



**CIRCULAR ECONOMY FOR MITIGATING CLIMATE
CHANGE IMPACTS: APPLICATIONS OF AGRICULTURAL
WASTES AS NATURAL THERMAL INSULATION
MATERIALS – CASE STUDY OF RESIDENTIAL
BUILDINGS TO ACHIEVE SUSTAINABILITY**

By

Sarah Adel Mohamed Saleh GadAllah

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Architectural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Under the Supervision of

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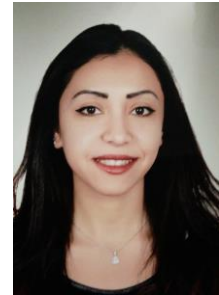
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Title of Thesis:

Circular Economy for Mitigating Climate Change Impacts: Applications of Agricultural Wastes as Natural Thermal Insulation Materials – Case Study of Residential Buildings to Achieve Sustainability

Key Words:

Circular economy; Climate change; Natural thermal insulation materials; Agricultural waste; and Sustainability

Summary:

Conventional thermal insulation materials in buildings consume huge amount of embodied energy. Nonetheless, these materials cause many harms whether indoors or outdoors; hence, increase carbon emissions that resulted in climate change. Buildings are accounted for around 40 per cent of the total consumption of energy. The research aims at utilization of agricultural wastes, as natural thermal insulation materials, which reflects the concept of circular economy, to lessen the harmful carbon dioxide emissions. This research is concerned with realizing the importance of thermal insulation materials in different climates, and reviewing their development worldwide, as well as the comparison between conventional and non-conventional thermal insulation materials. The research methodology depends on theoretical and applied studies through simulation to assess the application of agricultural residues in residential buildings; which reached a conclusion that these residues provide good thermal insulation and lessen carbon emissions and mitigate climate change.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Sarah Adel Mohamed Saleh GadAllah

Date:

Signature:

Dedication

I would like to dedicate my thesis to my mother, my role model and super woman.
The strongest woman I have ever seen, she's our source of light, and ultimate happiness.

Acknowledgments

I would like to express my ultimate gratitude to my supervisor, Professor Dr. Mohsen M. Abounaga for his continuous support and crucial advice, in addition to his motivation, tremendous patience, and most importantly, his vast and sophisticated knowledge. Professor Dr. Mohsen M. Abounaga has a huge contribution in developing and finalizing this thesis.

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Table of Contents

DISCLAIMER	I
DEDICATION	II
ACKNOWLEDGMENTS.....	III
TABLE OF CONTENTS.....	IV
LIST OF TABLES.....	VIII
LIST OF FIGURES.....	IX
NOMENCLATURE	XII
ABSTRACT	XIV
CHAPTER 1 : THESIS’S INTRODUCTION AND FRAMEWORK.....	2
1.1. SUMMARY.....	2
1.2. PROBLEM STATEMENT	2
1.3. SIGNIFICANCE OF THE STUDY	3
1.4. RESEARCH MAIN GOAL AND OBJECTIVES.....	4
1.5. RESEARCH QUESTIONS	5
1.6. RESEARCH METHODOLOGY	5
1.7. THESIS STRUCTURE AND DESCRIPTION	7
1.7.1. Chapter 2: Importance of Thermal Insulation Materials in Different Climates	7
1.7.2. Chapter 3: Buildings’ Energy performance – Conventional / Unconventional Materials	7
1.7.3. Chapter 4: Classification of Thermal Insulation Materials’ impacts	8
1.7.4. Chapter 5: Assessment of Buildings’ Thermal Insulation Materials - Global Outlook.....	8
1.7.5. Chapter 6: Thermal Insulation Materials in Egypt and Circular Economy	9
1.7.6. Chapter 7: Natural Thermal Insulation Materials - Case Studies’ Simulation...	10
1.7.7. Chapter 8: Conclusions and Recommendations.....	10
CHAPTER 2 : IMPORTANCE OF THERMAL INSULATION MATERIALS IN DIFFERENT CLIMATES.....	12
2.1. SUMMARY.....	12
2.2. INTRODUCTION	12
2.3. IMPORTANCE OF INSULATION MATERIALS IN DIFFERENT CLIMATES	12
2.4. REVIEW OF THERMAL INSULATION MATERIALS DEVELOPMENT WORLDWIDE	14
2.4.1. Leading countries in thermal insulation materials	14
2.4.1.1. Australia	15
2.4.1.2. Singapore.....	16
2.4.1.3. Dubai, UAE	17
2.5. NEW THERMAL INSULATION MATERIALS (GREEN WALLS & ROOFS).....	19
2.5.1. Examples for insulation represented in green walls and roofs.....	20
2.5.1.1. Green Roofs.....	20
2.5.1.1.1. Ewha University – South Korea	20

