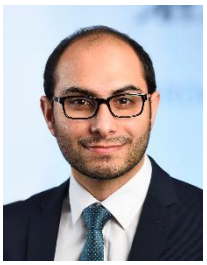
CURRICULUM VITAE - Sohail Khan



1. **Family name:** Khan
2. **First name:** Sohail
3. **Date of birth:** 24 February 1986, Pakistan
4. **Country and city of residence:** Madrid, Spain
5. **Nationality:** Pakistan
6. **Education:**

Name of Institution	Period of Attendance	Degree / Certificate acquired
Technical University of Vienna, Austria	2013 - 2016	PhD in Electrical Engineering, 2016 (PhD with Distinction, Scholarship)
National University of Sciences and Technology, Pakistan	2008 - 2010	MSc in Electrical Engineering, 2010 (Scholarship)
COMSATS University, Pakistan	2004 - 2008	BS in Electronics Engineering, (Scholarship - Chancellor Gold Medal)

7. Membership in Professional Associations and Publications:

- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- Senior Member, IEEE power and Energy Society
- Reviewer, Electric Power Systems Research, Elsevier

8. Publications:

- W. S. Khan, undefined. P. Palensky, "Stochastic Battery Model for Aggregation of Thermostatically Controlled Loads," in 2016 IEEE International Conference on Industrial Technology (ICIT), Taipei, Taiwan, 2016, pp. 570–575.
- Khan, S., et al. "On small signal frequency stability under virtual inertia and the role of PLLs," in Energies, vol. 11, no. 9, pp. 2372, 2018.
- Latif, A., et al, "Co-simulation based platform for thermostatically controlled loads as a frequency reserve," in 2016 Workshop on Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES), 2016, pp. 1–6.
- S. Khan, W. Gawlik, P. Palensky. "Reserve Capability Assessment Considering Correlated Uncertainty in Microgrid," in IEEE Transactions on Sustainable Energy, 2015.
- S. Khan, "Assessment and Allocation of Operational Flexibility in Power Systems with Distributed Resources," Ph.D. dissertation, Technische Universität Wien, 2016.
- Zhang, L., et al. "Distributed scheduling for multi-energy synergy system considering renewable energy generations and plug-in electric vehicles: A level-based coupled optimization method," in Energy and AI, vol. 16, pp. 100340, 2024.
- H. Khan, undefined. Sohail. "Transient Stability in Oscillating Multi-Machine Systems using Lyapunov Vectors," in IEEE Transactions on Power Systems, 2017.
- S. Khan, P. Zehetbauer, R. Schwalbe. "Evaluation of sensitivity based coordinated volt-var control and local reactive power for voltage regulation and power exchange across system boundaries in smart distribution networks," in Electric Power Systems Research, vol. 192, pp. 106975, 2021.

- Khan, S., et al, "Dynamics of wind-turbine driven Self-Excited Induction Generator with online parameter calculation," in IECON 2013-39th Annual Conference of the IEEE Industrial Electronics Society, 2013, pp. 5271–5275.
- S. Khan, A. Latif, "Python based scenario design and parallel simulation method for transient rotor angle stability assessment in PowerFactory," in 2019 IEEE Milan PowerTech, 2019, pp. 1–6.
- S. Khan, S. Henein, H. Brunner, "Optimal energy interruption planning and generation re-dispatch for improving reliability during contingencies," in 2020 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT), 2020, pp. 1–5.
- Zeb, M., et al. "Optimal placement of electric vehicle charging stations in the active distribution network," in IEEE Access, vol. 8, pp. 68124–68134, 2020.
- Khan, S., et al, "Calculation of reactive power requirement for voltage improvement at Mardan station," in 2022 7th Asia Conference on Power and Electrical Engineering (ACPEE), 2022, pp. 1861–1865.
- M. Ataollah Moghim Khavari, "Innovative grid operation planning tool for the system operators," 2018.
- S. Khan, "Lecture Notes on Grid Modeling of Renewable Energy," 2024.
- S. Khan, "Nonlinear Adaptive Flight Control System for Unmanned Aerial Vehicle: A Nonlinear Dynamic Inversion Based Approach," 2011.
- Khan, S., et al, "A replicator dynamics method for the unit commitment problem," in 2014 Workshop on Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES), 2014, pp. 1–4.
- P. Hadrien Bosetti. "Survey, Illustrations and Limits of Game Theory for Cyber-Physical Energy Systems," in at - Automatisierungstechnik, vol. 62, no. 5, pp. 375–384, 2014.
- Kotsis, G., et al, Database and Expert Systems Applications-DEXA 2021 Workshops: BIOKDD, IWCFS, MLKgraphs, AI-CARES, ProTime, AISys 2021, Virtual Event, September 27–30, 2021, Proceedings. Springer Nature, 2021.
- Zahra, S., et al. "Power transformer health index and life span assessment: A comprehensive review of conventional and machine learning based approaches," in Engineering Applications of Artificial Intelligence, vol. 139, pp. 109474, 2025.
- Ullah, K., et al. "Optimization-Based Comparative Study of Machine Learning Methods for the Prediction of Hydrogen Production From Biogas," in International Journal of Energy Research, vol. 2025, no. 1, pp. 8940534, 2025.
- T. Ahmed, S. Khan, K. Khan, "Handwritten Hindko Text Recognition Using Deep Neural Network," in 2024 International Conference on Frontiers of Information Technology (FIT), 2024, pp. 01–06.
- F. Muhammad Ahmad Khan, "Unveiling Brake Faults in Heavy Vehicles with Explainable AI," in Proceedings of Data Analytics and Management. ICDAM 2024, 2025, pp. pp–567.

