



AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ELECTRICAL POWER AND MACHINS DEPT.

OFFSHORE WIND TURBINE ENERGY GENERATION

A Thesis

Submitted in Partial Fulfillment of the Requirement for the
Degree of Master of Science in Electrical Engineering

By

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STATEMENT

This Thesis is submitted to Ain Shams University for the degree of Master in Electrical Engineering.

The work included in this thesis was carried out by the author. No part of this thesis has been submitted for a degree or a qualification.

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ABSTRACT

Offshore wind energy is a renewable energy source that has great potential in energy markets worldwide as our current knowledge of offshore engineering technology makes it ready for implementation immediately. In this Thesis, Zayt Gulf region was chosen to be the focus of this research interest for establishment and construction of both offshore and onshore wind farms for its high potential wind speeds all over the year. New different proposal for wind farms in the newly introduced site Zayt Gulf in Egypt is suggested. Both size and site of wind farm units are to be selected based on maximizing the use of available wind gust as well as avoiding environmental problems such as bird migration pathways and noise. Technical and economic analysis shall be provided to base the comparison between the different alternative wind farms. The speed and power of wind characteristics of Zayt Gulf region have been modeled and analyzed. To avoid bird migration problem, it is suggested to use modified wind turbines in the proposed onshore wind farms. Two proposals of onshore wind farms are introduced in the new area chosen (Zayt Gulf region). Another proposal for offshore wind farm is introduced at 10km away from Zayt Gulf region which has privilege of being away from bird migration pathways, avoiding noise problem and having higher wind speeds. For the privileged wind characteristics in this site, it is concluded that the cost of energy production is much lower than the internationally recognized benchmark.

TABLE OF CONTENT

Title	Page No.
STATEMENT	A
ACKNOWLEDGEMENT	B
ABSTRACT	C
TABLE OF CONTENT	D
LIST OF TABLETS	H
LIST OF FIGURES	K
LIST OF ABBREVIATION	M
LIST OF SYMBOLS	O
Chapter One: Introduction	
1.1. Back ground	1
1.2. research Motivation	2
1.3. Literature Review	3
1.3.1. Wind Privileges	
1.3.2. Wind Energy Conversion System	
1.3.3. Transmission Techniques	
1.3.4. Wind Energy Generation	
1.3.5. Wind Turbine Control	
1.3.6. Wind Energy Cost Assessment and Analysis	
1.4. Thesis Objectives	10
1.5. Thesis Outline	11
1.6. Contribution of the thesis	12
Chapter Two: Offshore Wind Energy Conversion System	
2.1. Introduction	13
2.2. Wind Energy System	14
2.3. Wind Turbine Aerodynamics	18
2.4. Drive Train	21
2.5. Power Generation System	21
2.5.1 Fixed-speed WECS	
2.5.2 Variable-speed WECS	
2.6. Offshore Wind Turbines Transmission Techniques	28
2.6.1. Overview	
2.6.2. Advantages and Disadvantages of Transmission Systems	

2.6.3. Offshore Transmission Technique Energy Availability	
2.6.4. Summary	
2.7. Doubly-fed Induction Generator	37
2.7.1. Equivalent Circuit of Doubly-fed Induction Generator	
2.7.2. DFIG Power Flow	
2.7.3. Lowering Magnetizing Losses	
2.7.4. Determination of Energy Losses	
2.7.5. Energy Production of the DFIG System	
2.7.6. Comparison to Other Wind Turbine Systems	
2.7.7. DFIG Control	
2.8. Conclusion	45
Chapter 3: Comparison between offshore and onshore wind turbines	
3.1. Introduction	47
3.2. Offshore wind turbines Installation	48
3.3. Advantages and Disadvantages of Offshore and Onshore Wind Turbines	52
3.3.1. Advantages of onshore wind turbines	
3.3.2. Disadvantages of onshore Wind turbines	
3.3.3. Advantages of Offshore Wind turbines	
3.3.4. Disadvantages of Offshore Wind turbines	
3.4. Offshore and Onshore (Coastal) wind farm statistics	54
3.4.1. First investigation of the German bight and Horns Rev	
3.4.2. Statistics	
3.4.3. Second Investigation of the USA Offshore and Onshore sites	
3.5. Power Potential and Land Availability in Offshore and Onshore Egyptian Sites	56
3.6. Factors Affecting Offshore Installation Cost	59
3.6.1. Water Depth Affection on Installation Cost	
3.6.2. Water Depth Affection on Distance from Grid	
3.7. Cost Comparison	62
3.8. Conclusion	64