2.5.1.1.2.	<i>Venny Community Facility for children - Australia</i>	22
2.5.1.1.3.	<i>Vancouver Convention Center - Canada</i>	23
2.5.1.2.	<i>Green Walls</i>	23
2.5.1.2.1.	<i>Consortio Santiago Building - Chile</i>	23
2.5.1.2.2.	<i>Bosco Verticale Garden (Residential Building) Milan - Italy</i>	24
2.5.1.2.3.	<i>ACROS Fukouka Prefectural International Center - Japan</i>	25
2.6.	REVIEW OF ENERGY CODES FOR THERMAL INSULATION MATERIALS	26
2.6.1.	The Energy Performance of Buildings Directive (EPBD)	27
2.6.2.	USA Building Code	28
2.6.3.	Australia's Building Code.....	28
2.6.4.	Japan's Building Code	29
2.6.5.	Singapore's Building Code	29
2.6.6.	China's Building Code.....	30
2.6.7.	Egypt's Building Code.....	31
2.7.	STATUS OF THERMAL INSULATION MATERIALS IN EGYPT.....	33
2.7.1.	Review of the Electric Energy Use in Egypt	33
2.7.2.	Importance of thermal insulation in Egyptian buildings.....	34
2.8.	CHAPTER 2 CONCLUSION	35
CHAPTER 3 : BUILDINGS' ENERGY PERFORMANCE – CONVENTIONAL /UNCONVENTIONAL MATERIALS		38
3.1.	SUMMARY	38
3.2.	INTRODUCTION	38
3.3.	BUILDINGS' ENERGY PERFORMANCE	40
3.4.	CONVENTIONAL THERMAL INSULATION MATERIALS	41
3.4.1.	Characterization of thermal insulation materials	42
3.4.1.1.	Thermal characterization	42
3.4.2.	Properties of conventional thermal insulation materials.....	45
3.4.2.1.	Stone (Rock) wool	45
3.4.2.2.	Glass wool	45
3.4.2.3.	Expanded Polystyrene	45
3.4.2.4.	Extruded Polystyrene.....	46
3.4.2.5.	Polyurethane	46
3.5.	UNCONVENTIONAL THERMAL INSULATION MATERIALS	47
3.5.1.	Properties of unconventional thermal insulation materials.....	47
3.5.1.1.	Bagasse	49
3.5.1.2.	Recycled Materials (Recycled cotton and denim).....	49
3.5.1.3.	Date Palm	50
3.5.1.4.	Rice	50
3.5.1.5.	Sunflower composite materials.....	51
3.5.1.6.	Straw bale	51
3.5.1.7.	Corn cob	52
3.5.2.	Analysis of the thermal performance of unconventional insulation materials....	53
3.6.	CHAPTER 3 CONCLUSION	53
CHAPTER 4 : CLASSIFICATIONS OF THERMAL INSULATION MATERIALS' IMPACTS		56
4.1.	SUMMARY	56
4.2.	INTRODUCTION	56
4.3.	ENVIRONMENTAL IMPACT.....	56

