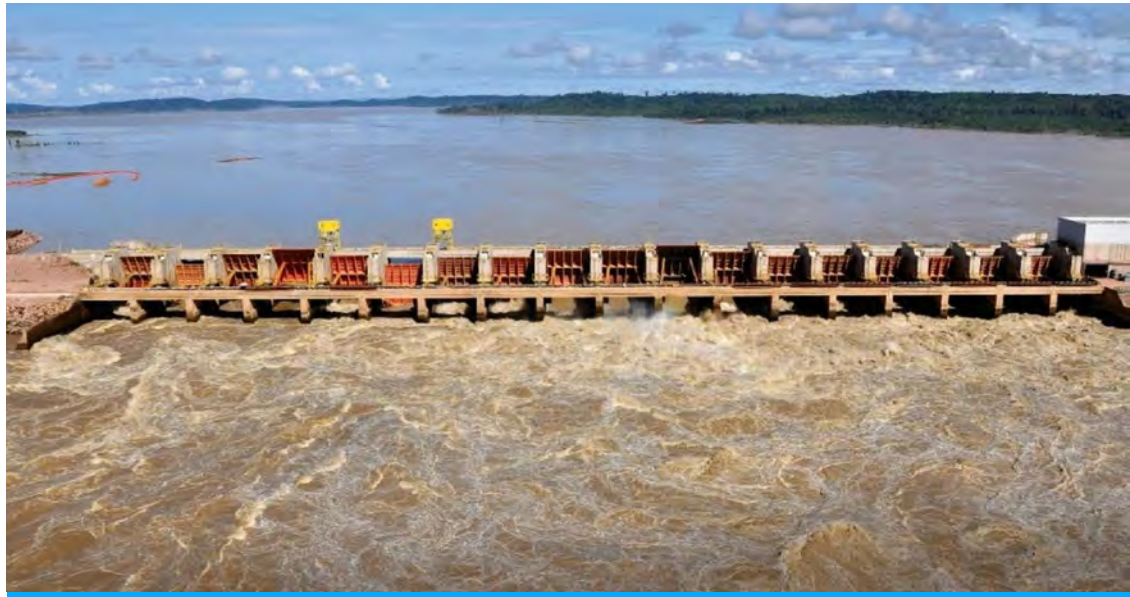
An investment project in 6 City Corporations, which focuses on different aspects related to sustainable, integrated waste management.

SCOPE OF WORK

- Conceptual designs and engineering
- Social and environmental studies and management plan
- Permitting and EIA procedures
- Financial analysis and procurement
- Training and capacity building in Bangladesh and in Europe

TRACTEBEL ENGIE

Environmental Assessment of the Jirau HPP



CLIENT	ESBR (ENGIE, Mitsui, Ietrobras Eletrosul, CHESF, Camargo Corrêa)
LOCATION	Brazil
PERIOD	2008 - 2016
ADDED VALUE	Greater stability for the energy grid Decarbonization and energy transition towards renewable sources Environment mitigation

PROJECT DESCRIPTION

Construction of the 120 km long Jirau Hydropower plant. Located on the Madeira River in the state of Rondônia in Brazil

SCOPE OF WORK

- Environmental Impact Studies (EIA/EIAR)
- Civil and Electromechanical Basic Design
- Bidding Documents for Civil and Electromechanical Works
- Analysis of Commercial Offers

TRACTEBEL ENGIE

Songwe River Basin Development program

PROJECT DESCRIPTION

The SRBDP is a cross-border project of Malawi/Tanzania to create a long-term strategic framework for basin-wide socio-economic development based on joint management of the shared waters.

SCOPE OF WORK

- Strategic Environmental & Social Assessment of the SRBDP
- Environmental & Social Impact Assessment (ESIA) and associated mitigation plans, relocation arrangements (RAP), and compensation schemes for each SRBDP intervention

CLIENT	Ministry of Agriculture, Irrigation and Water Development
LOCATION	Songwe River - Malawi,Tanzania
PERIOD	2013 - 2015
ADDED VALUE	Development of irrigated agriculture, flood control, stabilization of the river course, upgrading of water supply, fisheries development, etc.

TRACTEBEL ENGIE

EIA of the new lock Zeebrugge

PROJECT DESCRIPTION	Flemish government to improve the access to the inner port of Zeebrugge and the mobility and quality of life in the municipality.
SCOPE OF WORK	All water related aspects in the EIA studyfor the construction of a new lock were taken care off by IMDC. Such as sedimentation and turbidity modelling, water quality modelling, salt intrusion modelling, ground water modelling, water balance model, design conditions after sea level rise for the lock, surface water modelling and fish migration study.

CLIENT	Department of Mobility & Public Works
LOCATION	Belgium
PERIOD	2020 - 2023
ADDED VALUE	• Economic activity: Assure employment in the region • Improvement of quality of life in the area • Improvement of existing infrastructure and facilities

TRACTEBEL ENGIE

Population resettlement action plan by phase within the Kandadji dam

CLIENT	Haut Commissariat à l'Aménagement de la vallée du Niger / Agence du Barrage de Kandadji
LOCATION	Niger
PERIOD	2018 - 2021
ADDED VALUE	Social Assessment examining all the risks associated with phasing and supplemented by a Social Management Plan to minimize the social risks associated with the two-phase project.

PROJECT DESCRIPTION

This multi-purpose project includes a 24m high and 8km long dam on the Niger River, creating a reservoir with a total surface area of 297 km² resulting in the displacement of approximately 50,000 people, with temporary operation of the reservoir before the final reservoir.

SCOPE OF WORK

As a result of the design change in order to scale the resettlement process, Resettlement Action Plans were carried out for the two phases of displacement of populations.

- Social Assessment
- Resettlement Action Plans for the two phases of displacement of populations

TRACTEBEL ENGIE

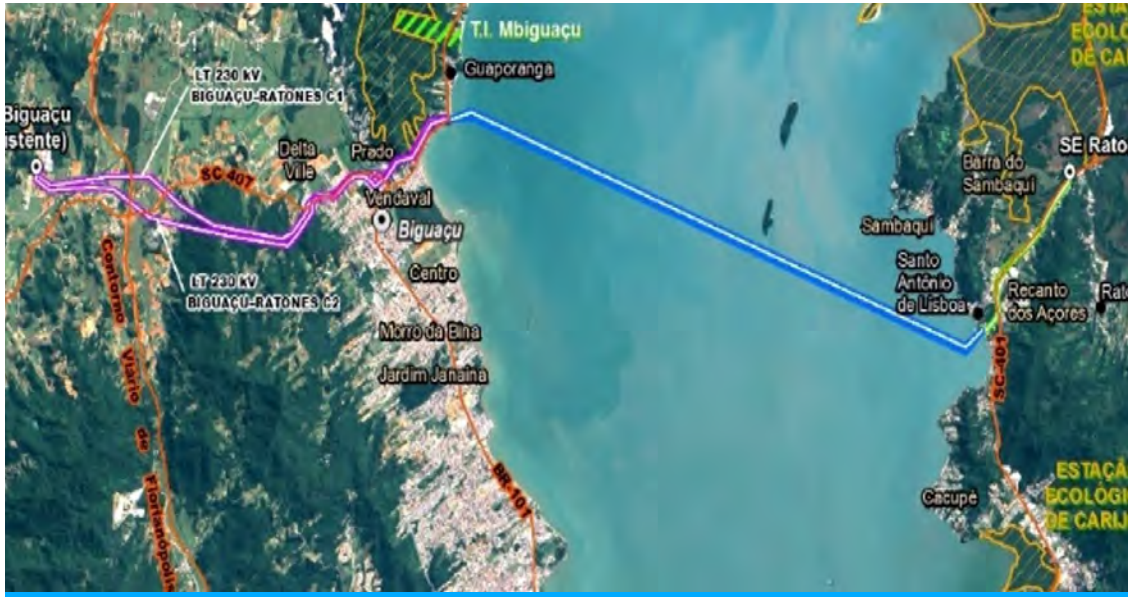
ESIA for Florianópolis Transmission Line

PROJECT DESCRIPTION

This multi-purpose project includes a 24m high and 8-km long dam on the Niger River, creating a reservoir with a total surface area of 297 km^2 resulting in the displacement of approximately 50,000 people, with temporary operation of the reservoir before the final reservoir.

