

Energy Transmission Lines



coba
GROUP

ENGINEERING AND ENVIRONMENTAL CONSULTANTS



FIELDS OF ACTIVITY

HYDRAULIC UNDERTAKINGS

Concrete, Earth-fill and Rock-fill Dams. Weirs and Reservoirs Water Conveyance Systems. Hydraulic Structures.

POWER GENERATION AND TRANSMISSION

Hydroelectric Power Plants. Photovoltaic power plants and wind farms. Small Hydropower Plants. Power Plants Rehabilitation and Modernization. Substations High Voltage Transmission Lines. Cooling Water Systems for Thermoelectric Plants.

WATER SUPPLY AND WASTEWATER SYSTEMS

Catchment, Transport and Distribution of Potable Water. Water Treatment Plants. Drainage Systems. Wastewater Treatment Stations. Pumping Stations.

AGRICULTURES AND RURAL DEVELOPMENT

Irrigation and Drainage Systems. Rural Roads. Production Systems. Mapping and Basic Information.

TRANSPORTATION INFRASTRUCTURES

Roads and highways. Railways. Passenger and Freight Railway Stations. Metro and Light Rail. Airports. Bridges and other engineering structures.

ENVIRONMENT

Environmental Impact Assessment. Environmental Management, Monitoring and Auditing. Pollution Control. Landscaping. Land Management. Recovery of Degraded Areas. Waste Landfills.

GEOTECHNICAL STRUCTURES

Tunnels and Caverns. Slopes in Fill and Cut Section. Special Foundations Breakwaters. Embankment Works.

MARITIME AND FLUVIAL WORKS

Wharfs. River Training. Quay Rehabilitation. Flood and Flow Control.

MINING INDUSTRY

Environmental Studies. Design of Tailings Dams and Related Structures. Safety Assessment of Tailings Dams. Design Review of Tailings Dam Closure. Operations Maintenance and Monitoring Manual for Tailings Dams. Risk Analysis. Mine Closure Plan. Training.

BUILDINGS

Residential and Services Buildings. Industrial Buildings. Steel and Mixed Industrial Structures. Rehabilitation and Restoration of Ancient Buildings.

CARTOGRAPHY AND CADASTRE

Geographic Information Systems (GIS). Digital Cartography. Thematic Cartography. Thematic Cadastres. Land Acquisition.

SAFETY CONTROL AND REHABILITATION

Expertise, Monitoring. Inspection and Reinforcement of Dams and Transportation Infrastructures. Works Instrumentation. Project Maintenance and Operation.

PROJECT MANAGEMENT AND CONSTRUCTION SUPERVISION

Project Management. Cost Management. Site Supervision. Quality Assurance/Quality Control.

PRESENTATION

COBA is a multinational and multidisciplinary group of Engineering and Environmental Consultants, founded in 1962.

The Group provides engineering consultancy services ranging from basic and planning studies, technical, environmental and economic feasibility studies, design and construction design as well as project management and works supervision, to operation follow-up and behaviour monitoring.

The Group has offices/subsidiaries in three continents and experience in more than fifty countries and encompasses several companies in accordance with functional specializations or geographical areas.

The competences acquired along the last six decades, together with the state-of-the-art employee expertise, the stability of its permanent staff and the comprehensive international experience allow to find out the best solutions for the full satisfaction of public and private Clients' needs and expectations.

During its existence, the Group has participated together with public authorities or private developers, in the feasibility of multidimensional projects, some of them being structuring projects and with major impacts on the improvement of peoples' life conditions in the several countries where it worked.

At present, the Group has a wide number of competences and technical areas that allow the composition of multidisciplinary teams who share knowledge and experiences in the execution of projects.

Energy Transmission Lines

Services Provided

Studies and Designs:

- Medium and High Voltage Distribution Networks, composed by aerial lines and underground cables;
- Low Voltage Distribution Networks;
- Substations;
- Switching and Transformer Stations;
- Public Lighting Facilities.



Project Management and Construction Supervision

- Civil construction, mechanical and electrical facilities;
- Planning Control;
- Financial Control - work certificates;
- Quality Control: inspection of works and materials;
- Geotechnical Control during excavation activities;
- Topographic Control;
- Environmental Control;
- Control of Safety Conditions.



Safety and Health Coordination:

During the Design Phase:

- Preparation of the Project's Safety and Health Plan;
- Validation of the technical solutions adopted;
- Assessment and evaluation of special risks and associated preventive measures;
- Definition of the safety and health management system to be implemented on site;
- Identification of specific safety procedures which are to be adopted by the Contractor during the Construction Phase.

During the Construction Phase:

- Validation of the Project's Safety and Health Plan;
- Assessment and validation of safety procedures for specific works;
- Inspections for monitoring work safety conditions;
- Safety audits;
- Preparation of the Undertaking's Technical File.



Quality, Environment and Works Safety Control:

- Remodelling of existing substations;
- Construction of new substations;
- Aerial lines - uprating and construction of new lines.



Environment:

- Environmental Impact Assessment;
- Assessment and validation of the Environmental Management Plan for the Construction Phase;
- Inspections for certification of environmental conditions on work sites;
- Monitoring and approval of the Work's Waste Management Plan.



Topography:

- Definition of rights-of-way;
- Topographic surveys;
- Monitoring of works construction: ditches and facilities;
- Support to work measurements.



Studies and Designs

Replacement of the 60 kV Energy Transmission Line between Luachimo and Calonda and Substations | ANGOLA

Client / Owner: MINEA – Ministério da Energia e Águas
Basic Design and Tender Documents

The 60 kV Dundo - Calonda aerial energy transmission lines comprise a ring connection network between the Luachimo powerplant, the New Dundo Urban Centre and 220/60 kV Dundo Substation, as well as a connection between the 220/60 kV Substation and Calonda.

The 60/15 kV substation shall be installed at the New Dundo Urban Centre, and the 60/30 kV will be located throughout the energy transmission line that connects the 220/60 kV Dundo Substation and Calonda.

A 220/60 kV substation, installed at Dundo, will connect with the future 220 kV energy transmission line between Dundo and Luena.

These electrical lines arise as a result of the installation of a 220/60 kV substation in Dundo and the uprating and increased power of the Luachimo Powerplant, located in the river with the same name and next to the Dundo village. They comprise an important step towards the electrification of this area of the Lunda North province.

The electrical connections form a network with two sectors that derive from the 220/60 kV Dundo substation:

The first network connects, in a circular form, the 220/60 kV Dundo Substation, the Luachimo Substation (10/60 kV) and the New Dundo City Centre Substation (60/15 kV), with a total length of 38 km. This ensures energy supply to the Dundo city and its surroundings, and enables connection of the 220/60 kV Dundo Substation to the future 220 kV energy line with origin at Luena.

