

# Expert Advisory Services

Solar PV, Wind, Grid Integration, Hydrogen



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We deliver solutions through the complete project lifecycle and support all project stakeholders including developers, investors, lenders and government authorities, **providing expert technical insight** as a basis for cost-effective project planning, risk mitigation and performance optimisation.

Discover our Expert Advisory Services here



Yield Analysis

- Reliable long-term energy yield calculation
- Usage of the latest modelling software including the measurement campaign management



Design Review

- Ensure compliance with the latest technical requirements, local regulation and industry best practices
- Optimise natural resources while limiting construction and operating costs



Acceptance Assistance

- Technical verifications at each critical project milestone
- Ensuring that the plant is commissioned in accordance with the EPC contract



Due Diligence

- Review all of your project documentation's technical details
- Assess the compliance and potential risks against the project specifications and the latest industry standards
- Identified risks are classified in accordance to their potential impact on project revenue, cost, ...



End-of lifetime analysis

- Perform an analytical assessment of the different components
- Create a risk-informed inspection plan
- Make a sound decision about the future of your assets

DEVELOP

BUILD

OPERATE

TRANSACT

END-OF-LIFE

- Site Measurement Analysis
- Lidar Rental
- Yield Analysis
- Lenders Due Dilligence
- Investors Due Diligence
- Site Suitability Assessment
- Product Technical Assessment
- Design Review
- Regulatory Review
- Feasibility Study
- Grid Impact Study
- Conceptual Design & Optimisation
- Permitting
- Strategy Guidance
- Policy Guidance
- Market review
- Tendering & Contracting
- Detailed Engineering
- Capacity Building
- Decarbonisation
- Scenario

- Lenders Due Diligence
- Investors Due Diligence
- Product Technical Assessment
- Design Review
- Construction Management & Monitoring
- Plant Inspection
- Acceptance Assistance
- Detailed Engineering
- Capacity Building
- ...

- Lenders Due Diligence
- Investors Due Diligence
- Technical Asset Management
- Asset Management Assistance
- Plant Inspection
- Acceptance Assistance
- Capacity Building
- Decarbonisation
- ...

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- Policy Guidance
- Strategy Guidance
- Capacity Building



## SOLAR PV SELECTION OF REFERENCES

### OWNER'S ENGINEERING – SOLAR ROOFTOPS

#### 7.5 MW solar PV rooftop projects for a big retailer in Belgium (2020-2022)

Owner's engineering services for the development of rooftop solar PV on 20 shops. Services included feasibility study and preliminary design; assistance during the tendering process and contract negotiations; permitting; grid connection and commissioning.



#### 3×1 MWp PV rooftops project for Ikea in Asia (2018-2020)

Owner's engineering services for rooftop PV installations on commercial stores of Ikea in Hyderabad, Mumbai and Bangalore: conceptual design review; technical assistance during tendering, EPC contract review; construction monitoring.



#### 1 MW Building Integrated Photovoltaic (BIPV) project for Sterling Bank PLC in Nigeria (2020)

Technical advisory on the solarization project at the Head Office in Lagos, Nigeria. 3E reviewed the proposed designs, key technical and financial risks of the 1 MW BIPV system and a 2.0 MWh energy storage system to be installed on the existing Sterling Towers.



#### 800 KWp PV rooftop on warehouses in The Netherlands (2017-2020)

Owner's engineering services for rooftop PV installation on logistic warehouses for Goodman: conceptual design, EPC tender specification and proposal evaluation; design verifications, provisional and final acceptance review including site visits and performance reviews.



#### Detailed engineering for 3MW PV rooftop for Navitas projects in Spain (2019)

Detailed design and permitting technical assistance for a 3 MW solar PV rooftop in Spain including implementation plan, SLDs, other electrical drawings, grid access request and project note submission.



# OWNER'S ENGINEERING – GROUND-MOUNTED SOLAR PV

## 100 MW solar PV KRISTALPARK – The biggest PV industrial development in Benelux (2017-2022)

Owner's engineering services during all phases of the project: permitting, design, tendering, contracting and supervision; construction monitoring including a resident engineer. 3E continues to be actively involved in the project during the operational stage by providing daily monitoring, forecast of the production and supervising the operational status and performance of the PV plant.

## 25 MW solar PV + connection lines – Owner's engineering for Benin's first utility-scale solar power plant – DEFISSOL

Owner's engineering services during all the phases of the project: from the review of EPC specifications, plant design, grid code compliance to the construction monitoring and operational phases.