9. Trainings Undertaken:

- SDDP based energy market design and simulation, utilizing OptGen for optimal dispatch of generation and performing medium to long term transmission expansion planning and least cost development strategies.

- Digitalization of Intelligent and Integrated Energy Systems, from TU Delft, edX
- NVIDIA Certificate of Competency: Fundamentals of Accelerated Data Science
- Professional (Multiple Trainings) of DIgSILENT PowerFactory,

10. Trainings Delivered:

- Workshop on Kenya Energy Market Overview as part of feasibility study for the 100 MWac 7 Forks solar PV extension project. It involved extensive coverage of the energy market model, regulatory dynamics, reserve analysis and role of PV and BESS of the proposed project in Kenya and in general in the market evaluation as per Least Cost Development Plan of Kenya.

- Workshop on Power System Losses Reduction Consultancy Training, World Bank, KPLC, Kenya, August 2025

- Workshop on Energy Data Analytics for Utility Operations, World Bank, KPLC, Kenya, August 2025

- Workshop on Cyber security, Kubernetes, Hypervisor for Enterprise Data, NADRA, Pakistan, December 2024

- Workshop on Advanced Power System Analysis, Sino-Pak Center for Artificial Intelligence, Pak-Austria Fachhochschule: Institute of Applied Sciences and Technology, Pakistan, 2023

- Workshop on Power System Operation and Control, Sino-Pak Center for Artificial Intelligence, Pak-Austria Fachhochschule: Institute of Applied Sciences and Technology, Pakistan, 2023

11. Countries of Work Experience: Austria, Cyprus, Turkey, Kenya, Italy, Germany, Czech Republic, Poland, Finland, Cyprus, Pakistan

12. Languages:

	Level of Proficiency (mother tongue, excellent, good, fair, poor)		
Language	Reading	Writing	Speaking
Urdu	Mother tongue		
English	Excellent	Excellent	Excellent
German	Good	Good	Good
Spanish	Good	Good	Good

13. Employment Record Relevant to the Assignment:

From: 01st November 2024
To: Present
Employer: MRC Consultants & Transaction Advisers, Seureca Veolia, Madrid, Spain
Position held: Senior Consultant Power System

- Leading power system studies using DIgSILENT PowerFactory, PSCAD, and PSS/E for World Bank-funded projects across Kenya, Tajikistan, Pakistan, Cyprus, and South America, conducting comprehensive feeder-level analysis, load flow studies, and network optimization
- Performing stochastic analysis and developing mitigation strategies including network reconfiguration, voltage regulation, Volt-VAR control, and infrastructure upgrades for distribution system loss reduction and renewable integration
- Delivering technical training workshops to utility engineers on PowerFactory modeling, loss analysis methodologies, and power system planning; preparing comprehensive technical reports for international funding agencies

From: September 2016
To: September 2020
Employer: Austrian Institute of Technology, GmbH, Vienna, Austria
Position held: Scientist