SCOPE OF WORK

- Surveys: sediment modeling for the study of the plume and its interference with shellfish farming, aquatic fauna, water quality, and the impacts on local communities.
- Coordination and management of licensing process.
- E&S Assessment and
- Environmental Impact Report
- Basic Environmental Project
- Plant and Vegetation Suppression Authorization



CLIENT	Companhia de Transmissão de Energia Elétrica Paulista - ISA CTEEP
LOCATION	Santa Catarina State, Brazil
PERIOD	2018 - 2021
ADDED VALUE	Improvement of the infrastructure of the indigenous community impacted by the implementation of the transmission lines. In addition, workshops were held to increase awareness about the transmission lines implementation and improve the financing of small projects within the community.

TRACTEBEL ENGIE

Strengthening of transmission networks in Madagascar

PROJECT DESCRIPTION

To meet the objective of reaching 70% of power access in Madagascar in 2030, the project consisted in developing 3 new transmission lines and 16 substations to connect 5 existing grids (Toamasina, Antananarivo, Fianrantsoa, Mankara, Mananjary). Rural electrification was also included.

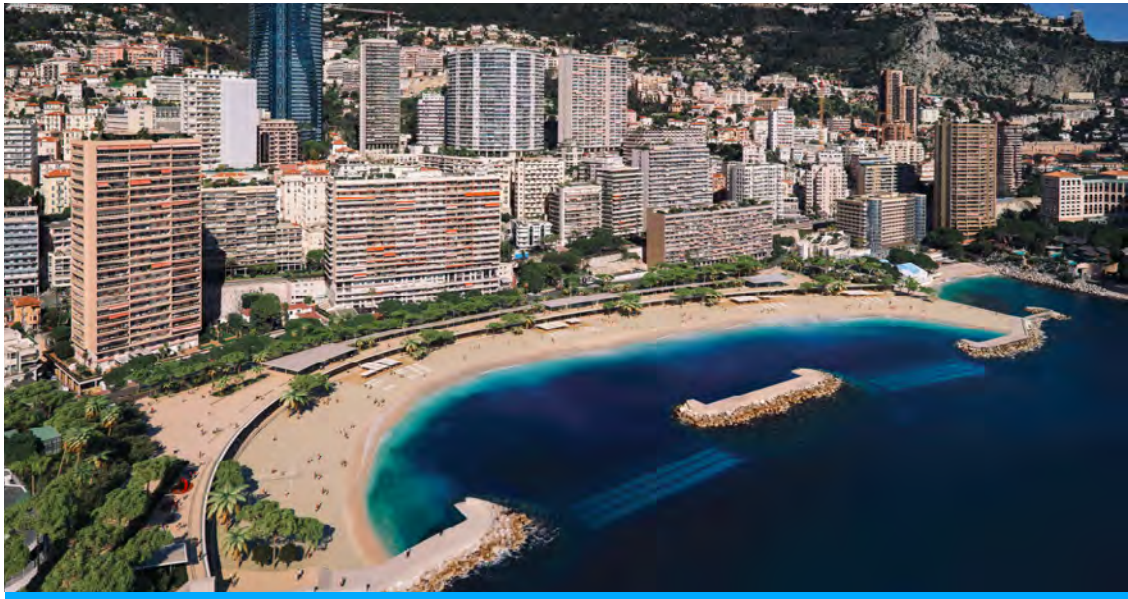
SCOPE OF WORK

- Identification of the sites for the substations, conducted the line route studies,
- The feasibility studies
- Two Environmental and Social Impact Assessment studies (ESIA)
- Two Resettlement Actions Plans (RAP)
- Stakeholder Engagement Plan (SEP)

CLIENT	JIRAMA
LOCATION	Madagascar
PERIOD	2019 - 2020
ADDED VALUE	Modification of one transmission line to avoid national parks, optimization of the routes of the transmission lines and towers to avoid critical habitats, and use of internal geolocalised data device tool (Field-Up) to collect biodiversity and socio-economic data of each affected household.
KEY FIGURES	586 km of 220 kV TL's, 281 km of 63 kV TL's, 16 SS's, Almost 20,000 affected people.

TRACTEBEL ENGIE

Extension at sea and redevelopment of Larvotto Beaches



PROJECT DESCRIPTION

Extension of Monaco by 6 ha taken from the sea, completed by the redevelopment of the adjacent seaside resort. The extension at sea includes a maritime infrastructure, homes, offices, a green space, a port... The seaside complex is completely modernized to be better integrated into the city.

SCOPE OF WORK

- Drafting the EIAs, integrating the
- specialized studies carried out by its
- partners and subcontractors, and assisting
- the Owner during their examination.
- EIA for the maritime infrastructure of
- the offshore extension
- EIA for the Larvotto redevelopment

CLIENT SAM Anse du Portier / Travaux Publics de Monaco

LOCATION Monaco

PERIOD 2014 - 2019

ADDED VALUE

The EIAs made it possible to:
1- Measure the diversity and sensitivity of the marine environment (marine nature reserves, patrimonial species); 2- Guide design choices and methods (reduction of the project footprint, implementation of targeted indicators specific to potentially impacted environments, noise procedures, etc.); 3- Implement innovative analytical methods in order to identify optimal compensatory measures.

TRACTEBEL ENGIE

Serra das Palmeiras wind complex E&S Assessment

PROJECT DESCRIPTION

The Serra das Palmeiras Wind Complex is located in the Northeast of Brazil, in a region of water scarcity and socioeconomic vulnerability. It adds 669.6 MW to the Brazilian energy grid from renewable sources. The complex foresees the installation of 108 generators and a 500 kv transmission line.

SCOPE OF WORK

- Environmental and social assessment
- Environmental Impact Report
- Basic Environmental Project
- Plant and Vegetation Suppression Authorization
- Environmental mitigation projects
- Permit compliance for the 500kV transmission line
- Mobilization, organization, and presentation of public hearings.

CLIENT CTG – China Three Gorges Corporation

LOCATION Paraíba State, Brazil

PERIOD 2022 - 2023

ADDED VALUE Improved access to water resources was identified as a critical mitigation measure for the social and environmental impacts caused by implementing the wind complex.

TRACTEBEL ENGIE

E&S Assessment Souapiti Hydroelectric Dam

PROJECT DESCRIPTION

450 MW hydroelectric dam on the Konkouré River, with 116 m high dam creating a 260 km² reservoir.

SCOPE OF WORK

Following the resumption of the design study which followed the decision of decreasing the height of the dam in order to reduce the resettlement of people, Tractebel carried out the environmental and social impact assessment and the resettlement action plan before the monitoring of the environmental and social management plan implementation.

- Environmental and social impact assessment
- Resettlement action plan

CLIENT

Administration et Contrôle des Grands Projets et des Marchés Publics (ACGPMP)

LOCATION

Guinea

PERIOD

2016 - 2022

ADDED VALUE

The analysis of the project alternatives showed that the number of displaced people could be three times less by lowering the level of the reservoir by 20 m, whilst still optimizing energy production for the Kaléta-Souapiti complex.

