

Contents

1	Introduction	1
1.1	Background to This Research	1
1.1.1	Sustainable Business Development	1
1.1.2	Drive Towards a ‘Green Economy’ and CO ₂ Emission Reduction	3
1.1.3	Irish Energy Benchmarks	7
1.2	Aim and Objectives of This Study	9
1.3	Methodology	9
1.3.1	Philosophical Underpinning of the Research	9
1.3.2	Methodologies Used in This Research Study	10
1.3.3	Research Design	11
1.4	Step-by-Step Development of the Framework	12
	References	13
2	Corporate Social Responsibility Through a Wind Turbine Lens—A Literature Review	17
2.1	Structure of This Literature Review	17
2.2	Corporate Social Responsibility	18
2.2.1	Overview	18
2.2.2	Ambiguous/Subjective Nature of CSR/Sustainable Development	23
2.3	Stakeholder Responsibilities in the CSR Space	25
2.3.1	Business Practitioners	25
2.3.2	Social Responsibility of the Corporation	26
2.3.3	Individual Responsibility	28
2.3.4	State Responsibility	29
2.3.5	Government	31
2.3.6	Local Communities	34
2.3.7	Media	35

2.4	Empirical Measurements of CSR Initiatives—Sustainability Reporting	36
2.4.1	Financial (Economic) Component	37
2.4.2	Human (Social) Component	37
2.4.3	Environmental Component	38
2.5	Key Stakeholders in the Wind Industry, Ireland	42
2.5.1	Wind Industry—Global	44
2.5.2	Wind Turbine Manufacturers	45
2.5.3	Wind Turbine Installers	45
2.5.4	Other Renewable Energy Technologies	46
2.6	Discussion and Conclusions	47
	References	49
3	An Irish Perspective on Sustainable Development	59
3.1	Introduction	59
3.2	Literature Review	60
3.2.1	Global Context	60
3.2.2	The Economic Aspect of Sustainability	61
3.2.3	The Environmental Aspect of Sustainability	62
3.2.4	The Human Aspect of Sustainability	63
3.2.5	Measuring Sustainable Development Practices	64
3.3	Research Methods/Methodology	66
3.3.1	Ethical Issues	67
3.3.2	Validity and Reliability	67
3.3.3	Data Analysis	67
3.4	Research Findings	68
3.4.1	Varied Perceptions of the Concept of Sustainability	68
3.4.2	Regulation Compliance	71
3.4.3	Organisational Leadership in Sustainability	72
3.4.4	Marketing	72
3.4.5	Human Aspects	73
3.5	Research Analysis	74
3.5.1	Organisational Sustainability	75
3.5.2	Interconnection	75
3.5.3	Business Sustainability Model	77
3.6	Discussion	78
3.7	Conclusion	79
	References	79
4	Financial Appraisal of a Micro-Generation Wind Turbine with a Case Study in Ireland	83
4.1	Introduction	83
4.2	Chapter Methodology	85
4.3	Evaluation Criteria	86

4.3.1	10-kW Wind Turbine Initial Cost	86
4.3.2	Rated Power Output	87
4.3.3	10-kW Wind Turbine Energy Output	87
4.3.4	10-kW Turbine Financial Investment Appraisal	88
4.4	Findings	93
4.5	Discussions	94
4.6	Conclusions	96
	References	97
5	Post-connection Financial Performance Analysis of a Four-Turbine, 3.5-MW, Wind Farm in Ireland	99
5.1	Introduction	99
5.2	Literature Review	100
5.3	Methodology	101
5.3.1	Case Study	101
5.3.2	3.5-MW Wind Farm Site and Plant	102
5.3.3	38-kV Local Substation	103
5.4	Overview of the Associated Plant for 3.5-MW Wind Farm	104
5.4.1	Design of the VESTAS V52-850-KW Wind Turbine	105
5.4.2	Design of the ENERCON 900-KW Wind Turbine	106
5.4.3	Electricity Market	107
5.4.4	Renewable Energy Generation Incentives	107
5.4.5	Business Expansion Scheme (BES)	108
5.5	Results and Discussion	109
5.5.1	Cost of 3.5-MW Wind Farm Project	109
5.5.2	Funding for 3.5-MW Wind Farm Project	109
5.5.3	Annual Revenue Generated from 3.5-MW Wind Farm	110
5.5.4	Financial Analysis on 3.5-MW Wind Farm	110
5.6	Conclusions	111
	References	112
6	Stakeholder Outcomes in a Wind Turbine Investment: Is the Irish Energy Policy Effective in Reducing GHG Emissions and Electricity Costs by Promoting Small-Scale Embedded Turbines in SMEs?	115
6.1	Introduction	116
6.1.1	Research Site for 300-kW Wind Turbine	118
6.1.2	Plant Overview for 300-KW Wind Turbine	121
6.2	Methodology	122
6.2.1	Data Collection for the Evaluation of the 300-kW Turbine Investment Decision	124
6.2.2	Data Analysis for the Evaluation of the 300-kW Turbine Investment Decision	125
6.2.3	Validity and Reliability	125