The second network, between the 220/60 kV Dundo Substation and Calonda, with a total length of 245 km, envisages connection of a series of 60/30 kV substations located at Fucauma, Cassanguidi, Luxilo, Andrada (Andrada 1 and Andrada 2), Maludi, Lucapa and Calonda.



220 kV Energy Transmission Line of the Dundo – Lucapa – Saurimo – Luena Eastern Network and Associated Substations

Client / Owner: MINEA – Ministério da Energia e Águas
Basic Design and Tender Documents



The 220 kV electrical line between Dundo and Luena will comprise a structural network enabling energy transmission in the Lunda North, Lunda South and Moxico regions.

This line with an expected length of 500 km, will connect the 220 kV substations of Dundo and Luena.

Several 220/60 kV substations are envisaged at Dundo, Lucapa, Samuela, Saurimo and Luena.

This network represents a support to the 60 kV network, to which shall be connected the energy generating power plants of these regions.

In the future, the 220 kV network of this Eastern system will be connected to the 220 kV network of the Northern system, at the Saurimo substation.

Studies and Designs

110 kV Energy Transmission Line Saltinho – Bambadinca – Bissau | GUINEA-BISSAU

Client/Owner: UNDP – United Nations Development Programme / Ministry of Energy
Tender Design

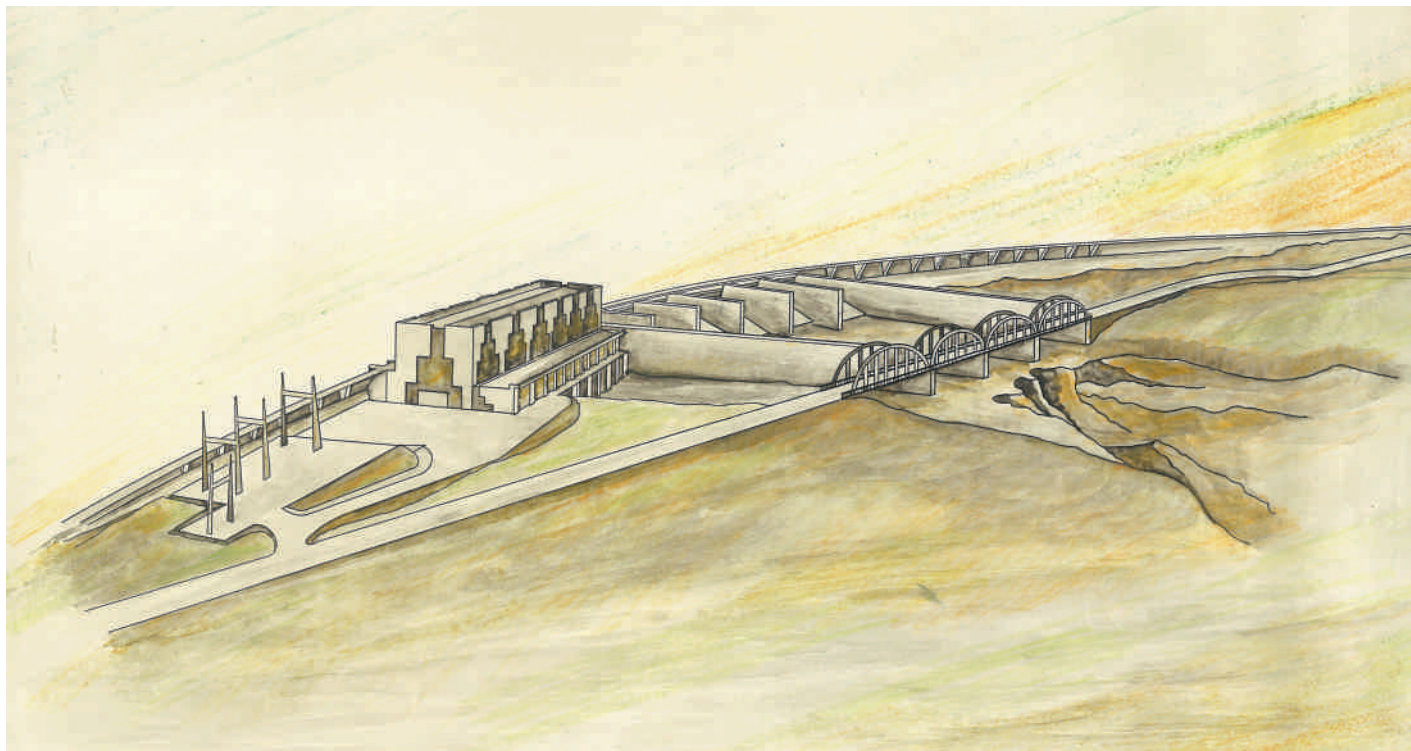
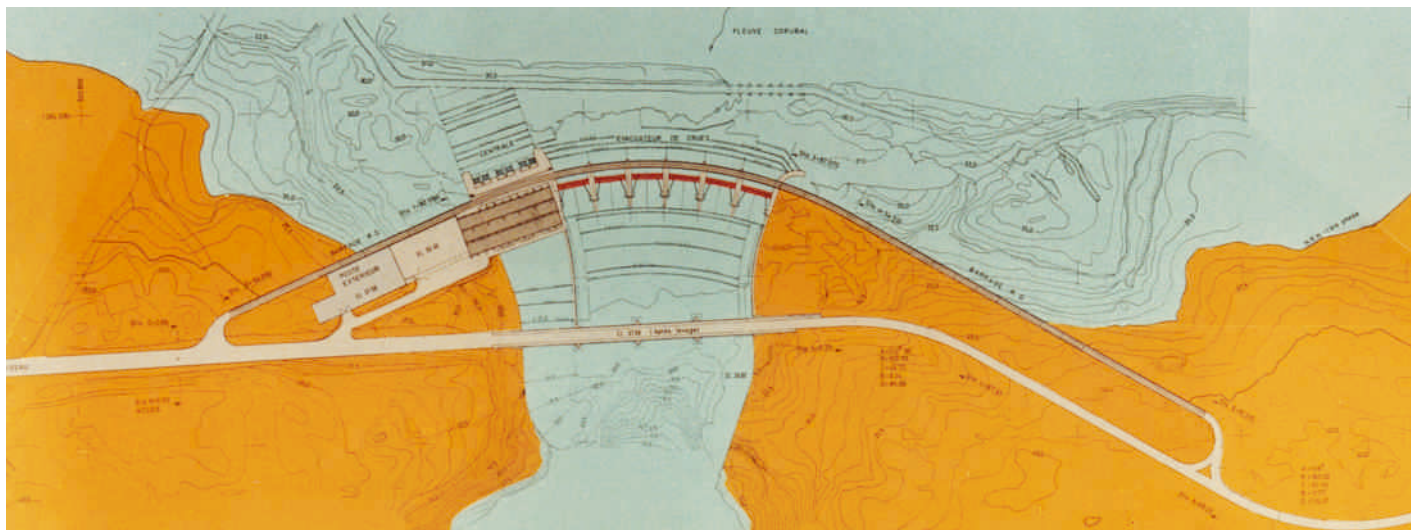
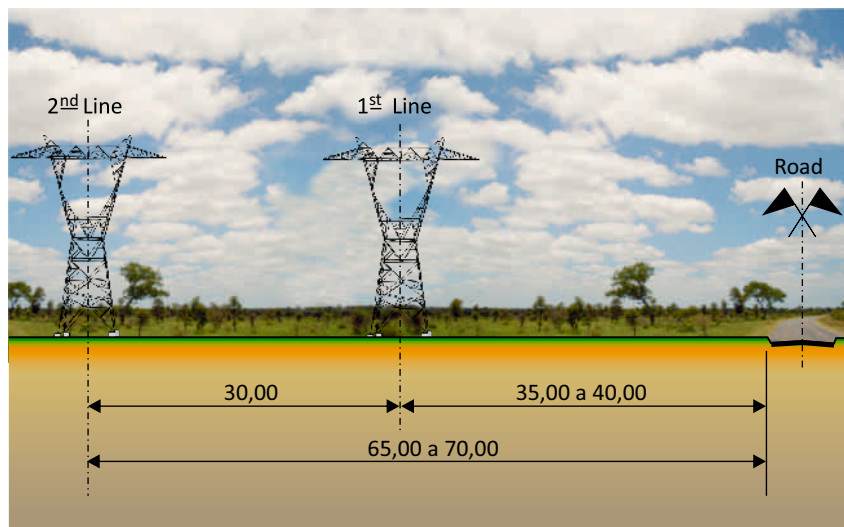
This energy transmission line is integrated in the Saltinho Hydropower Project, equipped with an 18 m-high dam and a powerplant with a nominal capacity of 20 MW.