TRACTEBEL ENGIE

ESIAs for Soubre & Gribo Popoli Hydropower projects

PROJECT DESCRIPTION

After the Soubré hydroelectric dam (270 MW), CI-ENERGIES is continuing to equip sites downstream of Soubré on the Sassandra River with the construction of the Gribo-Popoli hydroelectric scheme, with a total capacity of 112 MW, and associated 225 kV power lines.

SCOPE OF WORK

Environmental and social impact assessments and resettlement action plans for both projects. Monitoring of the permitting processes. Registration of the project (Soubré) to the carbon credit mechanisms (clean development mechanism).

- Environmental and social impact assessment
- Resettlement action plan

CLIENT

CI-ENERGIES

LOCATION

Cote d'Ivoire

PERIOD

2013 - 2022

ADDED VALUE

The projects induced a large socio-economic development for the Soubré region, including benefits for surrounding villages and local workers. Specific biodiversity protected area was created and maintained, as part of the environmental management plan.

TRACTEBEL ENGIE

Roanne Bioenergie

PROJECT DESCRIPTION

Construction of an anaerobic digestion unit for sludge from a wastewater treatment plant, and for bio-waste, grease and sludge from food industries, with injection of biomethane into the natural gas distribution network. Most digestates are recovered by specific spreading.

SCOPE OF WORK

Complete development of the DDAE comprising:

- EIA integrating various specialized studies carried out internally (analysis of BAT Reference document for Waste Treatment), by subcontractors (noise, odors, Health Risk Assessment, etc.) or by partners (spreading plan)
- Assistance during the investigation of the DDAE and related procedures by authorities, until obtaining the prefectural decree of environmental authorization

CLIENT Engie

LOCATION France

PERIOD 2019 - 2023

ADDED VALUE Exchanges with the authorities – including drafting of response reports to requests for supplements, updates of the DDAE, drafting of the response report to the opinion of the Environmental Authority, drafting of the response to the questions of the investigating commissioner, etc. Enabled the project to be optimized from an environmental point of view.

TRACTEBEL ENGIE

Transacional Technical Assistance for Ara Canal

PROJECT DESCRIPTION

Transactional Technical Assistance for Modernisation of the Ara canal system with 1,194 km of unlined canals built in the 1870s and spread over 202,000 ha (net) / 237,000 ha (gross) to increase farmers' capacity for on-farm water and crop productivity.

SCOPE OF WORK

- Initial Environment Examination
- Agro-socio-economic survey
- Poverty and Social Analysis
- Resettlement Studies
- Resettlement Plan
- Gender Action Plan
- Stakeholder Engagement Plan

CLIENT Department of Water Resources, Government of Bihar

LOCATION Bihar, India

PERIOD 2018 - 2019

TRACTEBEL ENGIE

Controlled flooding polder Außig

PROJECT DESCRIPTION

Based on the results of the flood protection concept, the construction of a controlled flood polder is planned on the left bank of the River Elbe near the village of Außig. To ensure flood protection, a barrier structure and dyke are also planned in the Dahle tributary and the adjacent Dahle floodplain.

SCOPE OF WORK

- Preliminary EIA assessment,
- scoping Environmental impact study (809 ha)
- Landscape conservation plan (809 ha)
- Impact assessment for five Natura 2000 sites,
- Species conservation report (1.094 ha)
- Expert contribution on forest conversion
- Preparation of tasks / coordination of mapping services (fauna and flora)
- Monitoring of the planning approval procedure
- Expert contribution on the Water Framework Directive

CLIENT State dam administration of the Free State of Saxony

LOCATION Germany, Free State of Saxony

PERIOD 2010 - 2021

ADDED VALUE The controllable polder is being built for supra-local flood protection. It will attenuate future flood waves of the Elbe and thus protect the downstream residents on the Elbe. A comprehensive avoidance and protection concept for flora and fauna was developed as part of the nature conservation documentation. There are also numerous compensatory and replacement measures, such as the renaturation of a section of the Dahle.

TRACTEBEL ENGIE

Rehabilitation of Agus-Pulangi Hydropower Complex

PROJECT DESCRIPTION

A rehabilitation programme for the Agus-Pulangi Hydropower Complex (APHC) has been developed by the National Power Corporation (NPC) through a Multiple Options Study. The APHPC on the island of Mindanao consists of seven mostly run-of-river hydropower plants on two rivers, with a total installed capacity of 1,001 MW.

SCOPE OF WORK

Tractebel carried out the Screening and Scoping Phase of the Environmental and Social Impact Assessment (ESIA) for the envisaged rehabilitation works in accordance with World Bank's ESF and with the legal and technical requirements of the Government of the Philippines, including Philippines EIA requirements.

CLIENT Delegation of the European Union to the Philippines

LOCATION Philippines

PERIOD 2020 - 2021

ADDED VALUE An ESIA Training Programme has been developed to support capacity building of NPC counterpart staff.

TRACTEBEL ENGIE

Weir Dismantling and river loop construction on a former power station site

PROJECT DESCRIPTION

In the north of Erfurt, the ecological continuity of the river Gera was to be restored. In addition, the structure of the watercourse was to be improved in line with the EU WFD, the harmless flow of flood water was to be ensured and near-natural riverbank areas were to be created.

SCOPE OF WORK

- Project planning
- Landscape conservation plan (LBP)
- species protection report (AFB)
- preliminary EIA assessment
- design surveying
- on-site construction supervision
- environmental construction supervision
- supervision of subsoil exploration
- hydraulic calculation on 2D model
- drone flights

CLIENT Thuringian State Office for the Environment, Mining and Nature Conservation

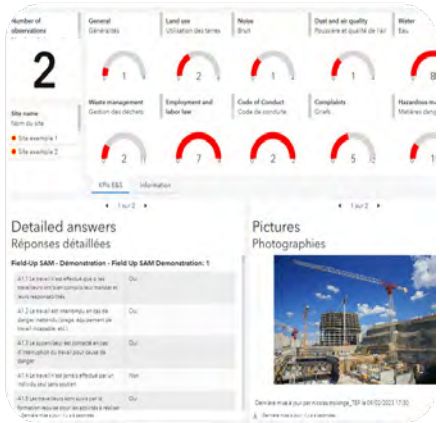
LOCATION Germany, Free State of Thuringia

PERIOD 2013 - 2021

ADDED VALUE Creation of continuity for the Gera watercourse and improvement of the watercourse structure as well as enhancement of the townscape with the adjacent parks.

TRACTEBEL ENGIE

Geomatics



Geomatics is the synergy of geography and informatics. It allows us to capture, analyze, and integrate spatial data into meaningful insights.

As an integral part of our engineering team, Geomatics enables us to visualize the context of our projects, predict impacts and foster sustainable solutions.

Revolutionizing engineering with a spatial perspective, Geomatics makes us leaders in sustainable innovation.

Melkisation for Gharb and Haouz irrigation perimeters

PROJECT DESCRIPTION

Tractebel provided to MCA Morocco technical and social assistance for the Melkisation of collective lands located in Morocco. The melkisation is the operation consisting of moving from ownership of an ethnic community in joint possession to individual private ownership by beneficiary.

SCOPE OF WORK

In addition to environmental services the project involved providing the design and implementation of a GIS web that provides visualization and analysis of geolocated data for a real-time operational view of the progress of the study. It includes GIS data collection based on cloud infrastructure, management of user rights and preparation of user manuals and training.

- **Resettlement policy framework**
- **Social management plan**
- **Surveyors training**
- **Web GIS for more than 100 users**

CLIENT MCA MOROCCO as a subcontractor to NOVEC

LOCATION Morocco

PERIOD 2019 - 2022

ADDED VALUE The « Rural property » project consists in the transformation of undivided ownership of the lands into individual properties for the benefits of the beneficiaries, so as to guarantee the land users the conditions of security and stability which are necessary for the development of investments, and for the revitalization of the land market.

