



DNV KEMA Energy & Sustainability Electricity Transmission & Distribution (ETD)

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ETD's Services / Products

Global Areas	Strategy & Planning	Power Systems Planning	Design & Engineering	Asset Management & Inspections
Technical Consulting	<ul style="list-style-type: none"> ■ Due diligence ■ Market changes ■ Investment Decision ■ Market simulations ■ Regulatory and cost issues 	<ul style="list-style-type: none"> ■ Simulations studies ■ System planning ■ Reactive power studies ■ Protection studies 	<ul style="list-style-type: none"> ■ Feasibility studies, tech. comparison ■ Project planning & routing ■ Tender doc. & construction support ■ AC and DC substations, HVDC converter stations 	<ul style="list-style-type: none"> ■ Asset management process optimization ■ Condition & LOL assessment ■ Data modelling support ■ Evidence assessment ■ Mitigation plan development ■ Compliance program development ■ Power failure investigations
Smart Grid Offerings	<ul style="list-style-type: none"> ■ Roadmaps ■ Pilot projects ■ Scenarios regarding DG, ES, energy efficiency 	<ul style="list-style-type: none"> ■ Analytical tools ■ Evaluate new technologies ■ DG & control ■ Dynamic protection 	<ul style="list-style-type: none"> ■ var compensation ■ Dynamic line rating ■ Smart cable guard ■ HVDC converter stations 	<ul style="list-style-type: none"> ■ Compliance with standards ■ New maintenance strategies ■ Black start procedures ■ Testing in labs

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PV Grid Integration Challenges

- Model Interaction
 - PV & ES
 - PV & EV
 - High Penetration
- Control Schemes
 - Variability
- Simulation Time Period
 - Years
 - Sub-Second

PV Grid Integration Challenges

- “Dynamic” Voltage Control
 - Outage Condition
 - Cloud Cover Mitigation
 - Short Term
 - Long Term
- Standards (IEEE 1547 & 519)
 - Islanding & Micro-Grids
 - Protection
- Economics