



TEN – Trans Med Engineering Network

Project Portfolio

(From 2012 onwards)

	Title	Short Description	Client
Electrical Studies and System Analysis			
1.	Master Plan of the Mediterranean Interconnections	<p>Sharing criteria for interconnection planning among the Mediterranean TSOs and analysis of the interconnection projects in the Mediterranean Area for the decade 2013-2022.</p> <p>Based on the National Development Plans collected for the North Western Mediterranean Area (France, Spain, Portugal, Italy), the South East Area (Morocco, Algeria, Tunisia, Libya and Italy), and for the Eastern Area (Albania, Greece, Bulgaria, Turkey, Syria, Jordan, Lebanon, Palestine, Israel, Egypt).</p> <p>The regional expansion plans for the decade 2013-2022 were estimated according to load demand forecast (TWh/yr), the generation mix, the grid analysis (load flows and cross-border exchanges).</p>	European Commission
2.	RES penetration in the Southern Mediterranean Energy Systems	<p>Study carried out in the framework of the EU Project “Paving the way for the Mediterranean Solar Plan”.</p> <p>The study concerned the penetration of solar and wind generation in the</p>	European Commission

		<p>Mediterranean countries, from Turkey to Egypt, to Morocco, on the base of the hourly simulation of the generation mix, by considering the yearly utilization factor of conventional power plants (Gas Fired Combined for base generation and Open Cycle or Diesel for peak duty) in presence of relevant amount of solar and wind generation, reserve margin related to the RES generation intermittency and cross-border exchanges.</p>	
3.	<p>“Electricity Corridor” from North Africa to Central Europe, through Italy</p>	<p>Feasibility study. Requirements of a transmission system allowing power flows from 1 to 3 GW at year 2022, between Maghreb and Central Europe through Italy. Three power exchange scenarios targets were examined, by considering 1, 2 or 3 submarine HVDC dipoles of 1 GW each. The study results include the “Reference networks” planned at year 2022 by the TSO of Algeria, Tunisia, Italy, the technologies available for cables and converters, the internal network reinforcements (submarine and OHL) and the cost analysis for each scenario.</p>	Medgrid (France)
4.	<p>100 MW Wind Power Plant in Jordan</p>	Grid Impact Study	CESI

5.	52MW Solar Power Plant in Ghana	Grid Impact Study, site selection and connection to the 161 kV network design	CESI
6.	Industrial end electricity consumer in Saudi Arabia	Harmonic impact study, power factor enhancement, reactive power compensation study and harmonic filter validation	CESI
7.	“Tyra” LNG plant	Electricity System study: load flow, short circuit, transient analysis, harmonic study, protection coordination design	Basis Engineering
8.	“Toulmont” LNG plant	Electricity System study: load flow, short circuit, transient analysis, harmonic study, protection coordination design	Basis Engineering
9.	SIC & SING Interconnections systems in Chile	Feasibility study of the Interconnection between the Central (SIC) and North Grande (SING) networks of Chile. AC and HVDC options have been investigated, for two levels of power capability (1000 and 1500 MW) and different topologies. HVDC options: single dipole ± 400 kV, 1000 or 1500 MW, 490 and 600km OHL.	SYNEX Beneficiary: Chilean TSO (CNE)
10.	Central-West Saudi Arabia Interconnection	Feasibility Studies of two options (HVDC Link ± 600 kV $2 \times 1500 \div 2000$ MW) for the HVDC interconnection between WOA (west) and COA (center) areas, including steady state, short circuit, transient stability, harmonic impact evaluation, converter station and lines basic design, detailed technical specifications, support in bidder evaluation.	CESI Beneficiary: SEC - Saudi Arabia Electricity Corporation