TRACTEBEL ENGIE

FIELD-UP: Observation and Follow-Up of Non-Conformities

CLIENT	Mairie de Paris
LOCATION	France
PERIOD	2020 - 2021
ADDED VALUE	The survey is quickly adopted by the teams and the dashboard is used as an essential working tool during the weekly meetings with the Project Owner. This solution saves time and improves the internal process for tracking ongoing issues, which were previously done on paper.

PROJECT DESCRIPTION

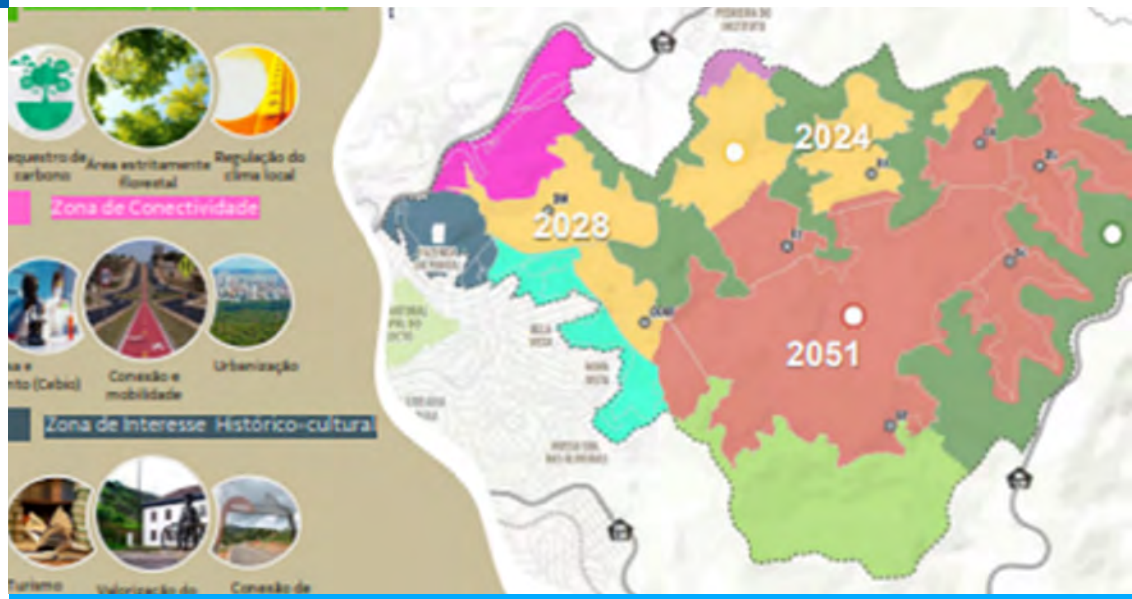
As part of the Courcelles tunnel security project in Paris, Tractebel monitored the work carried out by the contractors. Issues have been observed and collected on smartphones and tablets to be analyzed by a remote team on an online dashboard.

SCOPE OF WORK

Creation of collection forms, user license management (collector, viewer), report template creation, and GIS database management.

- Survey form available on iOS and Android plateform (smartphone and tablet)
- Online dashboard
- Automatic reporting (PDF, Word)

Geospatial Analysis – Future Use Planning



PROJECT DESCRIPTION

This project aims to develop tailor-made plans for the future use of mining areas after the closure of mining activities following sustainability guidelines and the concept of shared value.

SCOPE OF WORK

- Compilation, standardization, and organization of a geographic database. Compilation of data from priority units and proposal for the spatiality of the surroundings
- Qualitative and quantitative Geospatial Analysis Sectorization of priority units based on the useful shelf life of assets. Sectorization of the territory and identification of short, medium and long-term actions
- Physical and socio-environmental limits identification.

CLIENT VALE

LOCATION Minas Gerais and Pará States, Brazil

PERIOD 2022 - 2023

ADDED VALUE Minimization of conflicts between different users of the areas and improved recognition of each area's potential and vocation after the mining activities' closure.

TRACTEBEL ENGIE

Full Digital Supervision of large-scale PV plants

CLIENT	Engie
LOCATION	France
PERIOD	2023
ADDED VALUE	Establishing an approach being much more competitive and providing better results Improving our position as digital and innovative company Providing a digital platform for monitoring work progress, identifying non-compliances, and quality control

PROJECT DESCRIPTION

15 MW PV Plant in France, 10 months construction time. Tractebel identified a new Owner's Engineer approach testing on a Engie Green Project in France.

SCOPE OF WORK

- Combination of plant 3D model with site supervision with drones and artificial intelligence.
- Owner's Engineer Approach with AI and drones and Site monitoring

TRACTEBEL ENGIE

Environment & Social
Field Supervision and Monitoring

Responsible development requires field supervision, environmental monitoring, and remediation measures for the development of sustainable projects.

1. **Ecosystem-wide investigation projects**
2. **Management of environmental protection actions**
3. **Ecosystem restoration programs**
4. **Mitigation of negative impacts from human activities**

EHS Supervision of the Toktogul HPP Rehabilitation

PROJECT DESCRIPTION

The Toktogul hydropower plant's rehabilitation was identified as the highest priority to ensure Kyrgyzstan's energy security. It's a 1200 MW HPP supplying 40% of the country's electricity. The refurbishing works were commenced in 2012, with completion targeted for 2024.

SCOPE OF WORK

- Review of the initial environmental examination (ESIA) for the project
- Supervision of the Environmental safeguard activities by the contractors, including routine inspections for health and safety, review of method statements and risk analysis
- Special attention to the asbestos management plans

CLIENT: Open Joint Stock Company Electric Power Plants Kyrgyz Republic

LOCATION: Kyrgyzstan

PERIOD: 2015 - 2024

ADDED VALUE: Rehabilitation of the scheme together with supervision of EHS activities involved a large panel of Tractebel experts.

The plant generates approximately 6,000GWh of electricity a year using four vertical Francis turbines of 300MW each.

TRACTEBEL ENGIE

Technical Assistance to ENV – HSSE & Operation and Maintenance

PROJECT DESCRIPTION	Technical assistance to the Vietnamese national power generation and distribution company EVN on HSSE matters and Operations and Maintenance
SCOPE OF WORK	Improve their HSE Management System in line with ISO14001 and 45001 and assist for implementation Conduct quarterly HSSE audits on the construction of the Ialy 2 hydropower project to control their compliance with Vitenamese legislation and World Bank ESS standards and help them improving the HSSE performance • Quarterly HSSE audit reports • Action Plan for the implementation of HSE • Management System within EVN

CLIENT	AFD (Beneficiary : EVN)
LOCATION	Vietnam
PERIOD	2021 - 2024
ADDED VALUE	Strong knowledge of international best practices, WB standards and hydropower plant construction sites