- Led EU Horizon 2020 projects (INTERPLAN, DeCAS, LEAFS, Erigeneia, BatterieStable) performing extensive PowerFactory-based distribution network analysis including hosting capacity studies, Volt-VAR control strategy development, and frequency/voltage stability assessment in low-inertia grids
- Developed Python automation scripts interfacing with PowerFactory API for large-scale scenario analysis; created network equivalents and synthetic profiles for testing control strategies with emphasis on scalability and replicability
- Collaborated with Austrian DSOs (Salzburg Netz, Netz Oberösterreich) ensuring grid code compliance and validation; published research in top-tier journals (IEEE Transactions on Power Systems, Electric Power Systems Research, Energies)

From: March 2013
To: August 2016
Employer: Austrian Institute of Technology, GmbH, Vienna, Austria
Position held: Researcher (PhD Candidate)

- Conducted research on operational flexibility assessment in power systems with distributed resources utilizing PowerFactory, MATLAB/Simulink, and Python for integrated network analysis and co-simulation studies
- Developed methodologies for reserve capability assessment, optimal power flow, and unit commitment under renewable generation uncertainty; analyzed impacts of distributed energy resources on distribution network operation and stability

- Completed PhD with Distinction from Technical University of Vienna (2016) with dissertation on "Assessment and Allocation of Operational Flexibility in Power Systems with Distributed Resources"

From: October 2020
To: November 2024
Employer: Pak-Austria Fachhochschule – Institute of Applied Sciences & Technology, Pakistan
Position held: Associate Professor and Director of Sino-Pak Center for Artificial Intelligence

- Directed research center with team of 30 professionals managing PKR 991 Million budget, coordinating international collaborations and securing significant funding for power systems and AI research projects
- Developed and delivered training programs on Advanced Power System Analysis featuring DIgSILENT PowerFactory modeling, stability assessment, and renewable energy integration; supervised PhD and MSc students on distribution network analysis and hosting capacity studies
- Managed procurement and upgrade of High-Performance Computing infrastructure supporting power system simulations; published 19 peer-reviewed journal papers demonstrating strong technical documentation capabilities

From: October 2010
To: February 2013
Employer: COMSATS University, Islamabad, Pakistan and HITEC Taxila, Pakistan
Position held: Lecturer
Taught undergraduate courses in Electric Machines, Power Systems, and Microprocessor Systems; developed course materials and laboratory exercises for power systems education

From: March 2008
To: August 2008
Employer: Nautica Group, Pakistan
Position held: Junior Engineer
Developed RFID-based security system within four-month intensive project demonstrating capability to deliver technical solutions under tight deadlines

SUMMARY OF TECHNICAL EXPERIENCE
Total Professional Experience: 17 years (2008 - Present)
Power Systems Specific Experience: 14 years (2010 - Present)
Industrial power systems: 8 years (AIT Scientist 2016-2020 + MRC Consultant 2024-Present)
Academic/research: 6 years (Lecturer 2010-2013 + PhD 2013-2016 + Director 2020-2024)

DIgSILENT PowerFactory Experience: 12 years (2013 - Present)
Intensive professional use for distribution system modeling, load flow analysis, stability studies, hosting capacity analysis, and network optimization
Distribution System Modeling: 12 years (2013 - Present)

Extensive modeling of LV, MV, HV networks across Austria, Kenya, Tajikistan, Cyprus, Turkey, and Pakistan
Stochastic Analysis & Hosting Capacity: 9 years (2015 - Present)
Developed and applied stochastic methods for uncertainty analysis; conducted hosting capacity studies determining DER integration limits
Training & Capacity Building: 12 years (2013 - Present)
Delivered professional training on PowerFactory to utility engineers; conducted World Bank project workshops in developing countries; supervised graduate students
Project Management & International Coordination: 8 years (2016 - Present)
Led multi-country EU projects; managed 30-person team with multi-million dollar budget; coordinated with World Bank, utilities, and international funding agencies

SOFTWARE PROFICIENCY:
DIgSILENT PowerFactory (12 years),
PSCAD (5 years),
PSS/E (2 years),
MATLAB/Simulink (14 years),
Python for power systems (10 years)

This experience profile demonstrates qualification for assignments requiring extensive expertise in distribution system modeling, DIgSILENT PowerFactory, stochastic hosting capacity analysis, and capacity building for utility organizations.