## 20 MWp solar PV plant owner's engineering services in Castellón, Spain (2021)

Owner's engineering services during the construction phase of a PV project (single-axis trackers, fix tilt structure, string invertors): review of EPC specifications, plant design, grid code compliance, energy yield assessment and construction monitoring.

## 6×50 MW Bifacial PV owner's engineering services in Egypt (2017-2021)

Owner's engineering services on the pre-construction, construction and operational phases: review of technical project documentation, contracts and conceptual and execution designs; construction monitoring and commissioning.

## 2×40 MW PV owner's engineering services in Kenya (2016)

Owner's engineering services in the feasibility phase for two 40 MW PV projects, including project management, ESIA, geotechnical analysis, long-term yield assessment, terms of reference definition and EPC tendering, financial model review, PV measurements, and PPA review.



## 50 MW West Lunga PV project for Neoen in Zambia (2016-2018)

Owner's engineering services on a 50 MW PV park constructed within the Scaling Solar program, first PV project commissioned in Zambia. 3E's role consisted of PV design reviews, assistance to contract reviews and negotiation; construction management including one resident engineer on site throughout the complete construction and commissioning phase.

DETAILED ENGINEERING

Client	Location	Size (MW)	Scope	Year
Risen	Spain	80	Detailed Engineering; Feasibility Study; Owner's Engineering	2022-2022
Enerpetrol	Ecuador	14	Detailed Engineering; Owner's Engineering	2022-ongoing
Solariq	Chile	15	Detailed Engineering	2021-ongoing
Encontrol	Guatemala	6	Detailed Engineering	2021-ongoing
Arram	Spain	695	Detailed Engineering	2022-ongoing
Solariq	Chile	12	Paquen - Detailed Engineering; Detail civil engineering; Load Flow Study & Power factor; Harmonic Study;	2021-2021
Solariq	Chile	10	Powertis TDD set 4 projects - Detailed Engineering	2021-2021
Sisener	Spain	1500	Detailed Engineering	2020-2020
Greencells	Spain	400	Design Review; Detailed Engineering; Permitting	2019-2020
Dominion Group	Dominican Republic	60	Mata de Palma - Detailed Engineering	2019-2019
Gransolar SA (Ecuador)	Ecuador	15	Microgrid Ecuador - Detailed Engineering; Energy Yield Assessment	2019-2019
GES	Iran	9	Asleh Iran - Detailed Engineering; Energy Yield Assessment	2018-2018
Kirchoff Energy	Mexico	242	Ciudad Juárez - Detailed Engineering; Energy Yield Assessment	2018-2018
Kirchoff Energy	Mexico	121	El Panal 121- Detailed Engineering; Energy Yield Assessment	2018-2018
Asunim	Turkey	12	MT Dogal - Detailed Engineering; Construction Supervision	2018-2018
Especa	Syria	12	Der Atiah - Detailed Engineering; Energy Yield Assessment	2017-2017
Asunim	Turkey	20	Kula - Detailed Engineering; Construction Supervision	2017-2017
Intro Group	Egypt	5	Sharm-el-Sheikh - Detailed Engineering	2016-2016
Asiacrest Marketing Corporation	Philippines	60	Subic - Detailed Engineering	2016-2015
Asunim	Turkey	20	Akishar - Detailed Engineering; Construction Supervision	2016-2017
Renesola	United Kingdom	5	Henley - Detailed Engineering	2016-2016
Renesola	United Kingdom	5	Ainderby Detailed Engineering	2016-2016
Renesola	United Kingdom	5	Houndbeare - Detailed Engineering	2016-2016
Renesola	United Kingdom	5	Michaelstone - Detailed Engineering	2016-2016