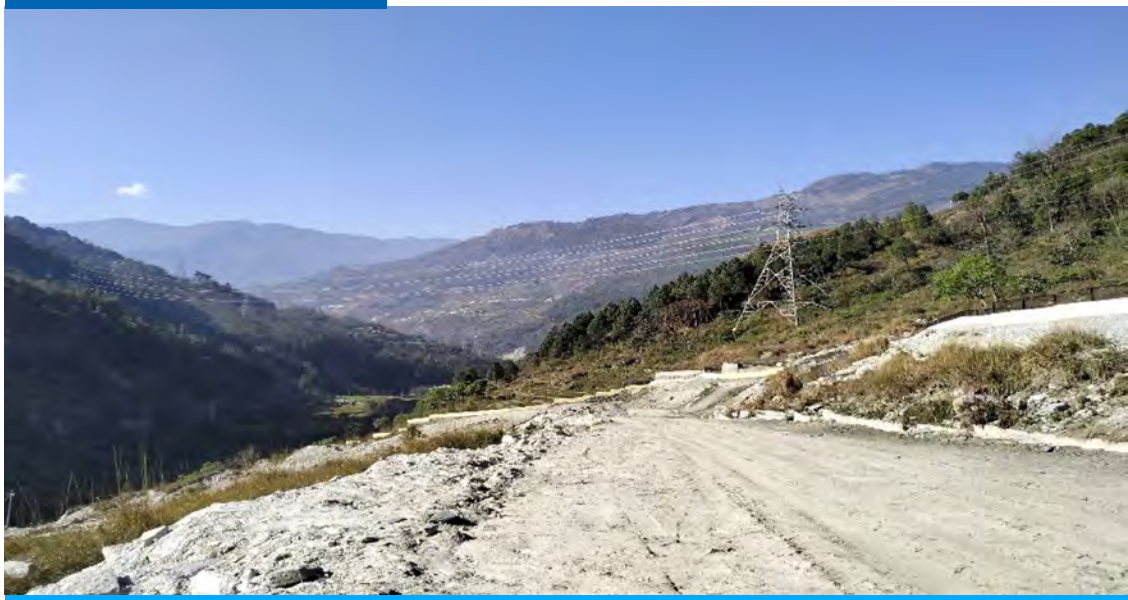
TRACTEBEL ENGIE

The “North Core” Interconnection Project

PROJECT DESCRIPTION	A 330 kV transmission line of approximately 875 km and a 225 kV line of approximately 25 km linking Nigeria to Burkina Faso via Niger with a segment linking Benin as well as 5 associated substations.
SCOPE OF WORK	• Monitoring the implementation of the Environmental and Social management plan (ESMP) and the resettlement action plan (RAP) within the control and supervision of the construction works . • AFNOR participatory training on awareness of ISO 14001 and ISO 45001 standards as well as GIS and HSE training
CLIENT	WEST African Power Pool
LOCATION	Benin, Burkina Faso, Niger, Nigeria
PERIOD	2022 - 2024
ADDED VALUE	Strong knowledge of international best practices, WB & ADB standards and integrated expertise for the client benefit.
KEY FIGURES	900 km Transmission line to monitor

TRACTEBEL ENGIE

Project Supervision Services for Electricty Grid Modernization



CLIENT	Nepal Electricity Authority, Government of Nepal
LOCATION	Nepal
PERIOD	2022 - 2026

PROJECT DESCRIPTION

Augmentation and modernization of the Nepal Electricity Authority's electricity transmission and distribution system by way of constructing new EHV sub-stations and new transmission lines.

SCOPE OF WORK

- Provide Overall Policy & Direction on Safeguard Management
- Establish environmental & Social Planning and Management System
- Develop, Organize & deliver Environmental & Social Training programs
- Develop Grievance Handling System
- Environment & Social Safeguard Management & Monitoring

TRACTEBEL ENGIE

Project Supervision Services for Major irrigation and Flood Mgmt

PROJECT DESCRIPTION

Modernization of Irrigation Infrastructure and Flood Risk Management . Improving climate change resilience is integrated within each of the project components.

SCOPE OF WORK

- Social Safeguards monitoring as part of Project Supervision Consultancy
- Monitoring of RAP implementation
- Monitoring of Grievance Redress Mechanism
- ESHS Training including training on Gender Based Violence (GBV)

CLIENT: Irrigation and Waterways Department, Government of West Bengal
World Bank and AIIB

LOCATION: West Bengal, India

PERIOD: 2022 - 2024

TRACTEBEL ENGIE

Field Supervision for Chanju-III & Deothal Chanju HPP Plants

CLIENT	Himachal Pradesh Power Corporation Limited (HPPCL) / Agence Française de Développement (AFD)
LOCATION	Himachal Pradesh, India
PERIOD	2018 - 2025

PROJECT DESCRIPTION	Development of two hydropower projects namely Chanjui-III (48 MW) and Deothal Chanju (30 MW) in Chamba valley of Himachal Pradesh in India.
SCOPE OF WORK	• Project Implementation / Construction Supervision • Management and Monitoring of Environmental and Social (E&S) Aspects

TRACTEBEL ENGIE

Brumadinho Wildlife Management Project

PROJECT DESCRIPTION

After the collapse of the dam B1, in Brumadinho, numerous actions for the rescue and conservation of wild and domestic fauna have been carried out in the affected watersheds (Ribeirão Ferro-Carvão and Paraopeba). These actions resulted in a large volume of data that needed to be managed and analyzed.

SCOPE OF WORK

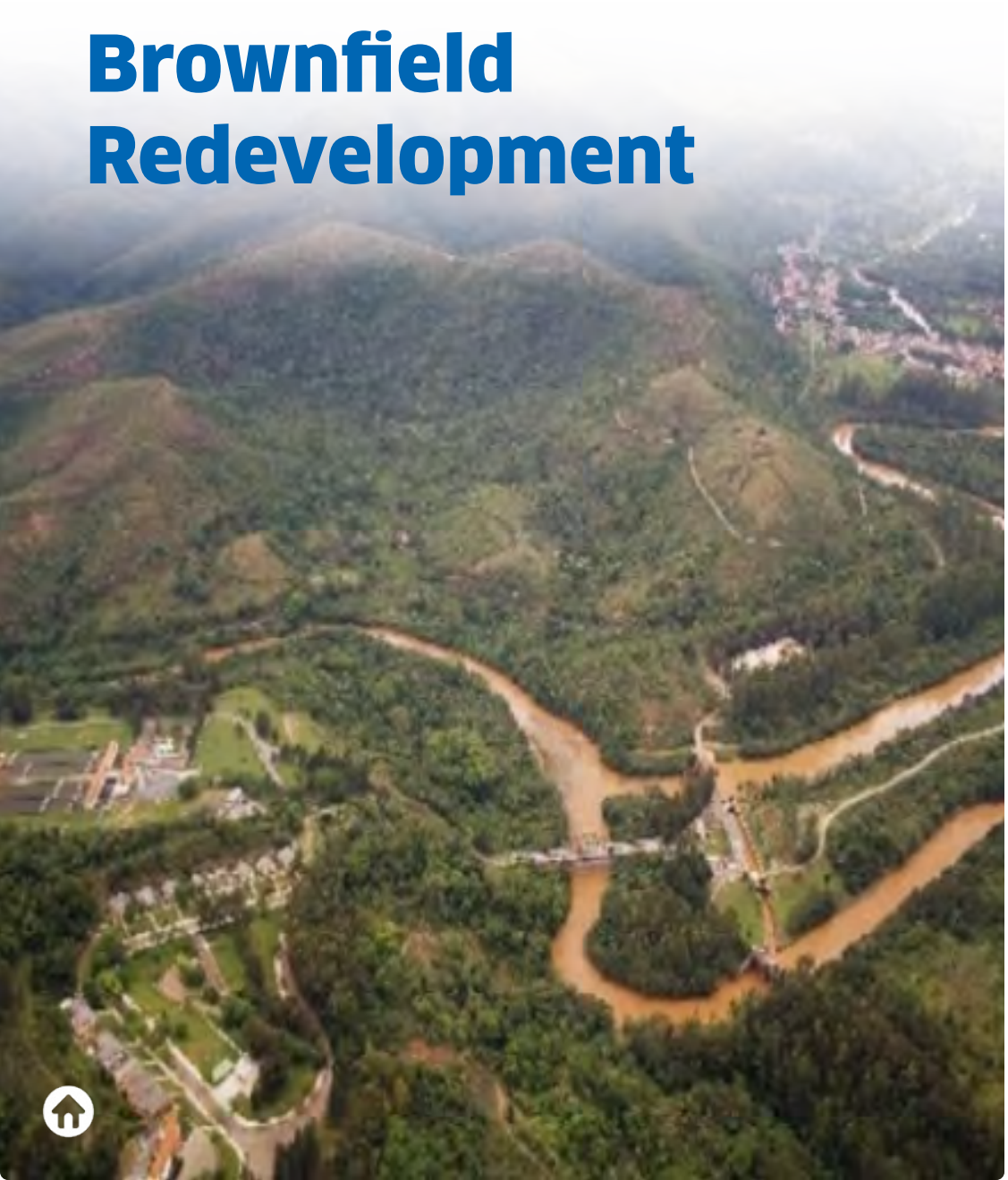
The data from the programs for monitoring ichthyofauna and ichthyoplankton, roadkill fauna, fauna crossings, water quality, prospecting and rescuing terrestrial fauna, conservation of bees, and of the Program managing VALE's facilities for receiving and keeping animals (Veterinary Hospital and Fauna Shelter) were structured into dashboards.