The line was divided into two sections: Saltinho – Bambadinca with 57 km and Bambadinca-Bissau with 95 km, totalling 152 km.

Since the Saltinho powerplant was intended to supply a network with thermal power plants in operation, high efficiency transmission lines were designed, as the losses in these lines should be balanced by the generation of thermal energy, which is usually a very expensive source.

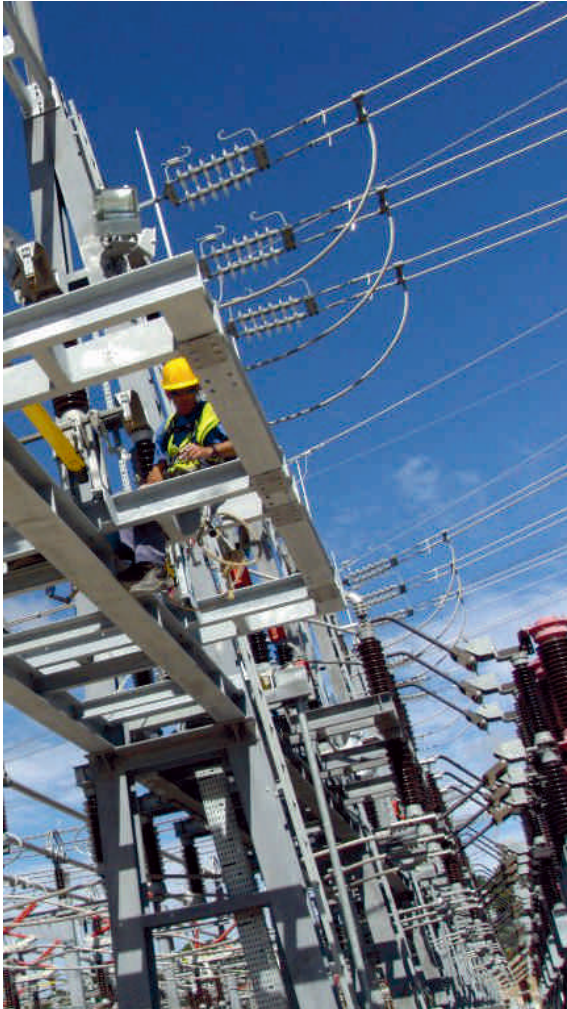
A 110 kV voltage for transmission of approximately 20 MW to an electric network would fully satisfy this purpose.

There was no alternative to the selected voltage, since the inferior standard voltages (60 or 66 kV) were clearly insufficient and the higher voltages (132 or 150 kV) revealed to be overstated.



Client / Owner: REN – Rede Eléctrica Nacional, S.A.

Quality and Environmental Supervision & Safety Coordination



Supervision and Environmental Follow-up and/or Supervision and Quality Control and/or Safety Coordination of works in power transmission lines and substations, which include the areas of civil construction and assembly of electric and mechanical Equipment. Reference is made to the following, most recent works (2016):

- Castelo Branco Substation (SCC) – LO 60V Castelo Branco EDP
- Tabua Substation (STBA) - TRF 220/60kV-126MVA (single-phase poles)
- Vila Chã Substation (SVC)-Transf 220/60- 63MVA (replacement)
- Zêzere Substation (SZR) - ATRF 220/150kV 250MVA (01.24) + 1 LP 220kV (Santa-rém) (01.25) + 1 LP 220kV Penela



Project Management & Construction Supervision

LAÚCA HYDROPOWER DEVELOPMENT | ANGOLA

Client / Owner: GAMEK – Gabinete de Aproveitamento do Médio Kwanza

Consultancy Services for Design Review, Coordination and Supervision of Civil Construction Works and Supply & Assembly of Equipment

The Laúca Hydropower Development is located in the middle section of the Kwanza River, in the Republic of Angola, Kwanza North Province, about 282 km from Luanda, between the Capanda Hydropower Development, located upstream, and the Cambambe Hydropower Development, located downstream.

The gravity type dam is made of roller-compacted concrete (RCC), with a maximum height of 132 m and a crest length of 1075 m, located at level 855,0 m. The Maximum Water Levels (MWL) Retention Water Levels (RWL) are situated at levels 852,00 and 850,00, respectively. The Minimum operating level, also designated as Minimum Normal Water Level of the Reservoir, was set at level 800,00 m.