SOLAR RESOURCE ASSESSMENT

Client	Location	Scope	Year
AMEA	South Africa	Resource Assessment	2022
Green Giraffe NL	Netherlands	Solar - Energy Yield Assessment	2022
Total Solar	Saudi Arabia	Solar - Energy Yield Assessment	2022
First Solar	France	Solar - Energy Yield Assessment	2022
ABO Wind Solar	Spain	Solar - Energy Yield Assessment	2022
Glennmont partners	Portugal	Solar - Energy Yield Assessment	2022
Red Rocket South Africa (Pty) Ltd	South Africa	Solar - Energy Yield Assessment	2022
Glennmont partners	Italy	Resource Assessment	2022
Deplasse	Belgium	Solar - Energy Yield Assessment	2022
Sunvest	Netherlands	Solar - Energy Yield Assessment	2022
Green Yellow	Benin	Solar - Energy Yield Assessment	2022
Obton	France	Solar - Energy Yield Assessment	2022
Chariot Tansitional Power	Mauritania	Feasibility Study; Energy Yield Assessment; Site Suitability Assessment; Strategy Guidance	2021
Africa Ren	Senegal	Solar - Energy Yield Assessment; Resource Assessment	2021
Deplasse	Belgium	Policy Guidance; Resource Assessment	2021
Langa International	Cape Verde	Solar - Energy Yield Assessment	2021
Urbasolar	France	Solar - Energy Yield Assessment	2021
Innosun	Zambia	Solar - Energy Yield Assessment	2020
European Energy	Denmark	Solar - Energy Yield Assessment for bifacial project	2020
Ecodelta	Côte d'Ivoire	Resource Assessment	2020
Engie	France	Solar - Energy Yield Assessment	2020
Total	Qatar	Solar - Energy Yield Assessment	2019
ALNowais	Ethiopia	Solar - Energy Yield Assessment	2019
Mulilo	Malawi	Solar - Energy Yield Assessment	2019
Atlantic Energy Partners	Pakistan	Solar - Energy Yield Assessment	2018
EDF	Oman	Solar - Energy Yield Assessment & MCP	2018
Scatec	Egypt	Solar - Energy Yield Assessment	2018
Frontier	Kenya	Solar - Energy Yield Assessment	2018
Enervest	Netherlands	Solar - Energy Yield Assessment	2017
Ralos	Honduras	Solar - Energy Yield Assessment	2017
EDF Energies Nouvelles	United Arab Emirates	Solar - Energy Yield Assessment	2016
EOS Holding SA; KMPG UK	Faroe Islands	Technical Due Diligence; Solar - Energy Yield Assessment; Construction Monitoring; Contract Negotiation & Review	2015



TECHNICAL ADVISORY – HYBRIDS | BESS

Technical due diligence of SAS DIVD Marie-Galante VPP (PV+storage) for Clean Energy for EU Islands Secretariat – European Commission (2019-2020)

Review of Energy Storage System (ESS) design and configuration and its corresponding Energy Management System (EMS) for SAS Marie-Galante ENR to develop a PV storage solution called DIVD Marie-Galante with a capacity of approximately 24 MWac PV production and 17.5 MW, 35 MWh battery storage of Tesla’s Megapack for grid’s secure operation.

Lender technical advisory for 1 solar energy facility + battery storage in Botswana (2022)

Lender technical advisory for the portfolio of hybrid, decentralized solar PV project serving on-grid sites (grid power + batteries), off-grid sites, hybrid (solar + battery + genset + batteries) and carried out the technical due diligence for its financing in Botswana.

Technical due diligence battery storage project in France (2019)

Technical due diligence for battery storage power plants in France: review of the technical design, contractual elements, and business plan with focus on technical and commercial aspect on a deal with primary reserve as part of a multi-year contract with an aggregator, grid services under a bilateral contract with the grid operator, and charging stations for electric vehicles.



TECHNICAL DUE DILIGENCE

Lender technical advisory for the Bid Window 5 with 6 solar energy facilities for Mainstream Renewable Power in South Africa (2022)

Lender’s technical advisory for the 6 solar energy facilities in a single cluster including pre-construction and construction monitoring as well as the grid connection and commissioning.



Lender technical advisory for 4 solar energy facilities of 75 MW in South Africa (2022)

Lender’s Technical Advisory: review of the technical aspects of the project documents and construction monitoring for a portfolio of 75 MW ground mounted Solar PV in South Africa.

Technical due diligence for Urbasolar’s portfolio of 40 PV plants (2021)

Technical due diligence within the framework of the Urbasolar Atlas portfolio project finance consisting of 40 ready-to-build PV plants producing up to 310 GWh of green energy of ground-mounted, floating, carports and rooftop plants with standard and bifacial modules.

Technical due diligence for a 1.9 MWp PV rooftops portfolio for LER Developpement in France (2020)

Technical due diligence for project finance of 1.9MWp of Solar PV rooftop systems in France: review of the electrical design, contracts (O&M) and financial model.