- Monitoring dashboard
- Indicators that assess progress of environmental recovery

CLIENT	VALE
LOCATION	Minas Gerais State, Brazil
PERIOD	2014 - 2023
ADDED VALUE	Increased local community involvement in the biodiversity recovery efforts and improved access to environmental information after the dam's collapse

TRACTEBEL ENGIE

Brownfield Redevelopment



Before industrial sites or contaminated land can be reused, evaluation is needed to gauge the potential for decontamination and/or demolition and consider whether actions are required to manage, mitigate or compensate for impacts.

1. **Dam De-characterization**
2. **Underground tank leaks**
3. **Redevelopment of contaminated or industrial lands**
4. **Decommissioning and demolition**
5. **Waste Management**
6. **Soil erosion**

De-characterization of a Sediment Containment Dike

CLIENT	VALE
LOCATION	Minas Gerais State, Brazil
PERIOD	2022 - 2023
ADDED VALUE	Improvement and innovation of solutions for treating and removing metals to mitigate potential impacts associated with mineral exploration and sustainable management of effluents in compliance with ESG guidelines.

PROJECT DESCRIPTION	Studies of alternatives and of a conceptual project for the de-characterization of the sediment retention dike and the analysis of solutions for treating the water from the waste pile.
SCOPE OF WORK	Data consolidation and analysis, Field inspection Assessment of potential levels of metal contamination Development of alternatives considering geotechnical, hydraulic, economic, and environmental aspects • Multiple Alternatives Analysis (MAA) • General arrangement and sections • Conceptual design of the chosen alternative

TRACTEBEL ENGIE

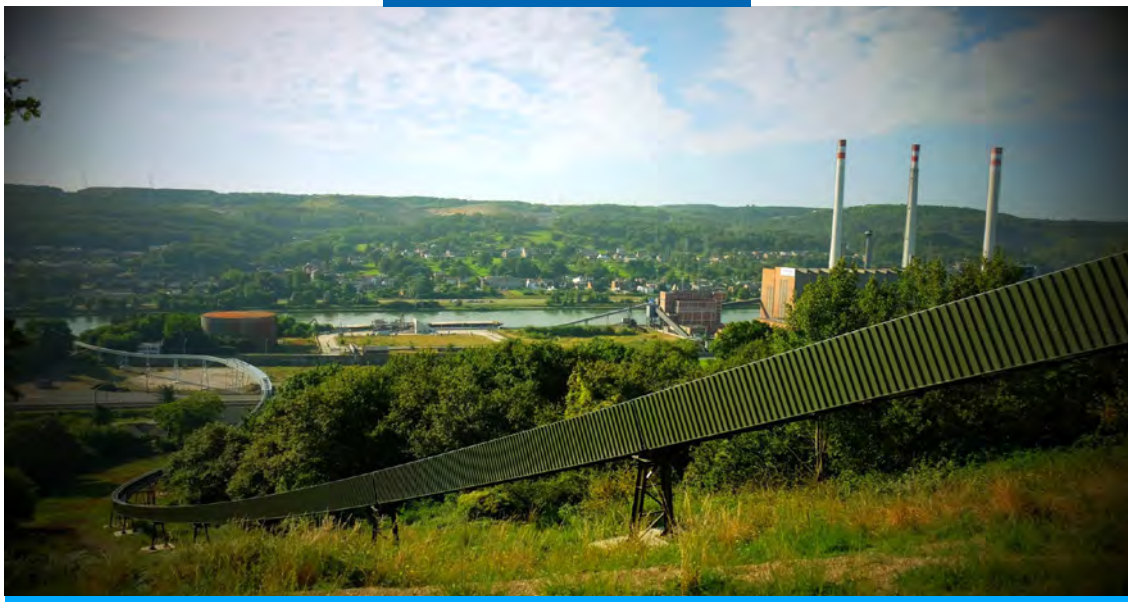
Removal of Hénâ slag heap

PROJECT DESCRIPTION

Located in the village of Awirs on the left bank of the river Meuse. It is made up of fly ash dumped between 1952 and 1972. For reasons of stability and for environmental and economic reasons, it was decided that the removal should be gradual, spread out over 10 years.

SCOPE OF WORK

- Preliminary, pre-feasibility and feasibility studies, including the environmental aspects (noise, dust, soil and water contamination, etc.)
- Engineering & design
- Civil engineering for the medium-term shoring-up work
- Electromechanical systems for processing and transporting the ash
- Supervision of the permitting process
- Monitoring



CLIENT Elecrabel

LOCATION Belgium

PERIOD 2004 - 2025

ADDED VALUE Improvement and innovation of solutions for treating and removing metals to mitigate potential impacts associated with mineral exploration and sustainable management of effluents in compliance with ESG guidelines.

TRACTEBEL ENGIE

Zigh Lake Remediation Project

PROJECT DESCRIPTION

Remediation of the oil polluted lake and the surrounded area in a sustainable and technically and financially feasible way. The remediation will be executed in an optimum synergy with the development of the project area as a city park.

SCOPE OF WORK

- Geological, topography, batimetric survey and report
- Environmental survey, lab tests and report
- Environmental Impact Assessment (EIA)
- Basic Design Studies
- Detail Design works
- Project cost-estimate in accordance with local requirements & standards

CLIENT Tamiz Shahar-for Ministry of Economy & Industry Azerbaijan

LOCATION Azerbaijan

PERIOD 2017 - 2019

ADDED VALUE Integrating sanitation techniques for the polluted lake into the design and the future use, while limiting sanitation costs by concentrating and safely store the most polluted parts

TRACTEBEL ENGIE

Les Awirs Demolition Project

CLIENT	Tamiz Shahar-for Ministry of Economy & Industry Azerbaijan
LOCATION	Belgium, Namen
PERIOD	2020 - 2024
PROJECT DESCRIPTION	Partial demolition of the Awirs Power Plant located on the territory of the City of Awirs. Removal of hazardous materials (e.g. asbestos and ceramic fibres) and the demolition of technical installations and buildings.
SCOPE OF WORK	• Asbestos Inventory and feasibility study • Technical specifications • Customer support during contractor selection • Site supervision • Project management
ADDED VALUE	• Implementation of conservation of critical structures • Taking care of the technical coordination and project management, so that the client can focus 100% on his investments • Optimizing the process technically and financially • Enhancing the functionality of the remaining structure

TRACTEBEL ENGIE

Ford Genk Rehabilitation and Redevelopment

PROJECT DESCRIPTION

Ford Genk was a car assembly plant located in the province of Limburg along the Albert Canal. The plant was opened in January 1964 and closed permanently in December 2014. The site covers approximately 140 hectares.

SCOPE OF WORK

In order to create new business park, the existing infrastructure and industrial buildings had to be demolished, including the removal of asbestos, the reuse and proper disposal of all materials and waste, and the remediation of the soil.