		<p>ESC Company was in charge the execution of the Electrical Studies.</p> <p>The network models as well as the HVDC converter stations were developed for the PSS/E software.</p>	
11.	<p>Montenegro - Italia HVDC link +/- 500 kVdc 2x600MW</p>	<p>Harmonic Impedance Studies (HIS).</p> <p>Grid modeling of Italy and Montenegro, suitable for the frequency sweep analysis studies.</p> <p>The grid models and the HVDC converters were developed for the PowerFactory DIgSILENT software.</p>	<p>Weidmann Electrical Technology AG (CH), Beneficiary: Toshiba Europe</p>
12.	<p>Montenegro - Italia HVDC link +/- 500 kVdc 2x600MW. Additional studies.</p>	<p>Additional studies of Load-Flow, short-circuit and dynamic.</p> <p>Network modeling of Italy (with an equivalent) and Montenegro plus Balkans (in detail), suitable for the transient stability studies.</p> <p>The network models and the HVDC converters were developed for the PSS/E software.</p>	<p>CESI Beneficiary: TERNA</p>
13.	<p>Futuristic Planning of the Chilean Network (Interconnection South with Central SIC Network, EHVAC or HVDC solutions)</p>	<p>Feasibility Study of network solutions to transport the hydro generation to the Centre-North of the country.</p> <p>A “Highway” planned up to the horizon year 2040 with a capability up to 12.000 MW in EHVAC at 765 kV, and in HVDC at ± 500 kV using 3 couple of dipoles (4000 MW each).</p>	<p>Colbun S.A. (IPP of the Chilean Energy Market)</p>

		<p>Load-Flow Analysis in N and N-1 conditions and short-circuit studies have been performed.</p> <p>The network models as well as the HVDC converter stations were developed for the PowerFactory DIgSILENT software.</p>	
14.	<p>Colombia - Panama Interconnection</p>	<p>Detailed electrical studies of the HVDC (± 450.kV, 600MW) interconnection, in OHL and submarine cable.</p> <p>Static and dynamic studies of the Colombia and Panama electrical systems to define the technical specification of the equipment and the performance of the HVDC substation and DC link.</p> <p>The study dealt with almost every network operational aspect, mainly related to voltage: reactive management, voltage profiles and stability, both on the Colombian and (mainly) on the Panama side with the SIEPAC interconnection up to Mexico.</p> <p>The network models as well as the HVDC converter stations were developed for the PSS/E and PowerFactory DIgSILENT softwares.</p>	<p>CESI and TERNA Beneficiary: ISA Colombia, ETESA Panama</p>
15.	<p>Transfer in Europe the PV generation in Jordan</p>	<p>Feasibility study of the Net Transfer Capability through the electrical corridors crossing the countries involved. Estimation of the power losses. The network models for the studies</p>	<p>Solar VENTURES</p>

		were developed for the PSS/E software	
16.	Ostiglia OCGT project	Feasibility study. Operation assessment for an Open Cycle GT considering the dispatching of conventional and RES generation. Checking the flexibility of the new units supplying ancillary services to the Italian Market, for balancing needs during the ramp. The network models were developed for the PowerFactory DIgSILENT software	REF (Italy) Beneficiary: E.ON – ITALY
17.	Compensation for reinforcing the Argentinean Transmission Network	Feasibility Study. Following the entry of the new Wind Farms in the Patagonia’s area. SSR studies and Small signal analysis. New Series Compensation on the 500 kV corridors from the Patagonia to South of Buenos Aires can affect the Steam units with the Subsynchronous Resonance SSR and Transient Torque phenomenon . Studies of the frequency scan have been performed for five Steam Power Plant located along of the mentioned above corridors. Different types of faults located along the corridors in the Southern have been simulated to check the transient torques and the impact on the shaft fatigue and loss of live for the Steam units involved. Load-Flow in N and N-1 conditions, short-circuit and Electromagnetic Transient	Mercados Energeticos Consultores (ARG) Beneficiaries: EmgaSud, IMPSA and ISOLUX