The reservoir created by the dam floods an area of approximately 185,35 km², and has a total storage capacity of 5.651,20 hm³.

As far as Safety and Operation Structures are concerned, the dam is equipped with a spillway, composed of three equal spans where three radial gates will be installed, a bottom outlet and, in terms of operation, with a water circuit intended for the operation of the Environmental Flow Powerplant.

The main powerplant, underground, is equipped with six vertical axis Francis units, with a nominal capacity of 334 MW each, totalling a maximum capacity of 2004 MW, under a net head of 200 m.

The energy produced amounts to 8 640 GWh/year, through action of the synchronous alternators, with a unit capacity of 371 MVA at a 50 Hz frequency and nominal speed of 200 RPM.



The water conveyance system is composed of 6 independent water intakes with a total width of 162,00 m and maximum height of 7,40 m above foundation, followed by shafts with a 7 m- inner diameter and 115 to 120 m depth, and conveyance galleries with rectangular-arch section, 9,00 wide and 12,20 m high, and an average length of 1900 m each.

The step-up transformers, placed on the external deck of the Main Powerplant, will be connected to the 400 kV Substation through 6 simple circuit lines with horizontally placed cables.

The 400 kV Substation is conventional type, with a double busbar and 1 1/2 circuit-breaker arrangement.

CAMBAMBE HYDROPOWER DEVELOPMENT

CONSTRUCTION OF POWER PLANT 2 FOR POWER UPGRATING | ANGOLA

Client / Owner: ENE - Empresa Nacional de Electricidade

Consultancy Services for Design Review, Coordination and Supervision of the Civil Construction Works & Assembly of the Water Circuit, Powerplant II and Substation Equipment

The Cambambe Hydropower Development is located in the Kwanza River, Republic of Angola, Kwanza North Province, approximately 180 km southwest from the city of Luanda and about 15 km from the city of Dondo. It is the Middle Kwanza hydropower undertaking located farther downstream.

The existing concrete arch dam, with an approximate height of 88 m, was built between 1958 and 1962, for elevation (112.75). Currently, ENE is implementing Phase II of this project, which includes the construction of Powerplant 2, with an installed capacity of about 700 MW, with four 175 MW turbine / alternator groups. The first units will begin operating in, whose first units will enter service in 2016. Dam heightening to elevation (132,00) was also undertaken during this second phase, under a separate contract.

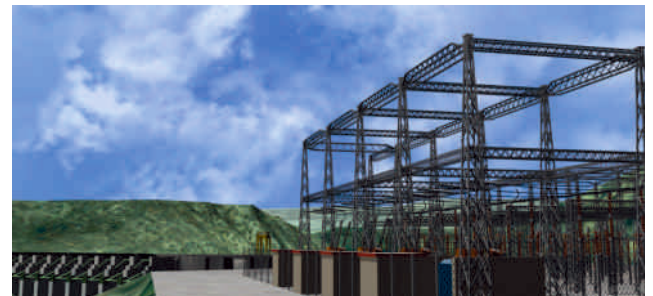
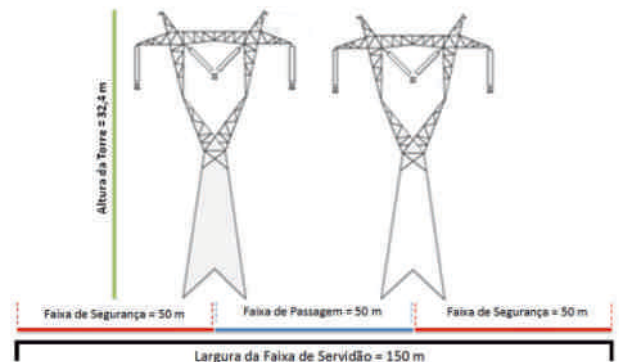
The Cambutas Substations include 60, 220 and 400 kV substations, consist of control building, equipment areas, single-phase autotransformers, step-up transformers for ancillary services, 15 kV armoured bus, transmission lines between Powerplant 2 and the Cambutas Substation; between the Cambambe 1 Substation and the Cambutas Substation, with connection to Cambambe 1 and Capanda.



High Voltage Energy Transmission System of Restricted Interest of the Mphanda Nkuwa Hydropower Development | MOZAMBIQUE

Studies undertaken in association

- Disclosure of the studies and project and the Interested and Affected Parties;
- Consultation meetings in the Villages of Chacocoma and Cataxa;
- EIA available for consultation;
- Open meeting held on 13th December 2012, at Tete.



Environmental Impact Assessment



The work consisted in preparing the Study of Major Environmental Constraints (MEC) and Environmental Impact Assessment (EIA) of the Detailed Design of the High Voltage Transmission Line between Fernão Ferro and Trafaria 2, at 150 kV, with about 16 710 m. This line will be implemented in the Setúbal District, namely in the Almada Municipality (parishes of Trafaria, Caparica and Charneca da Caparica) and Seixal Municipality (parishes of Corroios, Amora and Fernão Ferro).

Environmental Studies

Very High Voltage Line at 400 kV between Alqueva II and Alqueva Substation | PORTUGAL
Alqueva Hydropower Strengthening – Alqueva Powerplant II

Client / Owner: EDP – Gestão de Produção de Energia, S.A.
Study of Environmental Constraints & Environmental Impact Assessment

The Alqueva Stage was equipped, during a first phase, with two 130 MW reversible units. The objective of the hydropower strengthening consists in doubling the reversible installed capacity, to take the utmost advantage of the conditions resulting from the conjunction of the large Alqueva reservoir and the Pedrógão counter-reservoir, with a capacity to allow weekly turbination and pumping cycles.

The Alqueva Stage Hydropower Strengthening subject to environmental assessment includes a water conveyance structure in tunnel, a surface powerplant, a feeder canal and a substation. It also includes the connection of the Alqueva II Powerplant to the Alqueva Substation, through a very high voltage line (400 kV).

The environmental studies that comprise the Environmental Impact Assessment (EIA) include the following documents:

- Study of Environmental Constraints – identified the main environmental constraints associated to the implementation of the Alqueva II Powerplant and to the very high voltage line. It should be noted that this line is expected to follow the alignment of the existing line of the Alqueva Power Plant I;
- Environmental Impact Assessment – prepared according to the applicable legislation (Decree-Law nr. 197/05 of November 8th and Governmental Order nr. 330/2001 of April 2nd). Identifies the principal impacts associated to the construction and operation of the Alqueva II Powerplant and Energy Transmission Line, as well as the principal minimizing measures that should be taken into account, to submit the project to an Impact Assessment Process.