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Project: Kenya System Loss Reductions Study **Task 1: Distribution Network Modeling and Validation** - Develop and validate PowerFactory models - Integrate distributed generation - Model MV/LV networks **Task 2: Feeder-Level Analysis** - Conduct load flow analysis - Identify thermal constraints - Quantify technical losses **Task 3: Stochastic Analysis** - Perform scenario-based studies - Analyze uncertainty impacts **Task 4: Capacity Building & Training** - Deliver PowerFactory training - Transfer technical knowledge - Train utility engineers **Task 5: Reporting & Client Engagement** - Prepare technical reports - Present findings to clients - Coordinate with stakeholders	**Project: Kenya System Loss Reductions Study** **Year:** 2024-2025 **Location:** Kenya **Client:** Kenya Power and Lighting Company (KPLC), World Bank **Main project features:** Leading comprehensive study to reduce critical electricity distribution losses from 23% (3,069 GWh) to 18% by FY2028 through technical analysis, strategy development, and capacity building at KPLC. **Position held:** Lead Technical Expert - Power Systems **Distribution System Modeling & Validation:** • Developed and validated comprehensive DIgSILENT PowerFactory models for KPLC's distribution network) • Converted the Kenya Transmission System model from PSSE to DIgSILENT PowerFactory. • Analysed the losses in the transmission system and performed root analysis for the losses reduction • Studied 11kV,33kV and 66kV MV feeders with associated MV/LV transformers across multiple regions, ensuring accuracy of impedance data, transformer ratings and analyzing the losses contribution • Performing energy balance analysis at feeder level and developing strategies for utility in Kenya in developing a loss reduction plan considering the financial, technical and operational constraints. **Feeder-Level Technical Analysis:** • Performed detailed feeder-level load flow analysis to identify thermal overloading of conductors and transformers under various demand scenarios • Conducted voltage profile assessment across all feeders to determine voltage regulation issues and constraint points • Quantified technical losses at feeder level to pinpoint specific network segments contributing to overall system losses • Designed network reconfiguration strategies to balance feeder loading and reduce losses • Developed infrastructure upgrade recommendations including reconductoring and transformer replacement

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
	Training & Knowledge Transfer: • Delivered hands-on workshops (August 2025) to KPLC engineers on PowerFactory modeling techniques and loss analysis methodologies • Provided training on power system planning principles enabling KPLC staff to conduct independent analysis • Transferred technical knowledge through demonstration of PowerFactory features and best practices **Project Management & Reporting:** • Managed project timeline, coordinated with World Bank and KPLC stakeholders through regular virtual meetings • Prepared comprehensive technical reports with actionable recommendations for World Bank financing decisions • Presented findings to client teams and addressed technical queries from utility management
Project: Tajikistan Energy Loss Reduction Project **Task 1: Distribution System Analysis** - Assimilation of previous studies on losses analysis and consolidation of the ongoing and planned projects in STB - Regional analysis for identify the major contributors of the distribution system assets to the losses **Task 4: Stakeholder Coordination** - Engage with World Bank - Coordinate technical deliverables	**Project: Tajikistan Energy Loss Reduction Project** **Year:** 2023-2025 **Location:** Tajikistan **Client:** STB Tajikistan, World Bank **Main project features:** Leading Task 10 of four-year comprehensive loss reduction plan focusing on identification of overloaded MV/LV transformers and network optimization to reduce technical losses. **Position held:** Technical Lead - Distribution Network Analysis **Modeling:** • Performed detailed PowerFactory modeling of MV distribution networks capturing network topology, conductor types, and transformer specifications • Modelled LV distribution systems emanating from MV/LV substations to assess complete feeder characteristics