		studies of the integrated SIC+SING systems were carried-out.	
18.	Kazakhstan Renewable Energy Development (Italy-Kazakhstan)	Analysis of rules and standards on design and specifications for renewable energy generation plants, Grid Code requirements for the connection to the national grid and operation of envisaged renewable energy technologies the CDEC, the Superintendency of Electricity and Fuels (SEC), and the CNE, specifying the tasks to be fulfilled in the subjects concerned. The network models for the studies were developed for the PowerFactory DIgSILENT software	REF Beneficiary: Kazakhstan TSO
19.	C.H. Quitaracsa	Operational Study of a power plant to be presented to COES, the Peruvian TSO, to receive the approval for the operation of the power plant, demonstrating the compliance with the network requirements. The study included load-flow, short circuit analysis and protection settings, as well as transient dynamic assessment	ENERSUR S.A (IPP of the Peruvian Energy Market)
20.	Transmission Power Limit between the Central and South Areas of The SEIN Electrical System (Peru)	Feasibility Study. Based on Load-Flow, Transient Stability and Modal Analysis performed on different load scenarios and network configuration. Evaluation of the transient response when severe events occurs on the main AC link at 220 and 500kV among the areas of the SEIN	COES (Peruvian TSO)

21.	Possible Sub-Synchronous Resonances (SSR)	Analysis of the Thermal Units of the SEIN Electrical System (Peru), connected to the AC link with Series Compensation, considering the current topology and the new 500kv Project Mantaro-Montalvo (MAMO). Studies of Frequency scanning and Electromagnetic Analysis to verify the Sub-Synchronic Resonance, development of appropriate models to be implemented on the PowerFactory DIgSILENT simulation software	Client COES (Peruvian TSO)
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Electricity Infrastructure Design
(Preliminary, Final, Specification, Dossier for Tender Procedures)

22.	AL FAW Grand Port (Iraq)- electricity supply system	Final design and tender dossier for the electricity supply system of the port infrastructures, consisting of a power plant (280 MW) , the underground transmission grid (12 km, 132 kV) and distribution grid (70 km, 33 kV)	PEG Beneficiary: Energy Ministry of Iraq.
23.	Geothermal Apacheta Power Plant connection to the grid (Chile)	Preliminary design, technical specification, tender dossier, topographic survey.	ENEL GREEN POWER
24.	RUZIZI transmission lines and dams' rehabilitation - Kamanyola Station, Transmission Lines, and Cascade	Feasibility Study, Final Design, Tender Documents, Environmental and Social Impact Assessment. Investigations, Design and studies of rehabilitation works for the Dams.	Organisation pour l'Énergie des pays des grand Lacs (Project Funded by the European Union)

	Coordination Centre (Congo, Burundi and Rwanda).		
25.	Livorno HV substation (Italy)	Feasibility study, preliminary design.	TERNA
26.	Double Circuit 400 kV OHL “San Fiorano-Robbia”	Final Design	TERNA
27.	Double circuit 400 kV OHL “Udine Ovest – Redipuglia” (40km) –	Final design and authorization dossier	TERNA
28.	OHL (70km) and submarine (40km) 400 kV Line “Sorgente-Rizziconi II”	Final Design	TERNA
29.	Grid Revamping of Messina area related to the connection of the double circuit 380 kV overhead line “Sorgente-Rizziconi II”	Electricity System reorganization proposal	TERNA
30.	Collection system of wind generation in Salento area (30 km of 150 kV OHL and 150 kV switching substation).	General and detailed design	TERNA
31.	Italy - Tunisia Interconnection – Elmed Project –	Drawing up technical support of terrestrial cable design, Sicily side.	TERNA

32.	Burial of 132 kV lines in Bologna district (about 8 km)	Final design	TERNA
33.	400 kV Overhead power line “Paternò – Priolo” –	Design (Preliminary, Final) and drawing up technical support	TERNA
34.	Revamping of HV grid infrastructure and electrical substation in Agrigento district	Design (Preliminary, Final) and Environmental study	TERNA
35.	HV grid structure and electrical substation in Piana degli Albanesi district	Design and Environmental study	TERNA
36.	New 380/150 kV substation on the “Larino – Gissi” line.	Geographic localization. Feasibility study and final design.	TERNA
37.	150 kV grid in Messina district	Revamping Design	TERNA
38.	New 400/150 kV Pordenone substation	Design (Preliminary and Final)	TERNA
39.	New 400 kV OHL “Avenza - La Spezia - Acciaiole”	Design of the OHL and related rationalization of the 132 kV grid in Massa district	TERNA
40.	150kV interconnection of the Sorrento, Vico Equense, Agerola, Lettere distribution subsystems in Campania (Italy)	Supervisory design	TERNA