Pedrógão Stage – Powerplant II | PORTUGAL
Alqueva Multipurpose Undertaking

Client / Owner: EDP – Gestão de Produção de Energia, S.A.
Environmental Impact Assessment and Landscaping



Power Plant II of the Pedrógão Stage is located on the left bank of the Guadiana River, downstream from the Pedrógão Dam and in the Lower Alentejo subregion, Beja District, Serpa Municipality and parish of Pias.

This power plant envisages strengthening of the rated capacity in the Pedrógão Dam, through the installation of a generating unit with a maximum capacity of approximately 13,3 MW. The undertaking includes the following structures:

- Water Conveyance System (water intake, water main and feeder canal; the first two structures are already built);
- Power plant;
- Substation.

The Environmental Impact Assessment was undertaken according to the prescriptions of paragraph 1 of Article 5th of Decree-law 225/2007 of 31 March; since the project area embraces a National Ecological Reserve (NER), its licensing was preceded by an Environmental Impact Assessment undertaken by the "Comissão de Coordenação e Desenvolvimento Regional do Alentejo (CCDR-Alentejo)" (Committee for Coordination and Regional Development of Alentejo).

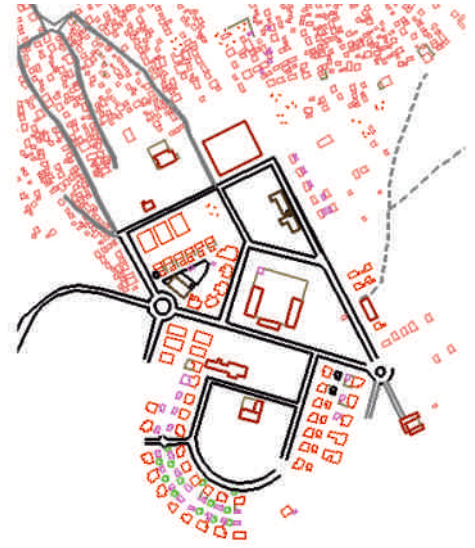
The Environmental Impact Assessment identified the locations for construction yards, made available to the Contractor, as well as the location for debris disposal, since the construction of Powerplant II envisages the dumping of 20 000 m3 of debris.



Replacement of the 60 kV Energy Transmission Line between Luachimo and Calonda and Substations | ANGOLA

Client / Owner: MINEA – Ministério da Energia e Águas

Production of mapping by restitution on high-resolution satellite images from different sensors: Geoeye-1, Ikonos2, Worldview-1 and Worldview-2.



Alteration of the Transmission Lines in the Area of the New Lisbon Airport | PORTUGAL

Cient: REN - Rede Eléctrica Nacional, S.A.

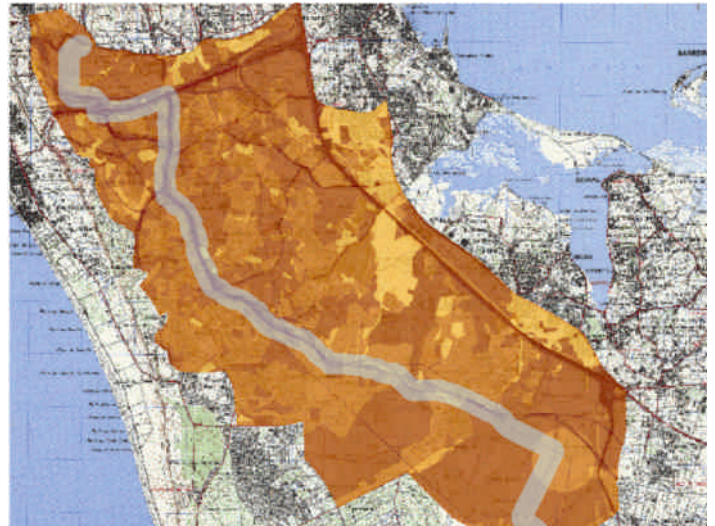
Execution of Cartographic Bases to Support the Studies, Land Occupation Map and Updating of the large existing infrastructures. Orthophotomaps.



High Voltage Transmission Line between the Fernão Ferro Substation and Trafaria. Geographic Information System. | PORTUGAL

Cient: REN - Rede Eléctrica Nacional, S.A.

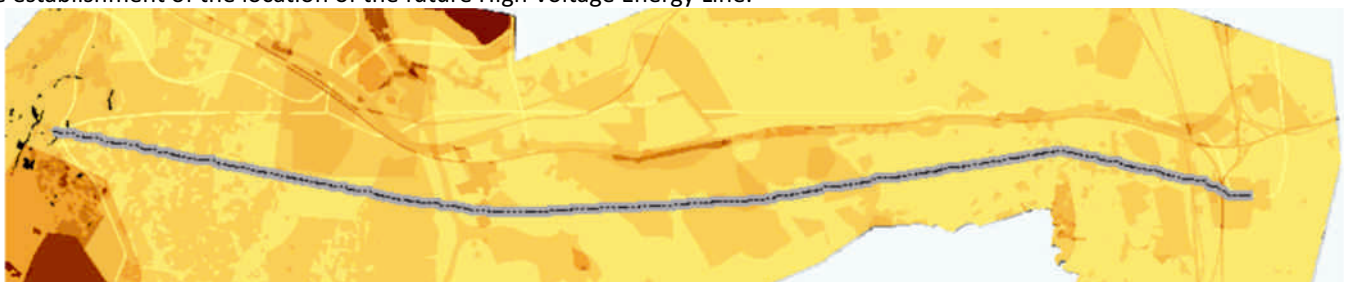
Implementation of the methodology for assessment of environmental constraints, envisaging the establishment of the location of the future High Voltage Energy Line.



High Voltage Transmission Line between the Fernão Ferro Substation and Palmela | PORTUGAL

Cient: REN - Rede Eléctrica Nacional, S.A.

Geographic Information Systems. Implementation of the methodology for assessment of environmental constraints, envisaging the establishment of the location of the future High Voltage Energy Line.