Chapter Four: Two Proposed Onshore Wind Farms at Zayt Gulf, Egypt	
4.1. Introduction	65
4.2. Detailed data of surface wind distributions	65
4.3. Model Analysis	66
4.4. Weibull parameters and mean wind speed values	68
4.5. Selection of suitable wind turbines for Zayt Gulf region	70
4.6. Case 1	71
4.6.1. Overview	
4.6.2. Energy capture availability and energy pattern factor	
4.6.3. Wind park Simulation	
4.7. Case 2	79
4.7.1. Energy capture availability	
4.7.2. Output power extraction	
4.7.3. Wind power simulation	
4.8. Conclusion	82
Chapter Five: A Proposed Offshore Wind Farm at Zayt Gulf, Egypt	
5.1. Introduction	84
5.2. Selection of suitable wind turbines for offshore Zayt Gulf site	86
5.3. Energy capture availability and energy pattern factor	88
5.4. Proposal of wind farms and cost analysis	89
5.5. Conclusion	91
Chapter Six: Zayt Gulf Wind Farms Assessment	
6.1. Introduction	92
6.2. Statistics	94
6.2.1. Case 1	
6.2.2. Case 2	
6.2.3. Case 3	
6.3. Conclusion	100

Conclusions and Recommendations	101
References	103
Appendixes	a
Arabic Summary	1

LIST OF TABLETS

Table No.	Table Name
Chapter two: Offshore Wind Energy Conversion System	
2.1	Ci Coefficients
2.2	A simple comparison between fixed speed WECS and variable speed WECS
2.3	Comparison HVAC, LCC HVDC and VSC HVDC for cable transmission
2.4	Energy availability comparison between one HVDC LCC and one HVDC VSC transmission systems for the case of 1000 MW wind farm
2.5	Energy Unavailability comparison of two HVAC transmission systems from 800 and 795 MW wind farms respectively for several average wind speeds. Transmission Voltage: 400 kV, Transmission distance 100km
2.6	Advantages and Disadvantages of offshore and onshore wind industry
2.7	Parameters of the induction machine in p.u.
2.8	Examples of the power flow for different slips of the DFIG system
Chapter Three: Comparison between offshore and onshore wind turbines	
3.1	Comparison with onshore forecasts for 36 hours
3.2	Increase in offshore installation costs as a function water depth
3.3	Scale factors for cost increases as a function of water depth and distance to coast
3.4	Cost Comparison between wind and coal power
Chapter Four: A Two Proposed Onshore Wind Farms at Zayt Gulf, Egypt	
4.1	Mean monthly wind speeds measured at 10 m hub height in Zayt Gulf region
4.2	Numerical values of Weibull parameters for monthly and annual wind speed distribution, at 10 m height
4.3	A comparison between estimated and actual output power at 163.5 & 163 m heights for both Enercon E-126 7,500kW and REpower 5M