41.	new HV electrical infrastructures in Messina area	Supervision of final design for authorization procedure implementation	TERNA
42.	New 400/150 kV Carisio (VC) sub station	Preliminary and final design	TERNA
43.	Burial of 220 kV line “Tiburtina – Roma Nord” –	Works’ plan	PRYSMIAN for TERNA
44.	Burial of several 150 kV lines of Elba Island –	Works’ plan	PRYSMIAN for TERNA
45.	Burial of 150 kV lines in Figline Valdarno district - Working plan	Works’ plan	PRYSMIAN for TERNA
46.	Burial of 150 kV lines in Fusignano-Lugo di Ravenna district -	Works’ Plan	PRYSMIAN for TERNA
47.	150 kV cable “Saline di Volterra –Saline”	Works’ Plan	TERNA
HVDC – HVAC International Interconnections			
48.	220 kV OHL “Somplago-Wurmlach” between Italy and Austria	Final Design and Authorization Dossier.	Alpe Adria Energia
49.	220 kV underground line “Somplago-Wurmlach” between Italy and Austria	Final Design and Authorization Dossier.	Alpe Adria Energia
50.	Italy Albania Interconnection HVDC link (about)	Final Design of <ul style="list-style-type: none"> • Submarine HVDC (220 km) 	ENEL

		<ul style="list-style-type: none"> • 400 kV substations in Italy and Albania for connection to the national grids • 26 km of 400 kV OHL in Albania 	
51.	150 kV OHL (merchant line) Redipuglia- Vertojba	Final Design	KB 1909
52.	Italy Tunisia Interconnection	Network study and congestion analysis	TUNUR
53.	Italy Tunisia Interconnection	Market study and CBA	TUNUR
54.	Market study for interconnection Italy - Slovenia,	Market analysis and congestion rent estimation in future possible scenarios	AGICI
Substations (S/S) and Power Lines (Over Head Lines – OHL, underground)			
55.	National grid connection of Coal Power Plant in Saline J. – New 400 kV Substation and new 400 kV power line single (64 km) and double circuit (7 km)	Final Design	SEI - REPOWER
56.	Connection to the national grid of the Crotone Windfarm – 18 km of OHL	Final Design	Venergy
57.	Ginosa 150 kV cable	Works Plan	PRYSMIAN
58.	Galatina 150 kV cable	Works Plan	PRYSMIAN

59.	400 kV double line “Padriciano – Redipuglia” and new 400 kV section in Padriciano substation	Final Design	Lucchini Energia
60.	Extension of 400/150 kV Foggia substation	Final Design	Ecoenergia
61.	New 400/150 kV Grottole (MT) substation and HV link of Grottole biomass power plant	Final Design	CESI
62.	New 400/150 kV S/S “Melfi”	Final Design	APINOVAENERGIA
63.	New 400/150 kV S/S Rotello (CB)	Final Design	APINOVAENERGIA
64.	Connection to national grid by mean of a buried 132 kV cable of the Pistoia power plant and new 132 kV Pistoia substation	Final Design	REPOWER
65.	Feasibility study of 400/150 kV S/S Torremaggiore (FG) Substation extension	Final Design	WKN
66.	Feasibility study of 400/150 kV Deliceto (FG) Substation extension	Feasibility Study	WKN

67.	New 150 kV “Palata Pepoli” substation	Final Design	ENERQOS
68.	150 kV S/S located in Fontanetto Po and Trino Vercellese (VC) – 9 km of 150 kV buried cable link	Final Design	AGATOS GREEN POWER (EGP)
69.	150 kV S/S located near Matrice (CB) and 40 km of 150 kV OHL from Matrice to Larino	Final Design	EDP Renewable
70.	150 kV S/S located near Sant’Elena Sannita (IS) and rebuilding of existing 150 kV OHL “CP San Massimo – San Polo – Campobasso”	Final Design	EDP Renewable
71.	Active electromagnetic shield on the 400 kV OHL “Rosignano – Acciaiuolo” with the modification of existing towers	Design and Supervision of works for commissioning	ROSEN Rosignano
72.	Distribution grid study of some district in Sierra Leone (MV and LV overhead and underground lines)	Grid Analysis	Studio Pietrangeli