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
	Investment Planning & Reporting: • Prepared tender specifications with clear technical justification for recommended interventions Conducted return-on-investment analysis demonstrating economic benefits of proposed mitigation measures • Coordinated regularly with World Bank project management team on technical deliverables and milestone achievements through virtual presentations
Project: INTERPLAN - Integrated Operation Planning Tool **Task 1: Advanced PowerFactory Modeling** - Develop pan-European network equivalents - Create clustered models - Validate against system data **Task 2: Stability Assessment** - Frequency stability analysis - Voltage stability evaluation - Low-inertia grid studies **Task 3: Algorithm Development** - Interface algorithms with PowerFactory - Automate stability assessment - Implement stochastic methods	**Project: INTERPLAN - Integrated Operation Planning Tool** **Year:** 2017-2020 **Location:** Austria, Pan-European Network **Client/Consortium:** ENEA Italy (Coordinator), DERlab (Germany), University of Cyprus, Fraunhofer IEE (Germany), IEn (Poland) **Main project features:** EU H2020 project developing integrated operation planning tools for pan-European network to support low-carbon targets while maintaining grid security with focus on future low-inertia grids. **Position held:** Technical Expert - Stability Analysis (Work Packages 6 & 7) **Advanced PowerFactory Modeling:** • Developed PowerFactory models incorporating "clustered" equivalents of pan-European transmission and distribution networks representing system connectivity possibilities in real grids • Created reduced network models maintaining essential dynamic characteristics while enabling computational efficiency for large-scale studies • Validated model behavior against detailed system data and historical event recordings **Stochastic Assessment Methods:** • Implemented stochastic methods for assessing frequency and voltage stability under high renewable penetration scenarios with uncertain generation and demand • Designed algorithms interfacing with PowerFactory API for automated stability assessment across hundreds of operating conditions • Developed Python-based scenario generation tools creating probabilistic operating points for comprehensive stability studies

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
	Stability Analysis in Low-Inertia Grids: • Evaluated impact of inverter-based resources displacing synchronous generation on system frequency and voltage stability • analysed requirements for synthetic inertia and fast frequency response from battery storage and renewable resources • Developed mitigation strategies for maintaining grid stability with reduced system inertia **Multi-Tool Validation:** • Performed electromagnetic transient (EMT) simulations using PSCAD to validate PowerFactory RMS model behavior for fast phenomena • Published peer-reviewed research on small signal stability analysis methodologies under virtual inertia provision **International Project Coordination:** • Collaborated with consortium partners across six European countries coordinating technical work packages • Delivered regular presentations to project steering committee and European Commission reviewers • Contributed to project deliverables and technical reports meeting EU project standards
Project: DeCAS - Demonstration of Coordinated Ancillary Services **Task 1: Network Equivalent Development** - Prepare PowerFactory equivalents - Model LV, MV, HV networks - Ensure scalability & replicability **Task 2: Volt-VAR Control Analysis** - Implement control algorithms - Test coordination strategies - Evaluate voltage regulation **Task 3: Profile Development** - Create synthetic load profiles - Develop generation profiles	**Project: DeCAS - Demonstration of Coordinated Ancillary Services** **Year:** 2015-2019 **Location:** Austria **Client/Consortium:** Salzburg Netz GmbH (Austria), Siemens AG (Austria), TU Wien (Austria), RWTH Aachen (Germany), Hochschule Kempten (Germany), ABB (Finland) **Main project features:** Research and demonstration of coordinated Volt-VAR control strategies across LV, MV, and HV networks including demand response coordination and market integration. **Position held:** Researcher - Network Modeling and Volt-VAR Control Analysis

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Task 4: DSO Collaboration - Validate against measurements - Engage with utility partners - Align with operational practices	**Network Equivalent Preparation:** • Prepared detailed PowerFactory network equivalents representing Austrian DSO networks (Salzburg Netz, Netz Oberösterreich) spanning LV through HV voltage levels for testing Volt/VAR control strategies • Developed scalable modeling approach applicable to different network topologies enabling replicability of control strategies across utilities **Volt-VAR Control Strategy Implementation:** • Implemented and tested sensitivity-based coordinated Volt-VAR control algorithms within PowerFactory environment simulating inverter reactive power dispatch • Evaluated effectiveness of distributed Volt-VAR control from inverter-based resources for voltage regulation across system boundaries • Analyzed coordination between local voltage control and centralized optimization ensuring stable voltage profiles **Realistic Scenario Testing:** • Developed synthetic load profiles and renewable generation profiles based on real measurement data from Austrian DSOs to enable realistic scenario testing • Created time-series datasets capturing daily and seasonal variations in PV generation and consumer demand • Ensured scenarios represented typical operating conditions as well as extreme cases stressing voltage limits **Utility Collaboration & Validation:** • Collaborated closely with Austrian Distribution System Operators to validate PowerFactory simulation results against field measurements • Engaged with utility technical staff to ensure control strategies aligned with operational practices and grid code requirements • Incorporated utility feedback into modeling refinements improving practical applicability of findings **Research Dissemination:** • Published peer-reviewed research in Electric Power Systems Research on sensitivity-based coordinated Volt-VAR control and voltage regulation