6.3	Technical Assessment of 300-kW Wind Turbine Project	126
6.3.1	Energy Benchmarks	126
6.3.2	Power Quality of 300-KW DFIG Wind Turbine	128
6.3.3	Analogue/Digital Energy Measurement	133
6.4	Economic Assessment of 300-kW Wind Turbine Project	134
6.4.1	Estimated Payback Period (PP) of Turbine Investment	134
6.4.2	Electricity Utility Energy Costs for SME	135
6.5	Discussion	137
6.5.1	GHG Emission Reduction Due to 300-KW Wind Turbine	137
6.5.2	Electricity Bill Cost Reduction with 300-kW Wind Turbine	139
6.6	Conclusions	141
6.6.1	Effectiveness of Government Energy Policy	141
6.6.2	Stakeholder Outcomes in 300-kW Wind Turbine Investment Decision	141
6.6.3	Alternatives to Supply-Side Management	142
	References	143
7	Key Enablers/Inhibitors in the Corporate Social Responsibility—Business Strategy Integration Space	145
7.1	Introduction	145
7.2	Literature Review	147
7.2.1	Overview/Definitions	147
7.2.2	Measurement and Reporting	149
7.2.3	Global Sustainability Initiatives	150
7.2.4	CSR/Sustainable Development Business Initiatives in Academia	151
7.3	Methodology	153
7.3.1	Data Collection	153
7.3.2	Data Analysis	154
7.3.3	Validity and Reliability	155
7.4	Results/Discussion	155
7.4.1	Profile of Respondents (Quantitative Data)	156
7.4.2	Open-Ended Questions (Qualitative Data)	162
7.5	Conclusions	168
7.5.1	Respondent Profile	168
7.5.2	Main Themes Identified to Enhance CSR/Business Strategy Integration	169
7.6	Management Implications	171
7.7	Limitations and Further Research	172
	References	172

Contents	xi
8 Findings	179
8.1 Introduction	179
8.2 Key Findings	180
8.2.1 Wind Turbines Through an SD/CSR Lens.	180
8.2.2 Wind Turbines: A Technical and Economic Evaluation	180
8.2.3 Wind Turbines: The Key Enabling Factors in Integrating SD/CSR and Business Strategy.	183
8.2.4 Wind Turbines: The Framework as a Power Tool to Managing Sustainable Development/CSR	185
8.3 Findings Summary Table	187
8.4 Findings Chapter Summary	188
References	188
9 Conclusions	191
9.1 Introduction	191
9.2 Reiteration of Research Aim and Objectives	193
9.3 Accomplishing Research Aim and Objectives.	193
9.3.1 Identify Weaknesses in the CSR Space from the Literature Review.	193
9.3.2 Technical Evaluation of Wind Turbine Projects	194
9.3.3 Economic Assessment of Wind Turbine Projects	194
9.3.4 Key Enablers in Sustainable Development/CSR/Strategy Integration.	195
9.4 Linking the Contribution to Knowledge of This Work to the Original Research Aims and Objectives	196
9.5 Future Research	196
9.5.1 Recommendations	196
9.5.2 Limitation of This Study	198
9.5.3 Final Summary	199
References	200
Conferences at Which Author Presented a Paper	203
Appendices for Chapter 3	205
Appendices for Chapter 4	207
Appendices for Chapter 6	213
Appendices for Chapter 7	219
References	239