Energy Transmission Lines

Some Projects

ENERGY TRANSMISSION LINES AND SUBSTATIONS | STUDIES AND DESIGNS

PROJECT		COUNTRY	CLIENT
DESIGNATION	SERVICES PROVIDED		
220 kV ENERGY TRANSMISSION LINE OF THE EASTERN NETWORK Dundo – Lucapa – Saurimo – Luena and Associated Substations	Preliminary Design, Tender Documents and Environmental Impact Assessment	Angola	Ministério de Energia e Águas ENE – Empresa Nacional de Electricidade, E.P.
REPLACEMENT OF THE 60 Kv ENERGY TRANSMISSION LINE Luachimo - Cassanguidi - Andrada - Maludi - Lucapa – Calonda and Associated Substations. LUACHIMO 60 kV ENERGY TRANSMISSION LINE NEW URBAN CENTRE AND SUBSTATION Dundo 220/60 kV SUBSTATION	Basic Design and Tender Documents and Environmental and Social Impact Assessment	Angola	Ministério de Energia e Águas ENE – Empresa Nacional de Electricidade, E.P.
LOW VOLTAGE ENERGY TRANSMISSION LINES AND PUBLIC LIGHTING OF THE CITIES: Facauna, Cassinguidi, Luchilo, Andrada, Maludi, Lucapa and Calonda and Dundo 60/15 kV SUBSTATION	Basic Design and Tender Documents and Environmental and Social Impact Assessment	Angola	Ministério de Energia e Águas
Saltinho Hydropower Development. 110 kV SUBSTATION. Saltinho-Bissau ENERGY TRANSMISSION LINE at 110 kV (152 km)	Tender Design and Tender Documents	Guinea-Bissau	UNDP - United Development Programme
Nacala, Monapo and Nampula 110 kV SUBSTATIONS Nacala-Nampula ENERGY TRANSMISSION LINE at 110 kV (185 km)	Preliminary Study, Preliminary Detailed Design and Tender Documents	Mozambique	Serviços Autónomos de Electricidade de Moçambique
Bom Jesus and Cunha Quiria Irrigation Perimeters. 60 kV, 30 kV Lines of 60/30 kV SUBSTATIONS AND TRANSFORMERS	Tender Documents	Angola	Sociedade de Comércio e Construções, SARL
Rio das Contas Irrigation and Hydropower Development (3 950 000 ha). Study of the high and low voltage distribution network for human consumption and water supply to the Itanagé, Marcolino Moura, Jussiape, João Vaz, S. Timóteo and Lagoa Real Irrigation Perimeters.	Technical and Economical Feasibility Study	Brazil	DNOCS - Departamento Nacional de Obras Contra as Secas
Irrigation Perimeter of the Brumado Valley. Study of the High And Low Voltage Distribution Network	Design	Brazil	DNOCS - Departamento Nacional de Obras Contra as Secas
Baixo Sabor Hydropower Development: Power plant, water conveyance structures and substation. 60 kV SUBSTATION	Final Design and Technical Assistance	Portugal	EDP - Gestão da Produção de Energia, S.A.
Moamba Major Dam and Power Plant 60 kV SUBSTATION	Preliminary Study	Mozambique	Zagope / Andrade Gutierrez Joint-Venture
Salamonde Hydropower Development. Power strengthening – Salamonde II. 400 kV SUBSTATION	Final Design and Technical Assistance	Portugal	EDP - Gestão da Produção de Energia, S.A.
Pedrogão Hydropower Development. Power Strengthening 60 kV SUBSTATION	Licensing Documents, Detailed Design and Tender Documents and Environmental and Social Impact Assessment	Portugal	EDP - Gestão da Produção de Energia, S.A.
Foz Tua Hydropower Development 400 kV SUBSTATION	Licensing Documents and Tender Specifications for the Execution of Civil Works and Supply of Equipments	Portugal	EDP - Gestão da Produção de Energia, S.A.
Rehabilitation and Extension of the Lomaum Hydropower Development. 220 kV SUBSTATION	Phase III – Design Phase IV – Tender Documents	Angola	EDP - Gestão da Produção de Energia, S.A.
Jamba-la-Oma Multipurpose Development. 220 kV SUBSTATION	Preliminary Study and Tender Design	Angola	GABHIC – Gabinete para Administração da Bacia Hidrográfica do Rio Cunene
Gove Hydropower Development. Dam Rehabilitation and New Hydropower Plant. 220 kV SUBSTATION	Tender Design and Construction Supervision	Angola	GABHIC – Gabinete para Administração da Bacia Hidrográfica do Rio Cunene
Fridão Hydropower Development - Power Plant and Conveyance Structures. 400 kV SUBSTATION	Preliminary Design	Portugal	EDP - Gestão da Produção de Energia, S.A.
Alqueva Multipurpose Project. Alqueva Hydropower Development - Alqueva II Power Plant 400 kV SUBSTATION	Tender Design, Final Design and Environmental and Social Impact Assessment	Portugal	EDP - Gestão da Produção de Energia, S.A.

Energy Transmission Lines Some Projects

ENERGY TRANSMISSION LINES AND SUBSTATIONS | STUDIES AND DESIGNS

PROJECT		COUNTRY	CLIENT
DESIGNATION	SERVICES PROVIDED		
Sambangalou Hydropower Development 225 kV SUBSTATION	Detailed Preliminary Design and Tender Documents	Senegal	OMVG – Organisation de Mise en Valeur du Fleuve Gambie
M'Bridge Hydropower Development 60 kV SUBSTATION	Final Design	Angola	ENE – Empresa Nacional de Electricidade
El Borj Hydropower Development. 60 kV SUBSTATION	Feasibility Study, Preliminary Design, Detailed Preliminary Design and Tender Documents	Morocco	ONE - Office Nationale de l'Electricité
Chiumbe – Dala Hydropower Development. 60 kV SUBSTATION	Tender Design	Angola	ENE – Empresa Nacional de Electricidade
Water Supply to Fortaleza. 60 kV SUBSTATION	Feasibility Study, Basic Design, Final Design and Environmental and Social Impact Assessment	Brazil	Secretaria dos Recursos Hídricos do Estado do Ceará (SRH)
Diversion System from the Mazafran River to the Douera Reservoir. 60 kV SUBSTATION	Tender Design and Tender Documents	Algeria	ANB - Agence Nationale des Barrages
Capanda Hydropower Development. 220 kV SUBSTATION	Tender Design and Tender Documents	Angola	SONEFE
Massingir Hydropower Development 110 kV SUBSTATION	Tender Design and Tender Documents	Mozambique	DNA - Direcção Nacional de Águas
Sela Hydropower Development 132 kV SUBSTATION	Tender Design and Tender Documents	Portugal / Spain	EDP/FENOSA (Fuerzas Eléctricas del Noroeste)

