



POLITECNICO DI TORINO

Dipartimento Energia "Galileo Ferraris"



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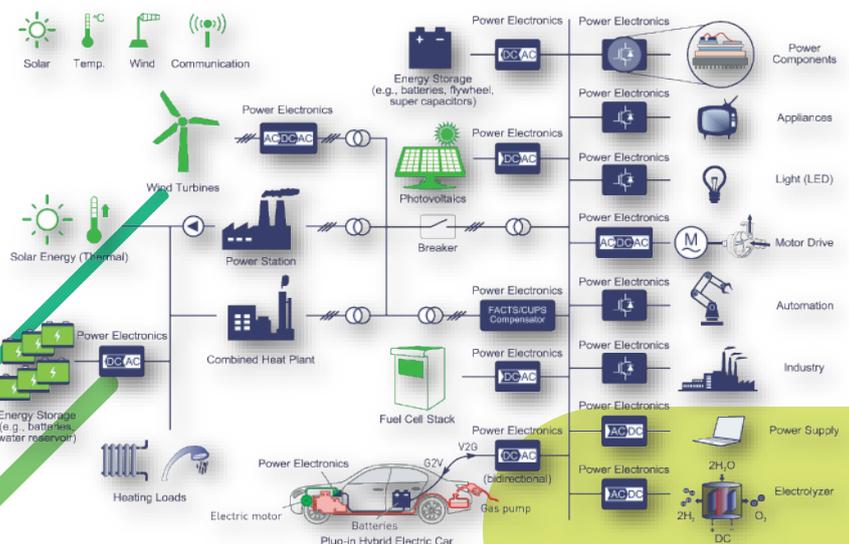
# POWER ELECTRONICS THE KEY TECHNOLOGY FOR RENEWABLE ENERGY SYSTEM INTEGRATION

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Full Professor in power electronics and drives at Aalborg University, Institute of Energy Technology, from 1998. His current research interests include power electronics and its applications such as in wind turbines, PV systems, reliability, harmonics and adjustable speed drives. He has published more than 500 journal papers in the fields of power electronics and its applications. He is the co-author of two monographs and editor of 7 books in power electronics and its applications. He has received 24 IEEE Prize Paper Awards, the IEEE PELS Distinguished Service Award in 2009, the EPE-PEMC Council Award in 2010, the IEEE William E. Newell Power Electronics Award 2014 and the Villum Kann Rasmussen Research Award 2014. He was the Editor-in-Chief of the IEEE TRANSACTIONS ON POWER ELECTRONICS from 2006 to 2012. He has been Distinguished Lecturer for the IEEE Power Electronics Society from 2005 to 2007 and for the IEEE Industry Applications Society from 2010 to 2011 as well as 2017 to 2018. In 2018 he is President Elect of IEEE Power Electronics Society.

The energy paradigms in many countries (e.g., Germany and Denmark) have experienced a significant change from fossil-based resources to clean renewables (e.g., wind turbines and photovoltaics) in the past few decades. The scenario of highly penetrated renewables is going to be further enhanced – Denmark expects to be 100 % fossil-free by 2050. Consequently, it is required that the production, distribution and use of the energy should be as technologically efficient as possible and incentives to save energy at the end-user should also be strengthened. In order to realize the transition smoothly and effectively, energy conversion systems, currently based on power electronics technology, will again play an essential role in this energy paradigm shift. Using highly efficient power electronics in power generation, power transmission/distribution and end-user application, together with advanced control solutions, can pave the way for renewable energies. In light of this, some of the most emerging renewable energies — , e.g., wind energy and photovoltaic, which by means of power electronics are changing character as a major part in the electricity generation — , are explored in this presentation. Issues like technology development, implementation, power converter technologies, control of the systems, and synchronization are addressed. Special focuses are paid on the future trends in power electronics for those systems like how to lower the cost of energy and to develop emerging power devices and better reliability tool for system assessment.



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