73.	Two OHL (about 100km total length) and electrical S/S for connecting to the grid the future hydro power plant of Ruzizi III , among Kivu e Tanganyika lakes.	Feasibility study	Studio Pietrangeli
74.	MV and HV collector system of 2 offshore wind farms in Pantelleria (Italy)	Final Design	Four Wind srl
75.	of MV and HV collector system of 1 offshore wind farms in Sicily (Italy)	Final Design	Enel Green Power
76.	New “Buteral” S/S 400/220/150 kV	Final Design	Enel Green Power
77.	New S/S 400/150 kV of Spinazzola linked to the Wind plant Castellani	Final design	WKN Basilicata Development
78.	OHL Melfi-Rapone 150 kV (two lines each 36 km) and new S/S 150 kV of Rapone, for the connection to the grid of the new wind power plant of Castelgrande.	Final Design	WKN Basilicata Development

79.	220 kV OHL (about 72 km) for the connection to the HV grid of the Geothermal plant of Cerro Parabellon (Chile)	Project revision, Design and Technical Specifications	ENEL GREEN POWER
80.	new 220 kV S/S of Conchi for the connection of the geothermal plant of Cerro Parabellon (Chile)	Feasibility study	ENEL GREEN POWER
81.	Connection to the national grid of the geothermal plant of "Milia" Monterotondo Marittimo (S/S, underground HV cables and HV switching substation design)	Final design	ENEL GREEN POWER
82.	New Al Faw harbor (Iraq), 33kV distribution system, 132 kV gas-isolated substation (GIS) and underground 12km HV cable line for the connection of the new power plant	Final Design	PEG (Consorzio IECAF)
83.	66kV S/S of LOS BUENOS AIRES	Design revision and Technical Specifications	ENEL GREEN POWER

84.	Connection to the 400kV grid of the new wind plant of Tataranu, 110kV switching substation, 400/110 kV S/S and 110kV OHL (about 4 km)	Final design	EOLIANA
85.	New electrical 220/400/150 kV S/S of PARTANNA 2 and HV OHL for its connection to the transmission grid	Final design	Amec Foster Wheeler
86.	220 kV S/S of Marsala	Final design	Amec Foster Wheeler
87.	New end user MV/HV S/S, 132kV S/S of Corteolona and HV OHLs for its connection to the transmission grid	Final design	A2A (Milan Electrical Municipal Company)
88.	MV/HV S/S and 132kV switching substation of SAKAKA in Saudi arabia	Technical specifications	ENEL GREEN POWER
89.	MV/HV S/S, switching substations and HV connecting power lines for a WF in Dumet Al Jandal in Saudi Arabia.	Technical specifications Load flow, capability curve and short circuit study for the Wind Farm	ENEL GREEN POWER
90.	Cerro Parabellon power plant	Grounding network design	TCS Engineering

91.	400/150 kV S/S “Angitola” (GIS) , feasibility study and final design		WPD Italia
92.	New “Gravina” sS/S 400/150 kV	feasibility study	METKA EGN
93.	New “Montalto 380” satellite substation 400/150 kV	feasibility study and final design	SolarKonzept
94.	New “Ramacca 380” 400/150 kV substation,	feasibility study	Qair
95.	New “Ciminna 2” 150 kV S/S	feasibility study and final design	IBVOGT
96.	Upgrading of existing OHL “Chilivani-Ozieri- Buddusò- Siniscola 2”, 150 kV OHL of circa 70 km length.	Final Design	FRIEL
97.	Upgrading of “Atella- Pietragalla” 150 kV OHL (26 km)	Final Design	WKN Italia
98.	“Matera 380” substation extension of the 150 kV section	Feasibility study	Green Utility
Photovoltaic (PV) and Wind Power Plants			
99.	New 100 MW Wind Power Plant in Jordan	Grid Impact Study	CESI
100.	New 52MW Solar Power Plant in Ghana	Grid Impact Study, site selection and connection to the 160 kV network design	CESI
101.	Industrial end user plant in Saudi Arabia	Harmonic impact study, power factor enhancement, reactive	CESI