# FLOATING PV & AGRI-PV

## Technical advisory for an innovative floating PV system in Port of Antwerp, Belgium (2019-2020)

Technical advisory services and guidance during the tendering process for the installation of a floating PV system at the Science Park University of Antwerp in Niel, Belgium.



## Energy yield assessment of 2 floating PV plants for Urbasolar in France

Independent technical advisory to perform a solar resource assessment and evaluation of the Long-Term Energy Yield of a floating PV plant with an installed capacity of 6.5 MWp and 1.6 MWp in France.



## Prefeasibility study of 2 floating PV plants for Enelec in Madagascar (2022)

Prefeasibility study for 2 floating PV plants with an installed capacity of 6 MWp each. Tasks performed: site suitability, connection to the grid, preliminary layout, yield calculation, construction cost assessment.



## Strategic advisory for agri-PV development in Belgium (2020)

Strategic advisory on the legal framework and market opportunities for the development of agri-PV in Wallonia. Part of the study focussed on the legal framework to market the produced energy via a CPPA combined with a consultation of possible interested stakeholders.



## Owner's engineering for agri-PV development in Belgium (2021)

Owner's engineering services to support the client during the design, procurement, construction and commissioning phases of the project.



## Preliminary design and first yield estimation for agri-PV project in Belgium (2022-ongoing)

3E has advised EnergetiQ regarding their agri-PV project in Affligem. 3E has created a preliminary design for different scenario's in terms of terrain use. The design was created for different structures accounting for the different terrain use (grazing sheep vs berry crops). Additionally for each terrain use, designs with different orientations were created. The yield was calculated for each of the scenario's in order to compare the economic feasibility of the different scenarios.



# WIND SELECTION OF REFERENCES

## OWNER'S ENGINEERING – WIND

**51,20 MW wind energy project Minas De Huascachaca – Technical assistance during the assembly, start-up and acceptance phase of the Minas de Huascachaca project for UCuenca EP in Ecuador (2022-ongoing)**

Owner's engineering services: performance evaluation based on SCADA data; wind turbine assembly; wind turbine inspections.



**10 MW Umnugovi and 5 MW Telmen wind projects – Owner's engineering for Asian Development Bank in Mongolia (2022-2023)**

Owner's engineering services: site identification based on satellite data; feasibility study; new measurements with SODAR and long-term correlation; grid connection solutions; cost estimation of the project; preparation of tender documents (Telmen site) for the bidders; evaluation and assistance during the bidding process; capacity building.

**1,000 MW wind farm for Kenya Electricity Generating company PLC financed by Agence Française de Développement (2020-ongoing)**

Owner's engineering services during two phases: Phase I: grid stability study and generation and demand balancing forecasts; data collection, modelling of the power system, calculation and simulation (load flow analysis, short-circuit; recommendation on the optimal capacity and dynamic performance requirements for wind development, including the investment plan, as well as the road map for the subsequent phases and phase II: Investigation and assessment of potential wind power resources, concept design, cost estimation, financial and economic analysis.





**TECHNICAL ADVISORY –  
HYBRIDS | BATTERIE STORAGE SOLUTIONS**

**Technical due diligence for a portfolio of 100 battery storage units, 100×1 MWh, 1.25 MW in France (2021)**  
Technical due diligence with duty of care towards CIC, Unifergie and Arkea for the financing of a portfolio of 100 battery storage units spread across France to be connected to the MV grid.



**Technical due diligence for wind, solar and storage (BSS), RES portfolio acquisition for Enel in France (2021)**  
Technical Due Diligence for the acquisition of 200 MW portfolio of Solar PV, Wind and storage assets located in France: design and contract review, compliance with the project specifications, industry standards and best market practices in order to assess the potential risks from a buyer perspective.

**Technical due diligence for 14 MW and 5.55 MWh storage system in Martinique (2016-2019)**  
Technical due diligence during the pre-closing and post-closing phases of a hybrid project composed of 7 wind turbines and a storage system.

**TECHNICAL DUE DILIGENCE – WIND**

**Technical due diligence for solar PV and wind farm projects in Jordan (2021)**  
Technical due diligence for one solar PV project of 247,6 MWp and one Wind Farm of 116,9 MW under operation in Jordan.

**Technical due diligence for 30.8 MW Peleia 1-2-4 wind farms for JPEE in France (2021)**  
Technical due diligence for the financing of the Peleia 1-2-4 wind farms repowering operation including the decommissioning of the 3 existing wind farms, located in the Loir et Cher department in France.

