1. Record Nr. UNINA9910136253003321

Titolo	HVDC grids : for offshore and supergrid of the future / / edited by Dirk van Hertem, Oriol Gomis-Bellmunt, Jun Liang
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley, , [2016] [Piscataqay, New Jersey] : , : IEEE Xplore, , [2016]
ISBN	1-5231-2360-5 1-119-11522-1
Descrizione fisica	1 online resource (529 pages) : illustrations
Collana	IEEE press series on power engineering
Disciplina	621.31
Soggetti	Convertidors de corrent elèctric Parcs eòlics marins Electric power systems Electrical engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	HVDC GRIDS; Contents; List of Figures; List of Tables; Contributors; Foreword; Preface; Acknowledgments; Acronyms; PART 1 HVDC Grids in the Energy Vision of the Future; 1 Drivers for the development of HVDC grids; 1.1 Introduction; 1.2 From the vertically integrated industry to fast moving liberalized market; 1.2.1 Brief History of the Transmission System Before Liberalization; 1.3 Drivers for change; 1.3.1 Liberalized Energy Market; 1.3.2 More Renewables in the Energy Mix; 1.4 Investments in the grid; 1.4.1 Why Investments Are Needed in the Transmission System 1.4.2 Difficulties with New Transmission Lines1.4.3 Available Investments Technologies; 1.4.4 HVDC Technology; 1.5 Towards HVDC grids; 1.5.1 Transmission Technology; 1.5.2 Why Not AC?; 1.5.3 HVDC Grids as a Supergrid; 1.6 Conclusions; References; 2 Energy Scenarios: Projections on Europe's future generation and load; 2.1 Introduction; 2.2 System setting; 2.2.1 Supply; 2.2.2 Demand; 2.2.3 Matching Supply and Demand; 2.2.4 European Energy Policy; 2.3 Scenarios for Europe's energy provision; 2.3.1 The Role of Defining Scenarios; 2.3.2 Supply Side; 2.3.3 Demand Side

2.3.4 Implications Towards the Grid2.3.5 International Cooperation and Market Perspective; 2.4 Conclusions; References; PART 2 HVDC Technology and Technology for Offshore Grids; 3 HVDC technology overview; 3.1 Introduction; 3.2 LCC-HVDC systems; 3.2.1 Configurations; 3.2.2 Reactive Power Properties of LCC HVDC; 3.3 LCC-HVDC converter station technology; 3.3.1 Converter Station; 3.3.2 Transformers; 3.3.3 Filters and Reactive Compensation; 3.3.4 Other Required Components; 3.4 VSC-HVDC systems; 3.5 VSC-HVDC converter station technology; 3.5.1 Converter Configurations; 3.5.2 Switching Components
3.5.3 AC Filters3.5.4 Transformers; 3.5.5 AC Phase Reactor and Arm Inductor in a Multilevel Converter; 3.5.6 DC Capacitors; 3.5.7 DC Chopper; 3.5.8 HVDC Switchgear; 3.6 Transmission lines; 3.6.1 HVDC Overhead Lines; 3.6.2 HVDC Cables; 3.7 Conclusions; References; 4 Comparison of HVAC and HVDC technologies; 4.1 INTRODUCTION; 4.2 CURRENT TECHNOLOGY LIMITS; 4.2.1 Onshore Equipment; 4.2.2 Offshore Equipment; 4.2.3 Current Ratings for HVDC Technology; 4.3 TECHNICAL COMPARISON; 4.3.1 Charging Currents-Transmission Distance; 4.3.2 Asynchronous Networks; 4.3.3 Power Flow Control Capability
4.3.4 Voltage Support4.3.5 Dynamic System Performance; 4.3.6 Stability Limits; 4.3.7 Right-of-Way; 4.3.8 Black Start Capability; 4.3.9 Electromagnetic Fields; 4.3.10 Insulation Requirements; 4.3.11 Reliability; 4.4 ECONOMIC COMPARISON; 4.4.1 Onshore Transmission; 4.4.2 Offshore Transmission; 4.4.3 AC Transmission Losses; 4.4.4 DC Transmission Losses; 4.4.5 Comparison of AC and DC Equipment Losses; 4.5 CONCLUSIONS; References; 5 Wind turbine technologies; 5.1 Introduction; 5.2 Parts of the wind turbine; 5.3 Wind turbine types; 5.3.1 Fixed-Speed Wind Turbines

Sommario/riassunto

Presents the advantages, challenges, and technologies of High Voltage Direct Current (HVDC) Grids This book discusses HVDC grids based on multi-terminal voltage-source converters (VSC), which is suitable for the connection of offshore wind farms and a possible solution for a continent wide overlay grid. HVDC Grids: For Offshore and Supergrid of the Future begins by introducing and analyzing the motivations and energy policy drives for developing offshore grids and the European Supergrid. HVDC transmission technology and offshore equipment are described in the second part of the book. The third part of the book discusses how HVDC grids can be developed and integrated in the existing power system. The fourth part of the book focuses on HVDC grid integration, in studies, for different time domains of electric power systems. The book concludes by discussing developments of advanced control methods and control devices for enabling DC grids. . Presents the technology of the future offshore and HVDC grid. Explains how offshore and HVDC grids can be integrated in the existing power system. Provides the required models to analyse the different time domains of power system studies: from steady-state to electromagnetic transients This book is intended for power system engineers and academics with an interest in HVDC or power systems, and policy makers. The book also provides a solid background for researchers working with VSC-HVDC technologies, power electronic devices, offshore wind farm integration, and DC grid protection. Dirk Van Hertem is an Assistant Professor within ESAT-ELECTA at KU Leuven, Belgium. Dr. Van Hertem has written over 100 scientific papers in international journals and conferences. Oriol Gomis-Bellmunt is an Associate Professor in the Technical University of Catalonia (UPC). He is involved in the CITCEA-UPC research group and the Catalonia Institute for Energy Research (IREC). Jun Liang is a Reader within the School of

Engineering at Cardiff University, UK. He's also an Adjunct Professor at Changsha University of Science and Technology and North China Electric Power University.