DESIGNING POWER TRANSMISSION SYSTEMS

COMMITMENT EXPERTISE SOLUTIONS
COMMITMENT

“We build strong operator-to-operator relationships to support our clients.”

A HIGH-QUALITY RELATIONSHIP MAKES ALL THE DIFFERENCE

at a time when power systems are being transformed in response to the world energy context, with changes in the energy mix, integration of renewable and conventional energy sources, introduction of smart grids and increasing number of interconnection. The challenges faced by each country or region are different, but the move to achieve greater sustainability is global. The EDF Group leverages its integrated organisational structure to provide the best solutions for local energy policies around the world. Our grid engineering expertise covers power plant connection, switchyards and power transmission systems. We build on our comprehensive knowledge of systems to forge close operator-to-operator relationships with our customers and provide standout support at each stage of their projects. The independence and strength of our Group further enhances this support.

Jean-Paul Mairesse,
Director of EDF’s Transmission System Engineering Centre (CIST)
**Jamaica**

Study of the impact of renewable energy integration on the Jamaican transmission system. **Findings**: the goal of 30% generation from renewables by 2030 is achievable, suitable sites have been identified and the costs have been calculated.

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**OUR ACHIEVEMENTS**

93% of satisfied clients (since 2011)

**AMERICAS**

**French Guiana**

Project management assistance for the SYSCODOM control centre system upgrade (design, supply, installation and commissioning of the new control systems, operator training).

**Guadeloupe-Martinique**

Project management assistance for the completion of the Fond Laitel and Pointe Jarry power plant switchyards.
EUROPE

Andorra
Design of 5 km of underground lines and EHV substations

France
Contract study with the TSO for an offshore wind farm project / Design and supervision of the 400 kV gas-insulated switchyard of the 1,600 MW Flamanville EPR

Poland
Detailed design study for the connection of a 900 MW supercritical coal-fired plant

Russia
Studies for the Murmansk tanker terminal

United Kingdom
West Burton combined cycle gas turbine (CCGT) switchyard, from design right through commissioning

AFRICA

Burkina Faso
Bobo-Dioulasso-Ouagadougou interconnection (360 km of overhead lines, three 225 kV substations, four 90 kV substations)

Cameroon
Protection study / Detailed study of the switchyard and the 225 kV power line for the Nachtigal hydroelectric power plant

Cape Verde
Network study to optimise the wind and fossil-fired generation fleet

Djibouti
63 kV substation and control centre supervision

Egypt
Management of 21 substation and transmission line design and works supervision studies

Ethiopia
HVDC / AC interconnection between Egypt, Sudan and Ethiopia (one +/-600 kV HVDC line, one 500 kV HVAC line, two 2,150 MW converter stations / Control centre feasibility study

Gabon
Inspection of 230 km of EHV overhead lines

Kenya
Detailed study (call for tender), drafting of technical specifications for HV overhead transmission (400 kV, 230 km) and distribution (33 kV lines, distribution substations (33 kV) and switchyard (400 kV) for the High Grand Falls hydroelectric power plant

Morocco
Inspection and audit of the 220 kV Dar Bouazza substation

Mozambique
Technical specifications and line and substation supervision (225 kV) / Control centre feasibility study

Republic of Congo
Network performance support contract

Reunion Island
Project management assistance for the construction of the Marquet substation

Senegal
Design study for a national control centre

Sudan
Static and dynamic studies for various consumption and generation scenarios as part of the connection of nine hydroelectric power plants

WAPP
225 kV line feasibility study (Ghana-Burkina Faso-Mali)

Zambia
Impact studies for the connection of the Kafue Gorge Lower (330 kV, 750 MW) and Kariba North (2 x 180 MW) hydroelectric power plants to the grid
AGILE TEAMS

Our teams, made up of 150 experts and project managers, can address your power transmission issues around the world. They combine agility and adaptability – agility based on our model with its flexible organisation and smooth information flow and adaptability supported by such practices as the dialogue we forge with local authorities, project contractors and service providers who carry out the works.

TO SERVE CLIENTS

With more than 40 customers in 33 countries, we provide expertise for:

- State-owned companies
- Network operators and distributors
- Producers
- Administrative departments and ministries
- Funding agencies
- Industrial clients

CERTIFICATIONS

since 2004  since 2005

Laos
Management of the transmission aspects of the Nam Theun 2 hydroelectic power plant project. Supervision of the implementation of the technical specifications and site supervision of all transmission aspects of the project, including the construction of 140 km of HV lines connecting the power plant to the 500 kV Thai and 115 kV Laotian power grids, featuring a 1.2 km crossing over the Mekong River.