		power compensation study and harmonic filter validation	
102.	“Tyra” LNG plant	Electrical system study (load flow, short circuit, transient analysis, harmonic study, protection coordination)	Basis Engineering srl
103.	“Toulmont” LNG plant	Electrical system study (load flow, short circuit, transient analysis, harmonic study, protection coordination)	Basis Engineering srl
104.	PV Plant Rossi2 (20 MW) - Basilicata	Design and authorization dossier	Mara Solar
105.	PV plant in Ottana (9 MW) - Sardinia	Final design	GES
106.	PV plant in Torchiarolo (9 MW) owned by AES Solar Puglia	Final design	GES
107.	PV Plant Pagliete (24 MW) - Puglia	Design and authorization dossier	Novasol Puglia (APINOVAENERGIA)
108.	6 PV Power Plants (ranging 3-9 MW)	Final design	ENEL GREEN POWER
109.	7 PV Power Plants of 1 MW each in Puglia	Final design	Asja
110.	PV “Palata Pepoli” (21 MW) - Emilia Romagna	Design and authorization dossier	Energos
111.	PV Plant Tafuri (95 MW) - Puglia	Design and authorization dossier	FRV Italia
112.	PV Power Plant Tafuri (120 MW) - Puglia	Design and authorization dossier	IBVOGT

113.	PV Power Plant Belpasso (300 MW) - Sicily	Design and authorization dossier	IBVOGT
114.	PV Power Plant Castel di Iudica (360 MW) - Sicily	Design and authorization dossier	IBVOGT
115.	PV power Plant Lamezia 1 e 2 (12 MW) - Calabria	Design and authorization dossier	Aurapower
116.	PV power plant in Puglia (20 MW)	Preliminary layout	Regener8
117.	PV power plant in Sardinia (25 MW)	Preliminary layout	Regener8
118.	PV power plant in Sardinia (50 MW)	Preliminary layout	Regener8
119.	PV power plant in Sardinia (7,5 MW)	Preliminary layout	Regener8
120.	PV plant in Puglia (25 MW)	Preliminary layout	Regener8
121.	PV power plant in Puglia (43 MW)	Preliminary layout	Regener8
122.	About 50 PV Plant and BESS in Italy (from 6 to 300 MW)	Technical and Administrative Dossier related to the application for grid connection	Varies
123.			
124.	New 52MW Solar Power Plant in Ghana	Grid Impact Study, site selection and connection design to the 161 kV network	CESI
125.	Final project of nr.3 wind farm in Italy Final project of several wind farm in South Italy		Apinovaenergia API Holding

	<p>Final project of several wind farm in South Italy (Region of Sicily)</p> <p>Preliminary and final project of several wind farm in Italy</p> <p>Final project of nr.3 wind farm in Italy</p> <p>Final project of several wind farm in South Italy</p> <p>Final project of several wind farm in South Italy (Region of Sicily)</p> <p>Preliminary and final project of several wind farm in Italy</p> <p>Preliminary Design of an offshore wind farm</p>		Enel Green Power
126.	PV plant in Sardinia (50 MW)	Preliminary layout	Regener8
127.	PV plant in Sardinia (7,5 MW)	Preliminary layout	Regener8
128.	PV plant in Puglia (25 MW)	Preliminary layout	Regener8
129.	PV plant in Puglia (43 MW)	Preliminary layout	Regener8
130.			
Battery Energy Storage System (BESS)			

131.	Electrochemical storage system in the existing Wind farm “Pietragalla”, 1 MW	Final Design	Enel Green Power
132.	Electrochemical storage system in the existing PV plant “Catania”, 1 MW	Final Design	Enel Green Power
133.	Electrochemical storage system in Maddaloni , 200 MW/800 MWh,	Design and authorization procedure	Aurapower
134.	Electrochemical storage system in Troia, 200 MW/800 MWh,	Design and authorization procedure	Aurapower
135.			
136.			
137.			