ENERGY TRANSMISSION LINES AND SUBSTATIONS - ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT		COUNTRY	CLIENT	DATE START/END
DESIGNATION	SERVICES PROVIDED			
REPLACEMENT OF THE 60 kV ENERGY TRANSMISSION LINE LUACHIMO – FUCAUMA – CASSANGUIDI – ANDRADA – MALIDI – LUCAPA and Associated Substations, of the 60 kV Electric Network Luachimo – New Urban Centre and 220/60 kV Dundo Substation	Environmental Impact Assessment	Angola	Direcção Nacional de Energia	2012/2014
VERY HIGH VOLTAGE LINE AT 220 kV. DUDO-LUENA. Very High Voltage Line at 220 kV, with an extension of about 500 km, between the Luachimo Hydropower Development and Luena.	Environmental Impact Assessment	Angola	ENE Empresa Nacional de Electricidade, E.P.	2012/2013
60 kV ELECTRIC NETWORK LUACHIMO – NEW URBAN CENTRE AND DUNDO 220/60 kV SUBSTATION. This 60 kV energy line extends throughout over 200 km between Dundo and Lucapa.	Environmental Impact Assessment	Angola	ENE Empresa Nacional de Electricidade, E.P.	2012/2012
HIGH VOLTAGE ENERGY TRANSMISSION SYSTEM OF RESTRICTED INTEREST OF THE MPHANDA NKUWA HYDROPOWER DEVELOPMENT. Studies pertaining to a Very High Voltage Line with an extension of approximately 17 km.	Environmental Impact Assessment	Mozambique	Hidroeléctrica Mphanda Nkuwa, S.A.	2012/2012
DOUBLE AERIAL LINE CARREGADO-RIO MAIOR 4 AT 400 / 220 KV (220 KV) DETAILED DESIGN Replacement of the single line Carregado-Rio Maior 1 (LCGRM 1) at 220 kV, with an approximate length 41 km, by a double line, Carregado-Rio Maior 4 (LCG.RM 4) at 400/220 kV (220 kV), with about 57 km.	Environmental Impact Assessment	Portugal	REN Rede Eléctrica Nacional, S.A.	2010/2011
Energy Transmission Line Fernão Ferro / Trafaria 2, at 150 kV. Buried Cable of Section P51 – P73. Energy transmission line between Fernão Ferro and Trafaria 2, at 150 kV, with 16.710 m..	Study of Major Environmental Constraints (MEC) and Environmental Impact Assessment (EIA)	Portugal	REN Rede Eléctrica Nacional, S.A.	2010/2010
Opening of the 400 kV Palmela/Ribatejo Line and Connection to the Fernão Ferro Substation Uprating of the Fernão Ferro Substation to 400 kV	Flora Monitoring Plan	Portugal	REN Rede Eléctrica Nacional, S.A.	2010/2010

Energy Transmission Lines

Some Projects

ENERGY TRANSMISSION LINES AND SUBSTATIONS - ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT		COUNTRY	CLIENT	DATE START/END
DESIGNATION	SERVICES PROVIDED			
FERNÃO FERRO SUBSTATION – 400 kV / 150 kV / 60 kV INTRODUCTION OF 400 kV and 2 PL 60 kV – QUINTA DO CONDE AND SANTANA Upgrading consists in introducing the 400 kV voltage level in the current substation and therefore its complete remodelling. This unit will be equipped with 3 voltage levels – 400 / 150 / 60 kV	Study of Environmental Incidences	Portugal	REN Rede Eléctrica Nacional, S.A.	2008/2009
MODIFICATION OF THE 150 kV AERIAL ENERGY TRANSMISSION LINES AT THE CONNECTION WITH THE FERNÃO FERRO SUBSTATION Detailed Design of the Modification of the 150 kV Aerial Energy Transmission Lines at the Connection with the Fernão Ferro Substation. The 6 lines subject to alteration, with approximately 10 km (9 695 m), will be entirely located in the “Fernão Ferro / Lagoa de Albufeira Site”, included the environmentally protected “Natura 2000 Network”.	Environmental Impact Assessment	Portugal	REN Rede Eléctrica Nacional, S.A.	2008/2009
VILA POUCA DE AGUIAR – VALDIGEM POWER LINE, AT 220 kW. Monitoring Plans for Avifauna, Iberian Wolf, Flora and Habitats during the preliminary phases of construction and operation of the Line.	Environmental Monitoring	Portugal	REN Rede Eléctrica Nacional, S.A.	2007/2008
Opening of the 400 kV Palmela / Ribatejo Line to the Fernão Ferro Substation. Upgrading of the Fernão Ferro Substation to 400 kV	Environmental Impact Assessment and Environmental Follow-up during Construction	Portugal	REN Rede Eléctrica Nacional, S.A.	2007/2008
UPGRADING OF THE ALQUEVA HYDROPOWER DEVELOPMENT – ALQUEVA POWER PLANT II AND 400 kV VERY HIGH VOLTAGE LINE BETWEEN ALQUEVA II AND THE ALQUEVA SUBSTATION Connection of the Alqueva II Powerplant to the Alqueva Substation, through a very high voltage line (400 kV)	Study of Environmental Constraints.	Portugal	EDP Gestão de Produção de Energia, S.A.	2007/2007
Trafaria Substation at 150/60 kV. Initial Installation. Quality, Environmental and Safety Supervision, Coordination of the Safety and Health on Site	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2006/2009
Castelo Branco - Ferro 1 and 2 Energy Transmission Line. 5178 Works. Quality, Environmental and Safety Supervision, Coordination of the Safety and Health on Site	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2006/2007
Castelo Branco Substation. Initial Installation. Quality, Environmental and Safety Supervision, Coordination of the Safety and Health on Site	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2006/2007
Alto Mira Power Plant. Degassing, Washing and Dismantling of Fuel Tanks and Pipelines and Management of Waste Produced. Environmental Follow-up and Safety Coordination.	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2006/2006
Bodiosa - Paraíso Line at 400 kV (until Post 75) and Bodiosa - Paraíso Line at 400 kV (from Post 75). Quality, Environmental and Safety Supervision, Coordination of the Safety and Health on Site	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2005/2008
Paraíso Substation. Initial Installation. Quality, Environmental and Safety Supervision, Coordination of the Safety and Health on Site	Environmental Follow-up during the Construction Phase	Portugal	REN Rede Eléctrica Nacional, S.A.	2005/2007
INTRODUCTION OF VOLTAGE LEVEL 400 kV AT THE FERNÃO FERRO SUBSTATION.	Study of Major Environmental and Feasibility Constraints (MEC) and Environmental Impact Assessment (EIA)	Portugal	REN Rede Eléctrica Nacional, S.A.	2005/2006
VERY HIGH VOLTAGE LINE AT 150 kV, WITH CONNECTION TO THE SINES COGENERATION PLANT Environmental Follow-up and Safety Coordination Extension of approximately 7 992 m.	Environmental and Archaeological Follow-up	Portugal	EPME (Dono de Obra: REN - Rede Eléctrica Nacional, S.A.)	2005/2006
Expansion of the Platform of the 220/60 kV Ferro Substation (SFE) to two 220 kV in-line Panels (Castelo Branco I and II). 62.03 Works Construction Supervision, Quality Control, Environmental Follow-up and Safety Coordination	Environmental Impact Assessment	Portugal	REN Rede Eléctrica Nacional, S.A.	2005/2005
Energy Transmission Line between Fernão Ferro and Monte da Caparica 2, at 150 kV This line connects the Fernão Ferro Substation to the future Trafaria Substation, for strengthening of the energy supply capacity in the Monte da Caparica Area.	Environmental Impact Assessment, Biology	Portugal	EPME (for REN – Rede Eléctrica Nacional, SA)	2005/2005