**Technical due diligence for 10 MW Racine wind project for Ecodelta in Switzerland (2021)**  
Technical due diligence for a 10 MW wind project Racine located in Switzerland to support on the acquisition process: energy yield report review; review of approvals and permits; TSA contract review; geotechnical survey review; O&M contract review; review of grid connection agreement; PPA review and general assistance and during stakeholder meeting.

**Technical due diligence for Grassridge, Chaba Waainek and Wesley wind projects (105 MW) in South Africa (2013-2020)**  
Lender technical advisory for four wind farm projects developed by Innowind namely Chaba, Grassridge I, Waainek, and Wesley wind farms for a total of 138MW: independent energy yield assessment, EPC and O&M contract review and negotiation; design review followed by construction monitoring, quality audit after financial close and assistance before takeover.





WIND MEASUREMENTS CAMPAIGNS

One of 3E's core services is provided in numerous wind projects worldwide, encompassing wind measurement campaign strategy development, installation and commissioning of met masts or Lidars, carrying out campaign follow-up and monitoring data.

Client	Location	Details	Year
Aedes Energies	France	Measurement campaign	2023
Storm	Belgium	Measurement campaign	2013-2023
RP Global	Spain	Lidar measurement campaign	2023
Gaïa Energy	France	Measurement campaign	2023
Agence Française de Développement	Indonesia	Measurement campaign	2022
Alterric	France	Lidar measurement campaign	2022
Luminus	Belgium	Measurement campaign	2022
Amea Power	Ethiopia	Measurement campaign	2022
Worldbank	Ethiopia, Pakistan, Papua New Guinea	Measurement campaign	2015-2022
Stantec	Côte d'Ivoire	Measurement campaign	2021
Intervent	France	Measurement campaign	2020
Imres	Bosnia and Herzegovina	Lidar measurement campaign	2020
EnergieTeam	France	Measurement campaign	2020
RPC	Luxembourg	Measurement campaign	2020
SUVORIVSKA WPS	Ukraine	Lidar measurement campaign	2019
GE	France	Lidar measurement campaign	2019
Energreen	France	Measurement campaign	2019
SEO	Luxembourg	Measurement campaign	2013-2019
PPA	Pacific Islands	Lidar measurement campaign	2019-ongoing
Rent-A-Port	Vietnam	Measurement campaign	2017-2018
DANIDA	Ethopia	Measurement campaign	2015-2019

BANKABLE ENERGY YIELD ANALYSIS

Range of activities:

- Wind/SCADA data analysis
- Long-term extrapolation
- Terrain and wind flow modelling
- Energy production calculation
- Uncertainty & probabilities of exceedance
- Micrositing
- Estimation of losses (wake losses, unavailability losses (maintenance and technical incidents on the WTG and the balance of plant, grid unavailability), performance losses, electrical losses, environmental losses (blade degradation, weather conditions), curtailment losses (sector management, noise, shadow flicker, bird, bat).

OFFSHORE WIND

Energy yield assessment for the Hollandse Kust Zuid Offshore wind farm (2020)

Energy yield assessment for the Hollandse Kust Zuid Offshore wind farm of Vattenfall Vindkraft AB (Netherlands), comprising 140 wind turbines for a total rated power of 1,617 MW.

Global offshore wind energy market and technology study (2018)

A confidential client active in the oil & gas construction industry based the Middle East commissioned 3E to explore the wind offshore market potential in selected countries. They envisioned a geographical scope on Europe, the Middle East and Northern Africa, India and South-East Asia.



Technical due diligence and market analysis for a 600 MW portfolio for Colam Invest in 10 countries (2017)

3E was contracted by Colam Invest to perform a technical due diligence for a 600 MW portfolio in Europe as well to evaluate the market conditions and technology evaluation in 10 countries.



### Long-term energy production assessment for Nobelwind Offshore Wind Park for Parkwind in Belgium (2022)

3E performed wind resources and energy production assessment of the offshore Nobelwind wind farm project. Tasks included: wind data analysis, SCADA data analysis, long term extrapolation, terrain and wind flow modelling.



### Energy yield assessment for the Hollandse Kust Zuid Offshore Wind Farm for Vattenfall in Netherlands (2020)

3E performed energy yield assessment for the Hollandse Kust Zuid Offshore Wind Farm of Vattenfall Vindkraft AB comprising 140 wind turbines for a total rated power of 1617 MW.