ASIA – MIDDLE EAST

Cambodia
115 kV substation and transmission line feasibility study

China
Audit of 220 kV substations, maintenance and operation activities and telecommunication and control command system facilities

India
Audit of the national control centre technical specification

Indonesia
Network study for a circular grid (40 km, 500 kV) around Jakarta, technical feasibility study, potential for developing smart grids

Lebanon
Transmission grid master plan / Drafting of tender documents for the construction of transmission lines and substations (63 and 225 kV)

Nepal
Planning study for the implementation of the master plan

New Caledonia
Technical support and HV line maintenance

Oman
Network study for the Oman - United Arab Emirates interconnection

Papua New Guinea
Feasibility study for a 2,200 km HVDC link for the Puran project

Qatar
Study and supervision for the DMS control centre

Thailand
Supervision and construction of the 230 kV underground cable between Ladprao and Vibhavadi

United Arab Emirates
400 kV / Marmar-Dubai underground lines (11.5 and 4.5 km ventilated tunnels) / BAB project in Abu Dhabi (400 kV overhead line and construction of two 400 / 225 / 110 kV substations) / Emirates interconnection, from feasibility study to supervision / Supervision of the Baraka 2 nuclear power plant switchyard

Vietnam
Support for connection of the 500 kV, 715 MW Phu My combined cycle gas turbine (CCGT) power plant / Design of the distribution grid control system and installation of the SCADA system

Yemen
Supervision of the Marib power plant switchyard (400 kV overhead line, associated substations and 132 kV lines) / Consultancy for the national and regional load control centre

Togo-Benin
Consultancy for interconnection works. Construction of two 2 x 161 kV overhead lines over distances of 260 and 30 km respectively, construction of a 2 x 63 kV underground line and a 161 / 63 / 20 kV substation, extension of a 63 / 15 kV substation.
To support the integration of renewable energies in the network, we introduced the probabilistic approach. The method enables us to characterise production variability in order to reduce the uncertainties inherent in intermittent generation and to maximise the systems’ renewable energy potential. This approach has been successfully applied in designing the island networks operated by our Group. In another development, we carry out investigations to improve the performance of equipment. The research is notably focused on underwater cables, which are needed to connect offshore generation facilities and to interconnect countries and islands.

We introduced a safety charter in 2013. Signed by 24 providers and partners, these guidelines enable us to support our suppliers and providers and to share best practices with them. Innovation and management thus foster risk prevention.

Our active pursuit of innovation and our long-term approach support the high quality of our work. A few examples developed with the Group R&D team serve to illustrate.

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We study and master all the parameters of your project, whatever its features, in order to deliver suitable solutions. Our hands-on approach starts early in the project and includes studies, structural design, worksite supervision, handover procedures, refurbishment and optimisation. The first stage consists of acquiring an in-depth understanding of the rules governing the operation of the power system. We then perform simulations to observe energy flows and use statistical tools to balance them. We also provide a more detailed estimate of cost effectiveness to facilitate and consolidate decision-making. The data and projections that we collect during this preparatory phase enable us to simulate the behaviour of the network for periods of up to 30 years. From contracting for your equipment and works to implementing your projects in the field and supporting your operations, our in-depth understanding of your challenges and goals enables us to work with partners and providers matching your needs and expectations to provide you with optimum support.
Our experts provide consulting services, technical support and project management assistance covering all stages of your projects with respect to:

**TRANSMISSION GRIDS:** construction and reliability upgrades of power line, cable and substation projects in a large number of countries based on a reliable, innovative and preventive approach.

**POWER SYSTEM STUDIES:** qualification of existing infrastructure through implementation of network studies, master plans and static and dynamic calculations.

**SUPPLIER TENDERING AND CONTRACTING:** thanks to defining technical / equipment / works specifications, drafting of tender documents and conduct of contractual negotiations.

**WORKS SUPERVISION:** from works inspection to factory acceptance, on-site testing and commissioning and warranty oversight.

**SUPPORT FOR OPERATION AND MAINTENANCE:** including protection plans and audit, diagnostics and performance analysis assignments.

**LOAD CONTROL AND REMOTE MANAGEMENT:** programme management and engineering of remote management systems, design and implementation of load control centres.

**INTERFACE WITH TRANSMISSION SYSTEM OPERATORS:** support for power transmission system operators through mobilisation of their capabilities in the areas of grid codes, system services and contractual engineering.
INTEGRATED ENERGY SUPPLIER
Generation and engineering
Transmission and distribution system management
Marketing of products and services
Research and innovation

Leading
Nuclear operator worldwide
European hydropower producer
Electricity supplier in France

39.1 million customers worldwide
158,467 employees worldwide
27 locations worldwide
€75.6 billion revenue

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