Energy Transmission Lines

Some Projects

ENERGY TRANSMISSION LINES AND SUBSTATIONS

PROJECT MANAGEMENT & CONSTRUCTION SUPERVISION	
STUDY	CLIENT
- Falagueira Substation – 400 kV / 150 kV / 60 kV Panel - Turbogás – Canelas / SEJ Line Uprating - Alto Mira Substation – 400 kV Panel - Ribatejo 220 kV Picote – Bemposta Line – Uprating - Pocinho – Valdigem 1 Line – Uprating - Trajouce Substation – Condenser Bank - Mogofores Substation 220 kV Bemposta – Pocinho Line – Uprating - Ferro Substation - 220/60 kV Panel - Batalha Substation- 1st TR 400/60 kV 170 MVA + 2 PN 400 kV - Batalha Substation - 1 PN 400 kV Pego 1 - Caniçada – Riba d'Ave Line – Uprating - Paraímo Substation - Initial Installation - Bodiosa - Paraímo Line at 400 kV (until Post 75) and Bodiosa - Paraímo Line at 400 kV (from Post 75) - Castelo Branco Substation - Initial installation - Mogadouro – Valeira Line – Uprating - Valdigem Substation – PN 60 kV - PN Testos / Rib. Laj. Dj and Feirão - Alto Mira Substation – PL 60 kV Zambujal 1 - Pego – Rio Maior – OPGW Line - Alto Mira Substation - 2nd Autotransf. 400/200 kV - 450 MVA and 3rd Transf. 400/60 kV - 170 MVA - Recarei - Vermoim and Recarei - Custóias Lines at 220 kV - Uprating - Estremoz 400 (150) /60 kV Substation - Initial installation - Paraíó 400 / 220 / 60 kV Substation - Recarei Substation: PN 400 kV Armamar; 2nd TRF. 200/60 kV; PN 60 kV Lordelo. Partial Remodelling of Systems - Frades Substation - Sacavém Substation - 3rd TRF. 220/60 kV and PL 220 kV Fanhões (Shielded) - Valdigem - Carrapatelo 2,3 Line - Uprating - Ermesinde Substation. Remodelling of the Substation - Chafariz Substation - 3rd TRT 220/60 kV - Mourisca 220/60 kV Substation. 60kV Line Panel (P623) – Ribeiradio - Bodiosa 400/60 kV Substation. 60kV Line Panel (P623) – Viso - Carriche Substation – 4º TRF 220/60 kV – 170 MVA - Linha Vieira do Minho – Pedralva 1 Line, at 400 kV - Castelo Branco Substation (SCC) - LP 60V Castelo Branco EDPD - Tabua (STBA) Substation - TRF 220/60kV-126MVA (single-phase poles) - Vila Chã (SVC) Substation - Transf 220/60- 63MVA (replacement) - Zêzere (SZR) Substation - ATRF 220/150kV 250MVA (01.24) + 1 LP 220kV (Santarém) (01.25) + 1 LP 220kV Penela	REN Rede Eléctrica Nacional, S.A.
Ribeiradio-Ermida Hydropower Development Substation of the Ribeiradio Stage, Transformer Capacity – 82 MVA, Transformer Ratio – 11/60 kV Substation of the Ermida Stage, Transformer Capacity – 9 MVA, Transformer Ratio – 6/15 kV Ribeiradio Powerplant with a rated capacity of 74,5 MW Ermida Powerplant, with a rated capacity of 8 MW	Greenvougá (Dono de Obra: EDP Gestão da Produção de Energia, S.A.)
Repair of the Gove Dam and Construction of the Powerplant. Gove Hydropower Development. SUBSTATION Transformer Capacity: 24 MVA Transformer Ratio: 11/220 kV Powerplant (Capacity: 60 MW).	GABHIC Gabinete para a Administração da Bacia Hidrográfica do Rio Cunene
LAÚCA HYDROPOWER DEVELOPMENT Main Substation: 400 kV; Ancillary Substation: 220 kV Main Powerplant: 2004 MW; Ancillary Powerplant (environmental flow): 65,5 MW	GAMEK Gabinete de Aproveitamento do Médio Kwanza
UPRATING OF THE CAMBAMBE HYDROPOWER UNDERTAKING – CONSTRUCTION OF POWERPLANT 2 400 kV, 220 kV and 60 kV Substations Powerplant 2 with a rated capacity of about 700 MW	ENE Empresa Nacional de Electricidade





 JULY | 2023



E N G I N E E R I N G A N D E N V I R O N M E N T A L C O N S U L T A N T S

PORTUGAL

COBA Portugal
Av. 5 de Outubro, 323, 1649-011 LISBOA
Tel.: (351) 210 125 000
Tel.: (351) 217 925 000
Fax: (351) 217 970 348
Email: coba-pt@cobagroup.com

ANGOLA

COBA Angola
Rua Marechal Brós Tito, N° 35/37,
Edifício Escom, 14° Andar B - LUANDA
Tel.: (244) 225 300 073
Fax: (244) 225 300 074
E-mail: coba-ao@cobagroup.com

MOZAMBIQUE

COBA Moçambique
Edifício Jat-VI City Mall
Rua dos Desportistas n° 733,
1° Andar, Escritório 55, MAPUTO
Tel.: (258) 21 328 813
Fax: (258) 21 016 165
Email: coba-mz@cobagroup.com

ALGERIA

COBA Algérie
09, Rue des Frères Hocine
El Biar - 16606, ARGEL
Tel.: (213) 21 922 802
Fax: (213) 21 922 802
E-mail: coba-dz@cobagroup.com

COLOMBIA

COBA Colombia
Carrera 47 N° 103-29
Bogotá D.C. - Colombia
Tel: (57) 314 696 9491
Tel: (57) 601 636 0222
E-mail: d.preciado@cobagroup.com

PERU

COBA Perú
JR BRONZINO 598
Urbanización: San Borja
Distrito. SAN BORJA
Provincia y Departamento: LIMA
E-mail: c.gomes@cobagroup.com