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Project: LEAFS - LV Loads and Storage Integration **Task 1: Hosting Capacity Analysis** - Determine maximum DPV integration - Identify infrastructure constraints - Assess voltage rise issues **Task 2: Smart Grid Simulation** - Model demonstration sites - Simulate high PV penetration - Analyze distributed resources **Task 3: Energy Storage Control** - Design charging strategies - Reduce reverse power flow - Maximize renewable utilization **Task 4: Inverter Control Evaluation** - Assess Volt-VAR capabilities - Test voltage support functions - Develop grid code recommendations	**Project: LEAFS - LV Loads and Storage Integration** **Year:** 2015-2018 **Location:** Austria **Client/Consortium:** Fronius International GmbH, Siemens AG Österreich, Salzburg Netz GmbH, Netz Oberösterreich GmbH, MOOSMOAR Energies OG **Main project features:** Evaluation of energy storage systems and load flexibility impacts on power distribution grids with development of optimal control strategies for maximizing distribution infrastructure utilization. **Position held:** Scientist - Distribution System Analysis **Hosting Capacity Analysis:** • Conducted extensive PowerFactory-based hosting capacity analysis of four Austrian smart grid demonstration sites to determine maximum distributed PV that could be safely integrated before infrastructure upgrades required • Performed systematic feeder-level analysis identifying thermal constraints in conductors and transformers limiting additional DPV interconnection • Analysed voltage rise issues caused by reverse power flow from residential PV systems determining voltage limit violations under high solar generation scenarios • Quantified hosting capacity metrics providing distribution system operators with actionable limits for DER interconnection approvals **Distributed PV Integration Analysis:** • Simulated high distributed PV penetration scenarios across residential LV feeders • Evaluated impact of increasing DPV on network voltage profiles and power quality parameters • Assessed feeder loading patterns under various solar irradiance and demand conditions **Mitigation Measure Analysis:** • Designed energy storage control strategies to mitigate voltage rise by absorbing excess PV generation reducing reverse power infeed from customers

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
	• Evaluated Volt-VAR control capabilities of residential inverters for providing voltage regulation support • Analysed effectiveness of local reactive power control in managing voltage within acceptable limits • Maximized utilization of locally produced renewable energy through optimized storage dispatch **Quasi-Dynamic Simulation:** • Implemented quasi-dynamic PowerFactory simulations with time-series load and PV generation profiles capturing temporal behavior of distributed resources • Analysed dynamic interactions between energy storage control, PV generation, and network voltages over representative time periods **Grid Code Development:** • Developed recommendations for grid code provisions regarding inverter Volt-VAR capabilities and storage dispatch functions • Contributed technical insights to Austrian regulatory framework for distributed resource interconnection
Project: Erigeneia - Smart Energy Management Systems **Task 1: Energy Management Algorithm** - Develop Python optimization - Optimize battery-PV systems - Provide grid support services **Task 2: Distribution Network Analysis** - Analyze demonstration sites - Evaluate grid support capabilities - Validate through simulation **Task 3: Volt-VAR Optimization** - Implement reactive power control - Consider grid code requirements - Address DSO technical needs	**Project: Erigeneia - Smart Energy Management Systems** **Year:** 2018-2020 **Location:** Cyprus and Turkey **Client/Consortium:** University of Cyprus FOSS (Cyprus), Cybrotech Ltd (UK), Fronius International GmbH (Germany), ADM Elektrik Dagitim A.S (Turkey) **Main project features:** EU Horizon 2020 project developing local and central energy management systems combining photovoltaics with battery energy storage for high PV penetration support and grid services provision. **Position held:** Technical Expert - Energy Management System Development