- Market study and Feasibility study
- Master plan including 3D model
- Coordination & environmental monitoring
- Soil Remediation
- Project management and supervision

CLIENT	Stad Genk
LOCATION	Belgium, Namen
PERIOD	2014 - 2023
ADDED VALUE	Improving functionality, market demand and economic growth.

TRACTEBEL ENGIE

Europaterminal Groundwater studies

PROJECT DESCRIPTION

Europaterminal is located just south of the Berendrecht lock. Works have started in 2020 for the construction of a new quay wall. Furthermore, the water depth will be increased to accommodate ships with a greater draught. The works will take 10 years to complete.

SCOPE OF WORK

Conducting all studies and coordinating all work related to these contaminants to ensure that the infrastructure works take place in the most optimal conditions

- Mapping of PFAS contaminants present;
- Optimising the dewatering operations to be carried out
- Evaluating the impact of the drainage on the contaminants present
- Designing, evaluating and elaborating the necessary mitigation measures

CLIENT Port of Antwerp Bruges

LOCATION Belgium, Antwerp

PERIOD 2020 - 2024

ADDED VALUE Identifying and evaluating the extent of PFAS contamination, ensuring regulatory compliance, managing and reducing PFAS concentrations in drainage water, protecting water resources, identifying responsible parties, and developing effective remediation strategies.
These efforts contribute to environmental protection, legal compliance, and potential financial recovery or cost savings in the long term.

TRACTEBEL ENGIE

GSK Demolition Project

PROJECT DESCRIPTION

In 2020, the Clinical Laboratory Sciences group of GSK in Belgium was split between the sites of Rixensart and Wavre. This arrangement led to inefficiencies in terms of workflow and operations and it was therefore decided to bring the activities of this group (approximately 350 people) under one roof at the Rixensart site in a former production building (RX 46).

SCOPE OF WORK

- Detailed demolition study
- Definition of the diversion works
- Drafting of technical specifications for the call for tenders
- Assistance in the contracting phase
- Drafting of ehs documents for the work organisation
- Follow-up of the diversion works
- Monitoring of the demolition works

CLIENT

Glaxosmitkline Biologicals SA

LOCATION

Belgium

PERIOD

2020 - 2024

ADDED VALUE

- Implementation of conservation of critical structures
- Taking care of the technical coordination and project management, so that the client can focus 100% on his investments
- Optimizing the process technically and financially
- Enhancing the functionality of the remaining structure

TRACTEBEL ENGIE

Environmental Modelling & Climate Change

Environmental modelling is a key tool to anticipate possible environmental and socioeconomic impacts caused by changes in the ecosystems. Those changes can be driven by human activities/assets, as well as effects of climate change.

1. **System modelling**
   (hydrology, hydraulics, and reservoir)
2. **Flood risk management and urban resilience**
3. **Groundwater contamination**
   due to pesticides and fertilizers
4. **Watershed management**
   including mitigation of erosion and changes in hydrologic regimes
5. **Assessments & adaptation plans**
   for Climate Change vulnerability

Environmental noise impact of enlarging the production plant of Agristo

CLIENT	Flemish Region
LOCATION	Belgium
PERIOD	2022 - 2023
ADDED VALUE	High reliability of expertise and ample similar references and experience.

PROJECT DESCRIPTION

Agristo is an industrial processor of potato products. The production facilities are located in a rural área in Wielsbeke. These facilities will be expanded in order to reach the double of the current processing capacity. This can have a major environmental impact which is being studied and mitigated to be compliant on the Vlarem II noise regulation.

SCOPE OF WORK

- Noise measurements
- Numeric simulations to develop noise maps
- Expertise on environmental noise impact

TRACTEBEL ENGIE

WDAC dynamic acoustic curtailments of wind turbines

CLIENT	ENGIE LAB Laborelec
LOCATION	Belgium, France
PERIOD	2022 - 2024
ADDED VALUE	High level of expertise and proprietary development of specific measurement systems

PROJECT DESCRIPTION

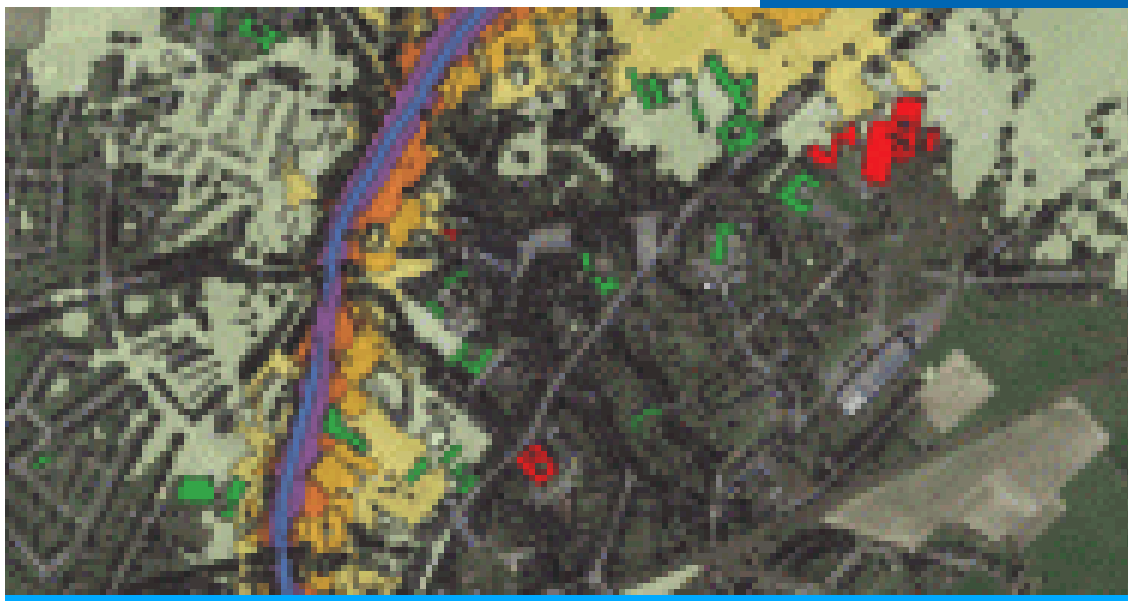
Windparks are often at night required to produce less power than possible due to noise limits. This is called curtailment. This procedure is only once determined at the time of the environmental permit. In France this is based on the “emergence”, meaning a limited amount above the background noise which is permitted. The project aims at measuring continuously the noise level and to split this into the specific noise (coming from the windpark) and the background noise. This way more mower can be produced when the background noise is also higher.

SCOPE OF WORK

- Noise measurements
- Numeric simulations to develop noise maps
- Expertise on environmental noise impact

TRACTEBEL ENGIE

Noise maps of transportation impact in the Walloon region



CLIENT	Walloon Regional Government
LOCATION	Belgium
PERIOD	2022 - 2024
ADDED VALUE	High expertise complex simulations of environmental noise impact of traffic on a large scale.

