Power Systems Analysis

ITPEnergised is an international consultancy with expertise in undertaking power systems modelling and analysis of renewable projects and the wider electrical systems into which they are integrated.

The power systems team can support all phases of a project from feasibility to as built compliance, ongoing compliance and support of assets. The team has substantial depth of knowledge of power systems design and grid code compliance requirements supported by capability with major power systems analysis tools including: DigSilent PowerFactory, PSS/E, PSCAD, MATLAB, Python.

The team use power systems models to develop high level project design concepts, undertake detailed project design, define equipment specifications and demonstrate grid code compliance.

The team can advise regarding electrical system design considering, harmonics, losses, availability, redundancy and operational considerations.

The team has substantial experience implementing dynamic and EMT models including building models from scratch as well as working with OEM turbine and equipment models.

Our services include:

Renewable generation grid connection services for onshore, offshore and hybrid renewables

- Load flow studies
- Reactive power capability, compensation equipment specification and optimization
- Short circuit (fault level), equipment rating
- Network strength requirements (weak grid and SCR assessments)
- Electrical losses (and design optimization of electrical losses)
- Transformer specification
- Harmonics including filter specification
- Resonance including sub synchronous control interaction (SSCI)
- Transient (EMT)/ dynamic analysis (fault ride through, inrush, voltage control, frequency response)
- Design reliability
- Grid code compliance tests, studies and model validation
- Cable rating, including offshore dynamic cable rating

Grid network and renewable integration

- Contingency analysisand identification of reinforcements requirements and constraints
- Generator and network dynamic stability

info@itpenergised.com +44 131 557 8325 www.itpenergised.com

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Select references:

- 2020-21, carried out conceptional design and evaluation for the integration of offshore wind power and OTEC devices into the Barbados island grid for the Barbados government.
- 2020-21, finalization of final compliance test and model validation for multiple onshore wind farms equipped with Senvion Wind Turbines (now SGRE)
- 2019-20, Phu Cuong Nearshore Wind Farm (VN, 400MW), Mainstream Renewable Power. Electrical design and optimization of the array cable system including simulation of electrical losses and reactive power compliance with the grid code.
- 2019-20, Cleve Hill Solar Park (UK, 300MW), Wirsol Energy and Hive Energy. FEED studies including load flow, reactive power and voltage control, short circuit , and harmonics
- 2018-20, Formosa 2 Offshore Wind Farm (TW, 376MW), Macquarie Capital. Electrical design studies for FEED and validation of contractor studies including load flow, reactive power capability, short circuit , short circuit ratio, harmonics , and electrical losses.
- 2018-19, Seagreen Phase 1 Offshore Wind Farm (UK, 1075MW), Seagreen. Provision of FEED studies including load flow, short circuit, reactive power capability, harmonics and resonance. Assessment of different offshore transmission system designs and voltages. Managed subcontractor in production of electromagnetic transient studies.
- 2018-19, Baltic Eagle Offshore Wind Farm (DE, 476MW), Iberdrola. Preliminary engineering studies: load flow, losses, short circuit, harmonics, plus provision of SLDs and data sheets.
- 2014-15, Rumuruti Solar Power Station (KE, 40MW), Kenergy Renewables. Grid connection option assessment, voltage limits, voltage step change, voltage flicker, voltage on transformer energization, circuit thermal ratings, wider network contingency analysis, and short circuit.

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