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Task 4: Multi-Country Deployment - Deploy in Cyprus context - Deploy in Turkey context - Adapt to regional requirements	**Python-Based Algorithm Development:** • Developed Python-based energy management algorithms optimizing battery-PV system operation for maximizing local renewable utilization while providing distribution grid support services - Implemented optimization routines considering battery state-of-charge constraints, PV generation forecasts, and grid service requirements • Created modular, reusable code structure enabling adaptation to different utility contexts and grid configurations **Distribution Network Simulation:** • Performed PowerFactory distribution network analysis for Cyprus and Turkish demonstration sites modeling MV feeders and LV networks • Evaluated grid support capabilities including voltage regulation and peak shaving achievable through coordinated battery-PV dispatch • Validated energy management strategies through PowerFactory simulations under various grid operating conditions **Volt-VAR Control Implementation:** • Implemented Volt-VAR optimization functions in energy management system considering inverter reactive power capabilities • Ensured compliance with Cyprus and Turkish grid code requirements for distributed resource interconnection • Designed control algorithms addressing technical requirements from distribution system operators including voltage support and power factor management **Multi-Jurisdiction Experience:** • Successfully deployed energy management solutions in two different regulatory and technical contexts (Cyprus and Turkey) • Adapted system designs to regional grid code requirements and DSO operational practices • Demonstrated capability to work across diverse utility environments with varying technical standards

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Project: BatterieStable - Synthetic Inertia from Battery Storage Task **1: Frequency Stability Analysis** - Analyze synthetic inertia provision - Evaluate measurement delays - Assess PLL dynamics **Task 2: Small Signal Stability** - Perform PowerFactory studies - Evaluate frequency response - Test battery-based inertia **Task 3: EMT Validation** - Conduct PSCAD simulations - Validate RMS models - Analyze fast frequency events **Task 4: Inverter Control Optimization** - Develop control parameters - Optimize frequency support - Publish research findings	**Project: BatterieStable - Synthetic Inertia from Battery Storage** **Year:** 2016-2018 **Location:** Austria **Client:** Netz Niederösterreich GmbH (Distribution System Operator) **Main project features:** Investigation of battery storage systems providing synthetic inertia as ancillary service for grid stabilization in networks with high renewable energy penetration replacing conventional synchronous generation. **Position held:** Scientist - Frequency Stability Analysis **Inverter-Based Resource Analysis:** • **A**nalysed impact of large-scale inverter-based generation (battery storage, PV) displacing synchronous machines on grid frequency stability • Evaluated synthetic inertia provision from battery inverters as mitigation for reduced system inertia • Assessed fast frequency response capabilities of battery systems for frequency regulation **PowerFactory Stability Studies:** • Performed small signal stability analysis using PowerFactory to evaluate frequency response from battery-based synthetic inertia under various disturbance scenarios • Analysed interaction between frequency measurement systems, PLL dynamics, and virtual inertia control effectiveness **Grid Stability with High Renewables:** • Evaluated grid stability challenges arising from high proportion of renewable energy input displacing conventional generation • Developed recommendations for battery inverter control parameters optimizing frequency support effectiveness • Contributed to understanding of stability requirements for grids transitioning to renewable-dominant operation