### Technical due diligence and market analysis for a 600 MW portfolio for Colam Invest in Europe (2017)

3E performed a technical due diligence for a 600 MW portfolio in Europe as well as an evaluation of the market conditions and technology in 10 countries.

## TECHNICAL INSPECTIONS - WIND

Date	Client	Service	Type of inspection	Project	Wind turbine type	Capacity	Location
2022	Total Energies	Visual inspection	Commissioning inspection	Yaté	Gamesa G58 850kW	20.4	Nouvelle Calédonie
2022	Storm	Visual inspection	Commissioning inspection	AMG 3	Vestas V150 4.2MW	33.6	Belgium
2022-2021	Elicio	Assistance to the client's project manager	Construction follow up	Bassenge	Siemens Gamesa SG 2.6MW	23.6	Belgium
2021	Storm	Visual inspection	End of warranty	Melsele	Senvion MM100	6	Belgium
2020	Storm	Visual inspection Blade inspection	End of warranty (2 years)	Lokeren	Enecon E82 E2 2.35MW	9.4	Belgium
2015	Innovent	Visual inspection Gearbox inspection	Periodic inspection (4 years)	Fiefs	WinWind D3 - 3.0MW	18	France
2015	Storm	Visual inspection	Failure root cause analysis	Wachtebeke	GE 2.5XL - 2.5MW	5	Belgium
2015	Wind aan de Stroom	Visual inspection	Commissioning inspection	Antwerpen	Siemens SWT-3.0 - 3.0MW	45	Belgium
2014	Integration	Visual inspection	Periodic inspection (3 years)	El Tropezón	MADE AE59 - 800kW	2.4	Ecuador
2014	Volitalia	Visual inspection	Periodic inspection (3 years)	La Lande	Ecotècna ECO80 - 1670kW	8.35	France
2012	RPC	Visual inspection	Commissioning inspection	Saint-Ode	DeWind D6 - 1.25MW	7.5	Belgium
2012	OMC	Visual inspection	Commissioning inspection	Mesnil Saint Blaise	Enercon E82 - 2.0MW	2.3	Belgium



## GRID INTEGRATION SELECTION OF REFERENCES

### **Owner's engineering for the construction, development and maintenance of a solar PV plant in Illouloufin, Benin (2020)**

Owner's engineering services for Benin's first utility-scale solar power plant Illouloufin, with a capacity of 26 MWp and a planned capacity of 50 MWp and connection lines (20 kV) and 20 kV / 161 KV (50 MVA) substations. Project includes the monitoring the implementation of the HV works, including the power station's internal HV network, the delivery station, the evacuation line and the the Illouloufin source station.



### **Due diligence analysis for deploying a pilot project in the smart grid migration of DPDC distribution network of Dhaka in Bangladesh (2019)**

Technical review of the existing DPDC distribution grid with a dedicated focus on the smart grid investments and technology already used: analysis of the state of the existing DPDC grid, its performance and the quality of service proposed including losses, SAIDI, SAIFI, energy not distributed.

### **Grid study for a 75 MW PV plant in Mali (2019)**

Modelling and evaluation of the integration of a 75 MW photovoltaic power plant into the local grid: static and dynamic studies; maximum allowable penetration; reactive power compensation requirements.

### **Development of Green Mini-Grid (GMG) enabling framework in Gambia (2018-2020)**

Technical regulatory framework for renewable energy connections to the Mozambican national grid for the connection and operation of PV plants up to 10 MW at voltage level up to 33 kV: modelling of the national transmission and distribution grid using DIgSILENT PowerFactory to show the impact of the penetration rate of renewable sources on the stability of the grid.

### **Technical due diligence for several GCC studies in Spain and LATAM (2019-2020)**

Grid code compliance simulation and analyses in Campos del Río, Torres Cotillas, Trina, Guzman, Alcaceres, Toledo, Pequen for Foresight, Grupo Dragon: DIgSILENT modelling; grid code assessment; compliance check; reactive compensation requirements; recommendations.



## HYDROGEN INTEGRATION SELECTION OF REFERENCES

### **PROJECT NOUR, 10 GW – Renewable hydrogen, local content strategy support for RES for Chariot Transitional Power in Mauritania (2022)**

3E is providing detailed staffing estimates for wind, solar power generation and transfer assets. 3E has performed an update on the pre-feasibility through benchmarking with projects (PROJECT NOUR, 10 GW) in the region. 3E is also performing supply chain mapping for wind and solar generation and transfer assets, as well as the identification of local suppliers.