PROJECT DESCRIPTION

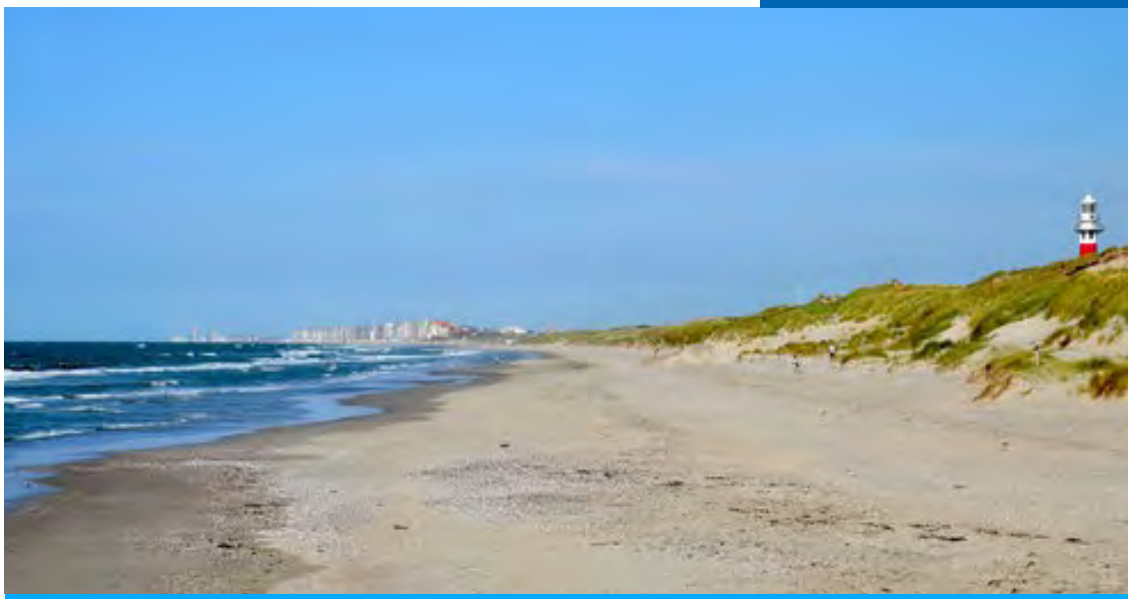
According to the European Directive 2002/49/EC environmental noise maps of the impact of transportation are to be made on the level of the Walloon region and for large agglomerations such as Liège and Charleroi. The road and railroad traffic is considered as well as the impact of airports and in the case of the agglomerations also the impact of industrial activities.

SCOPE OF WORK

- Noise measurements
- Numeric simulations to develop noise maps
- Expertise on environmental noise impact

TRACTEBEL ENGIE

Kustvisie - Coastal vision



PROJECT DESCRIPTION

Strategic plan aiming at preparing Flanders to deal with the consequences of climate change at the Flemish coast, up to 3m sea level rise, so up to 2100 and beyond.

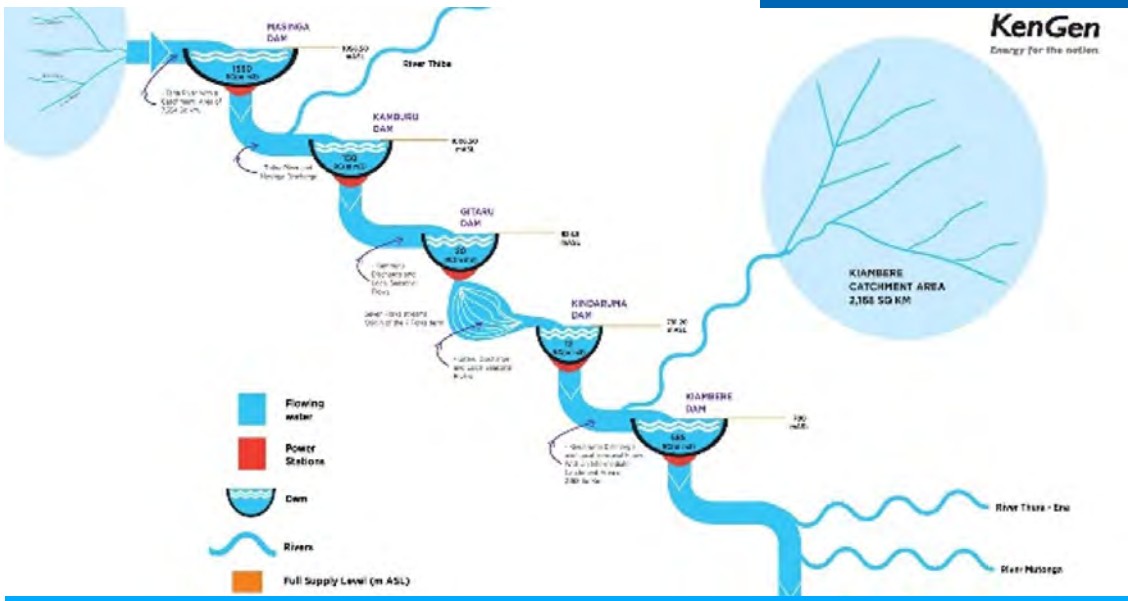
SCOPE OF WORK

- Coastal processes and physical characteristics of the coastal system
- Assessing flood risk with climate change prospections, up to 3 m sea level rise
- The evaluation and design of alternative coastal protection solutions such as nature-based solutions
- Morphological modelling
- The implementation aspects of the measures. The structural requirements for a multifunctional use of the coastal zone

CLIENT	Flemish government, department Mobility and public works
LOCATION	Belgium
PERIOD	2017 - 2024
ADDED VALUE	Integrated coastal zone management, safeguarding people, economy and nature for the future, with increased sea levels due to climate change

TRACTEBEL ENGIE

Environmental & Social services for Kenya seven forks



PROJECT DESCRIPTION

Development of a new solar plant close to the Kamburu dam with hybridization on the cascade of hydropower plants present on the Tana river.

SCOPE OF WORK

The benefits of developing an integrated management of the solar and hydro electricity generation at the cascade level were estimated through the calculation of the carbon footprint of different coupling scenarios including use of batteries and over the entire life cycle of each scenario.

- Feasibility study
- ESIA
- Livelihood Restoration Framework
- Livelihood Restoration Plan
- Biodiversity Compensation Plan

CLIENT

AFD – French Development Agency
Beneficiary: KENGEN

LOCATION

Kenya

PERIOD

2021 - 2023

ADDED VALUE

Integrated management system of the solar and hydro electricity generation at the cascade

Carbon footprint of different coupling scenarios over their entire life cycle

Environment Mitigation

TRACTEBEL ENGIE

Climate Change Vulnerability of the Hydropower Sector

CLIENT	SUEZ
LOCATION	Ivory Coast
PERIOD	2020 - 2022

PROJECT DESCRIPTION

The proposed hydropower system of the Bandama and Sassandra watersheds provide a combined installed capacity of 1 202 MW. Projected increases in precipitation over the next decades offer an opportunity to further develop the system's capacity and better integrate clean energy into the overall energy plan.

SCOPE OF WORK

- Climate risk management plan
- Real-time water management tool

ADDED VALUE

A long-term strategic direction for the energy sector in the Ivory Coast.
The real-time water management tool encourages improved water management in the system as well as better integration across energy sub-sectors in allocating annual targets.

TRACTEBEL ENGIE

Development of an Ecosystem Services Tool

PROJECT DESCRIPTION	Smartsediment© tool project concerned the development of a conceptual and spatial tool to link the direct effects of sediment management to the supply of ecosystem services.
SCOPE OF WORK	IMDC developed scenario analysis and evaluation of a range of ecosystem services in estuaries to assess the impacts of sediment management strategies. • QGIS tool
CLIENT	University of Antwerp
LOCATION	Belgium
PERIOD	2017 - 2020
ADDED VALUE	Project was a part of the European Interreg V Project Smartsediment

TRACTEBEL ENGIE

3D Modelling for a Fish Transportation System

CLIENT	Norte Energia S.A.
LOCATION	Xingu River - BRAZIL
PERIOD	2009 - 2018
ADDED VALUE	Increased potential to maintain aquatic biodiversity, primary production processes, and fishing activities downstream of the dam.

PROJECT DESCRIPTION

A Fish Transportation System (FTS) has been built at Belo Monte HPP on the Xingu River to allow unhindered fish passage and migration up- and downstream.

SCOPE OF WORK

Three-dimensional fluid dynamics modeling and a laboratory scale model were used to size and evaluate the structure's efficiency

- Design of the fish transposition system (basic and executive)
- Fish Trasposition Mechanism monitoring program

TRACTEBEL ENGIE