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
Project: Seven Forks Solar Extension Project Feasibility Study (100 MW) – KenGen, Kenya **Key Responsibilities:** - Leading feasibility study for a 100 MW solar PV plant near the existing Seven Forks Solar Project - Managing stakeholder engagement with EPRA, KPLC, Ministry of Energy, and international financiers (AFD, KfW, AfDB, World Bank) - Coordinating a multidisciplinary team across key study tasks over an 8-month period - Preparing procurement documentation (PQ and bidding documents) for EPC contractor selection **Technical Contributions (BESS Focus):** - Evaluating BESS integration options for grid stability and renewable energy optimization - Performing grid interconnection study (load flow, short circuit, transient stability analysis) - Developing conceptual plant design and technical specifications including single-line diagrams - Developing LCOE, IRR, NPV, and DSCR financial models with sensitivity analysis - Preparing detailed EPC cost estimates and Life Cycle Cost Analysis (LCCA) - Developing a Solar PV Master Plan for the Seven Forks Complex (~28,375 acres) - Delivering capacity-building workshops for ~30 KenGen staff	**Project: Seven Forks Solar Extension Project Feasibility Study (100 MW) – KenGen, Kenya** **Year:** 05/2026 – 04/2027 **Location:** Kenya **Client:** KenGen (Kenya Electricity Generating Company) **Main project features:** Feasibility study for a 100 MW solar PV extension near the existing Seven Forks complex, covering technical, financial, and social dimensions including BESS integration options, grid interconnection analysis, and Solar PV Master Plan development for ~28,375 acres. **Position held:** Lead Feasibility Study Expert **BESS Integration & Grid Interconnection:** • Evaluating BESS integration options for grid stability and renewable energy optimization, including sizing, technology selection, and dispatch strategy for the 100 MW solar plant • Performing grid interconnection study using PSSE-compatible software, including load flow, short circuit, and transient stability analysis • Developing conceptual plant design and technical specifications including single-line diagrams, major equipment lists, and instrumentation and control systems • Developing LCOE, IRR, NPV, and DSCR financial models with sensitivity analysis; preparing EPC cost estimates and Life Cycle Cost Analysis (LCCA) • Analysing proposed tariff structure and Certified Emission Reductions (CERs) revenue potential; developing Solar PV Master Plan for the Seven Forks Complex (~28,375 acres) • Managing stakeholder engagement with EPRA, KPLC, Ministry of Energy, and international financiers (AFD, KfW, AfDB, World Bank) • Delivering capacity-building workshops and two-day training sessions for ~30 KenGen staff on solar PV and BESS systems
Project: Pakistan AMI Meters – Technical Consultant (16.2 Million Meters, 5 DISCOs) – IFC / World Bank | PPIB, Pakistan **Key Responsibilities:** - Leading IFC/World Bank advisory for AMI rollout across five DISCOs (LESCO, MEPCO, PESCO, QESCO, HAZECO) under BFOT concession model	**Project: Pakistan AMI Meters – Technical Consultant (16.2 Million Meters, 5 DISCOs) – IFC / World Bank | PPIB** **Year:** 05/2026 – 03/2027 **Location:** Pakistan

12. Detailed Tasks Assigned	13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned
- Managing multidisciplinary team of 10+ international and local experts across AMI engineering, regulatory, cybersecurity, E&S, telecoms, and transaction law - Leading stakeholder engagement with IFC, PPIB, Ministry of Energy, NEPRA, and five DISCO boards - Overseeing DISCO performance assessment including energy balance, IT system reviews (HES, MDMS, CIS, SCADA, GIS), and billing evaluation - Coordinating preparation of deliverables D-1 through D-6 in compliance with IFC reporting requirements **Technical Contributions:** - Designing vendor-agnostic HES/MDMS architecture ensuring interoperability with existing CIS, SCADA, OMS, and GIS environments - Directing telecoms feasibility assessment across G3-PLC, RF Mesh, and Cellular technologies - Overseeing cybersecurity assessment including DLMS/COSEM compliance, NIST/ISO benchmarking, and data governance gap analysis - Leading AT&C loss diagnostic and modelling linking AMI deployment to revenue recovery and circular debt reduction - Leading RFP technical inputs including vendor-agnostic performance obligations and bid evaluation criteria	**Client:** IFC / World Bank, PPIB – Five Pakistani DISCOs (LESCO, MEPCO, PESCO, QESCO, HAZECO) **Main project features:** 12-month IFC/World Bank advisory engagement assessing feasibility of rolling out Advanced Metering Infrastructure (AMI) across five Pakistani distribution companies covering 16.2 million meters under a Build, Finance, Operate and Transfer (BFOT) concession model. **Position held:** Lead Technical Consultant – AMI & Smart Metering **AMI System Architecture & Technical Design:** • Designed vendor-agnostic HES/MDMS architecture ensuring interoperability with existing CIS, SCADA, OMS, and GIS environments across five DISCOs, drawing on prior AMI specifications delivered for IESCO and LESCO (ADB TA-9756-PAK) • Directed telecommunications feasibility assessment across G3-PLC, RF Mesh, and Cellular technologies; harmonised single-phase meter technical specifications across five target companies • Oversaw cybersecurity assessment of AMI system architectures including DLMS/COSEM protocol compliance, NIST/ISO benchmarking, firmware vulnerability review, and data governance gap analysis • Led AT&C loss diagnostic and modelling, quantifying technical and non-technical losses per DISCO and developing scenario analyses linking AMI deployment to measurable revenue recovery and circular debt reduction • Led preparation of RFP technical inputs including vendor-agnostic performance obligations, minimum meter and system specifications, and technical bid evaluation criteria for the concession tender • Directed elaboration of PPP transaction concepts per DISCO covering geographical perimeter, loss reduction objectives, risk factors, and private sector appetite screening