



International Conference on Renewable Energies and Power Quality  
(ICREPQ'25)  
Tenerife, Spain, 25 -27 June 2025

## **Sustainable Smart Grid, Technology option to resolve operations and control challenges of Electrical Power System**

By

***Prof. Dr. Tariq Masood***

Frostburg State University MD  
USA

Electricity is fundamental to world civilization; it conveys energy and information, delivers power to the user with no emission at the point of use, and provides an increasing array of innovative products and services. On the other hand, the electric power system, by all measures, is a very complex “machine” that consists of various significant sources of power generation, vast transmission networks, and local distribution systems. Among the attributes of this complexity are inadequate power flow control, inadequate reactive power management, power angle and voltage instabilities, inadequate planners/operators training, inefficient use of collected data, etc.

It is, therefore, imperative to constantly look at the development of new “smart” technologies to be implemented on the grid to improve grid performance and provide reliable and quality power delivery. The complex infrastructure of the transmission grid requires innovative and intelligent solutions. Under the “**Smart Grid**” umbrella, there will be several evolving developments. The following are several key characteristics that might qualify a transmission grid to be “smart”.

### **Power System Sustainability Questions:**

1. **Self-healing:** grid that rapidly detects, analyzes, and restores following incidents.
2. **Empowers and incorporates** consumer equipment and behavior in grid design and operation.
3. **Tolerant of attack,** the grid mitigates and is resilient to physical and cyber-attack.
4. **Provides the power quality** needed by the "digital society," i.e., a grid that delivers power quality consistent with consumers' and industry's needs.
5. **Accommodates a wide variety of supply** and demand. The grid accommodates a variety of resources (including demand response, combined heat and power, wind, photovoltaic, and end-use efficiency).
6. **It is fully enabling** and is supported by competitive markets.

### **Conclusions:**

Enhancing power Grid performance by providing intelligent solutions for Power system complexity, power flow management, reactive power management chronic issues, and power system stability (angle and voltage instabilities). This research also improved transmission capacity and reliability limits with a degree of precision.

## *Short biography of Prof. Dr. Tariq Massoud*



**Dr. Tariq Masood** is a distinguished professional with a wealth of academic qualifications in electrical power system engineering. His credentials include an M.Eng, M.Phil, and a Ph.D. (Smartgrid/Microgrid Renewable Energy Distributed Power Generation) from the esteemed University of Bath, Bath, U.K. He also obtained Scientific Teaching Fellowship-2022, Accredited/Sponsored by the NSF-National Science Foundation and hhmi- Howard Hughes Medical Institute in the United States.

These qualifications, coupled with his status as a chartered engineer registered with the Royal Engineering Council in the U.K., a senior member of IEEE-USA, a senior member of AIChE-USA, and a member of IET-UK, reassure his extensive expertise. His professional affiliations also include being a certified CET International USA member and a registered ASCET (American Society of Certified Engineers and Technicians) USA member.

Dr. Masood is an Assistant professor (Tenured-Track) at Frostburg State University in Frostburg, Maryland. His leadership roles at the university, including serving as a Senator *of the Faculty Senate, a Member of the Academic Affairs Committee, and a Member of the Academic Standard Committee, demonstrate his commitment to fostering academic excellence.*

Dr. Masood is a versatile, collaborative, accomplished, and knowledgeable professional. His successful track record as a Professional Engineer/Academician. His collaborative approach makes everyone feel included and part of a team. He has also contributed as a Visiting & Adjunct Professor and Invited speaker at OIT, UTT, Texas A&M Qatar, UTA, TTU, UND, U.B., and UDC in the United States of America. He is also certified by the Lean Six Sigma Green Belt. In the past, he also served as a Vice President of Technical Operations at Energy and Utilities Service in New Jersey, USA.

He joined Qatar Petroleum in 1997 as a Technical Coordinator Operations/Advisor. He is a member of the BPTC (Best Practices Technical Committee) and other production integrity committees under the patronage of H.E. Dr. Mohd Saleh Al-Sada, Minister of Energy and Industry Qatar. His contributions to the field are evident in his more than 68 technical research papers published in IEEE Conference, Journal, papers and books ISBN-978-3-659-40995-0 ISBN: 978-3-659-40995-0 ISBN:978-3-659-40995-0. He has received several awards for his outstanding performance and dedication to improving Qatar Petroleum's production operations and control, including two Mubarak awards from the H.E Minister of Energy and Industry, and three Al-Hasba Awards from the Vice President of Operations. He was the secretary for the GCC oil-producing companies (QP-Qatar, PDO-Oman ARAMCO-Saudi Arabia, KOC-Kuwait, TATWEER-Bahrain, and ADNOC-United Arab Emirates) Production and Maintenance Technical Committee in 2008 and 2011. He is also serving as an Associate Editor of IEEE Access (Impact Factor 3.44). You may reach by email: [t.masood.dr@ieee.org](mailto:t.masood.dr@ieee.org)