### **Resource assessment and preliminary macroeconomic impact study for Chariot Transitional Power in Mauritania (2021-2022)**

3E acted as technical advisor to assess the long-term onshore and offshore wind and solar resources in a designated area of Mauritania with the aim to find the best mix and capacity factor to produce green hydrogen, taking into account all environmental constraints. The study included a preliminary overview of the CAPEX, OPEX and LCOE in order to compare technical suitability to cost as well as a preliminary study of macroeconomic impact and capacity building. Results of the study were aimed to help determining the final design and layout of the various project sites (PROJECT NOUR, 10 GW).

### **Innovation funding for the Hyport Oostende renewable hydrogen plant for DEME in Belgium (2020-2022)**

3E provided strategic guidance and technical support for the application dossier for innovation and state aid funding for Hyport Oostende, a 30 MW renewable hydrogen plant with 70 MW of solar and wind energy. 3E verified the project's technical features against the rules under the Innovation Fund, the IPCEI Hydrogen initiative and the CEAC state aid guidelines and assessed the climate, energy and socio-economic impact of the project.

### **Framework agreement for renewable hydrogen energy project in Morocco (2022)**

3E was contracted for the development of a large-scale renewable hydrogen in Morocco. 3E is acting as the main technical renewable energy advisor during the feasibility and development phases with regards to the renewable energy part of the project. Tasks include: wind resource assessment and solar resource assessment.







## ESMAP – Renewable energy wind mapping for World Bank in Ethiopia, Pakistan, Papua New Guinea, Nepal (2014-2022)

The World Bank has trusted 3E for the calculation of high quality and validated wind resource maps for different countries using mesoscale modelling and an extensive ground based measurement. The first phase of the projects consisted on a preliminary wind energy data map with limited validation, based on existing wind measurements. Second phase was the implementation of a measurement program on

several sites for a duration of 2 years with monitoring and wind reporting. Third phase consisted on further modelling and comprehensive validation using latest wind energy measurement data. The projects included high degree of capacity building for key stakeholders including policymakers, delivery agencies dealing with electrification and meteorology; regulatory agencies and utility companies, and involved high collaboration, transparency of methodology and open and accessible results.



## Promotion of renewable energy, including Feed in Tariffs and Mini Grid Framework for Ministry of Mineral Resources and Energy of Mozambique funded by AfDB in Mozambique (2017-2018)

3E together with Economic Consulting Associates supported the enabling environment for private sector participation in developing renewable energy in Mozambique. Tasks included the implementation of the country's first Feed in Tariff regime for small/medium RE projects through standardised PPAs, grid connection guidelines, and investor guidelines; the pre-

paration of a mini-grid regulatory framework, tariff structure, technical regulations, and environmental regulations; and capacity building and awareness activities. 3E modelled the national transmission and distribution grid using DlgSILENT PowerFactory. The simulations show the impact of the penetration rate of renewable sources on the stability of the grid. The observed limits are used to define the capacity levels of renewable energies allowed in the different segments of the national grid.



## Lender's technical advisory for a 36MW wind farm for EBRD in Morocco (2017-2019)

3E acted as lender's technical engineer for the 36 MW wind farm, equipped with second-hand wind turbines, including site visit, design and planning review of the wind farm, review of wind conditions,

technical evaluation, scada analysis, technical review of grid connection, project documentation and contractual provisions, O&M programme and O&M contract, procurement review and financial model review.



## Clean Energy in EU Islands Secretariat for European Commission (2021-2023)

The objective of the Clean Energy for EU Islands Secretariat (phase I) was to facilitate the clean energy transition on EU islands from the bottom up. 3E is engaging in the following roles:

- To provide technical assistance to island communities in order for them to continue advancing in their clean energy transition.
- To provide dedicated capacity building to local leaders through workshops and webinars in order to empower islands to make informed decisions about their energy future.

- To act as a platform of exchange of best practices for islands' stakeholders.
- To support the European Commission and member states to identify and overcome legal and regulatory barriers to energy transition on the islands.
- To contribute to a long-term framework that ensures support to islands communities working on clean energy transition.
- To reach over half of the EU's islands communities with the dissemination and showcasing of island decarbonisation plans and actions focusing on replicable and scalable projects.



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