	5,000kW wind turbines respectively
4.4	A calculated monthly energy pattern factor K_E at 10 m height and energy density available at 163.5 & 163 m heights for both Enercon E-126 7,500kW and REpower 5M 5,000kW wind turbines respectively
4.5	Annual total output energy and the cost/kWh for 120 MW and 80 MW wind farms at offshore Zayt Gulf region using Enercon E126 7,500kW and REpower 5M 5,000kW wind turbines respectively
4.6	calculated monthly energy pattern factor K_E at 10 m height and energy density available at 40 m and 44 m heights
4.7	A comparison between the predicted and the actual output power at different heights for both wind turbines
4.8	Annual total output energy and the cost/kWh for 69 MW wind farm at Zayt Gulf region using Gamesa G52-850kW and Vestas V-47 660kW wind turbines respectively

Chapter Five: A Proposed Offshore Wind Farm at Zayt Gulf, Egypt

5.1	Mean monthly wind speeds measured at 10 m hub height 10km away from Zayt Gulf region inside Red Sea
5.2	A comparison between estimated and actual output power at 90 m and 135 m heights for Repower 5M 5,000kW and Enercon E-127 7,500kW wind turbines respectively
5.3	calculated monthly energy pattern factor K_E at 10 m height and energy density available at 90 m and 135 m heights
5.4	Scale factors for cost increases as a function of water depth and distance to coast
5.5	Annual total output energy and the cost/kWh for 120 MW and 80 MW wind farms at offshore Zayt Gulf region using Enercon E126 7,500kW and REpower 5M 5,000kW wind turbines respectively

Chapter Six: Zayt Gulf Wind Farms Assessment

4.1.	Mean monthly wind speeds measured at 10 m hub height at Onshore Zayt gulf region
5.1.	Mean monthly wind speeds measured at 10 m hub height at Offshore Zayt gulf region inside red sea
4.5.	Annual total output energy and cost/kWh for 120 MW and 80 MW

	wind farms at onshore Zayt gulf region Enercon E126 7,500 KW and RE power 5M 5,000 kW wind turbines respectively
4.8.	Annual total output energy and cost/kWh for 69 MW wind farms at Zayt gulf region using Gamesa G52-850 kW and Vestas V-47 660 kW wind turbines respectively
5.4	Scale factors for cost increases as a function of water depth and distance to coast
5.5	Annual total output energy and cost/kWh for 120 MW and 80 MW wind farms at offshore Zayt gulf region Enercon E126 7,500 KW and RE power 5M 5,000 kW wind turbines respectively

LIST OF FIGURES

Figure No.	Figure Name
Chapter two: Wind Energy Conversion System	
2.1	Probability density of the Rayleigh distribution. The average wind speeds are 5.4 m/s (solid), 6.8 m/s (dashed), 8.2 m/s (dotted), 11 m/s (dashed-dotted), 13 m/s (*) and 15 m/s (dashed *)
2.2	Power Coefficient characteristic plotted in function of the Tip Speed Ratio (λ) with variable pitch angle (β)
2.3	Mechanical power as a function of wind speed at rated rotor speed (solid line is fixed pitch angle, i.e., stall control and dashed line is active stall)
2.4	Figure 2.4: Output power vs. wind speed characteristic
2.5	General structure of a fixed-speed WECS
2.6	General structure of a limited variable-speed WECS
2.7	General structure of an improved variable-speed WECS
2.8	General structure of a full variable-speed WECS
2.9	Choice of transmission system for different wind farm capacities and connection distances based on overall system economics
2.10	comparison of transmission options with respect to costs (investments plus net present value of transmission losses) depending on distance to shore
2.12	Equivalent circuit of the DFIG.
2.13	The produced average grid power and generator, converter and gearbox losses for an average wind speed of 6 m/s. 100% correspond to the input turbine power at optimal, with respect to the rotor speed, aerodynamic efficiency.
2.14	Energy efficiency of the FSIG 1, FSIG 2, VSIG, PMSG and the DFIG system as a function of the average wind speed.
Chapter three: Comparison between offshore and onshore wind turbines	
3.1	Shallow Water Foundation Technology – Current Options
3.2	Cost of Offshore Wind Turbine Substructures with Water Depth
3.3	Transitional Substructure Technology