4.3.1.	Thermal Insulation materials classification	57
4.3.2.	Environmental Impacts due to gases content of thermal insulation materials ...	58
4.3.3.	Classification of Environmental Impacts	61
4.3.4.	Materials' Life Cycle Key Stages and Related Global Warming Potential	63
4.4.	HEALTH IMPACT	66
4.4.1.	Thermal insulation materials: Climate change & health issues	69
4.5.	EMBODIED ENERGY IMPACT	72
4.6.	COST IMPACTS	77
4.6.1.	Eco-cost	78
4.7.	IMPACTS OF UNCONVENTIONAL THERMAL INSULATION MATERIALS	80
4.8.	CHAPTER 4 CONCLUSION	80
CHAPTER 5 : ASSESSMENT OF BUILDINGS' THERMAL INSULATION MATERIALS MARKET – GLOBAL OUTLOOK		84
5.1.	SUMMARY	84
5.2.	INTRODUCTION	84
5.3.	THERMAL INSULATION MATERIALS' MARKETS	85
5.3.1.	Asia	85
5.3.2.	North America	85
5.3.3.	Europe	86
5.4.	REGIONS DOMINATING THE THERMAL INSULATION MARKET	88
5.5.	MAIN DRIVERS OF THE GLOBAL THERMAL INSULATION MARKET	89
5.5.1.	Sustainable Development and its goals	90
5.5.2.	Main Drivers' weight based on SDGs	92
5.5.3.	Egypt's Thermal Insulation Market Drivers' weight	95
5.6.	CHAPTER 5 CONCLUSION	98
CHAPTER 6 : THERMAL INSULATION MATERIALS IN EGYPT AND CIRCULAR ECONOMY		102
6.1.	SUMMARY	102
6.2.	INTRODUCTION	102
6.3.	BUILDINGS WITH THERMAL INSULATION MATERIALS – EGYPT	103
6.3.1.	Healthcare	103
6.3.1.1.	Dar EL-Fouad Hospital	103
6.3.2.	Hospitality	104
6.3.2.1.	St. Regis - The Nile Corniche Hotel	104
6.3.3.	Exhibitions	105
6.3.3.1.	Grand Egyptian Museum	105
6.3.4.	Commercial Buildings	106
6.3.4.1.	Office Buildings	106
6.3.4.1.1.	MB4 Building	106
6.3.4.1.2.	EFG Hermes New Regional Headquarters	107
6.3.4.2.	Banks	107
6.3.4.2.1.	Credit Agricole Bank Head office	107
6.3.4.2.2.	ABC Bank	108
6.3.4.2.3.	NBD Bank	109
6.3.5.	Analysis of buildings with thermal insulation materials	109
6.4.	THERMAL INSULATION IS NOT GENERALIZED IN EGYPT	110

6.5.	CIRCULAR ECONOMY	113
6.5.1.	History of Circular Economy	114
6.5.2.	Principles of Circular Economy	114
6.5.3.	Requirements to achieve Circular Economy	115
6.5.4.	Rank of countries regarding Circular Economy	116
6.6.	CIRCULAR ECONOMY IN EGYPT	117
6.6.1.	Benefits of applying Circular Economy concept in Egypt	117
6.6.2.	Circular Economy concept in Agricultural waste	118
6.6.3.	Mapping Egypt's leading crops	118
6.7.	CHAPTER 6 CONCLUSION	122
CHAPTER 7 : NATURAL THERMAL INSULATION MATERIALS – CASE STUDIES' SIMULATION.....		126
7.1.	SUMMARY	126
7.2.	INTRODUCTION	126
7.3.	METHODOLOGY OF THE APPLIED CASE STUDIES	127
7.4.	USED TOOLS.....	129
7.5.	CASE STUDY	129
7.6.	DATA INPUT.....	130
7.7.	DATA OUTPUT	135
7.7.1.	Dakahlia	135
7.7.1.1.	No insulation	135
7.7.1.2.	Extruded Polystyrene.....	136
7.7.1.3.	Rock wool.....	137
7.7.1.4.	Wheat Straw bale.....	138
7.7.1.5.	Rice Husk	139
7.7.2.	Qena	140
7.7.2.1.	No insulation	140
7.7.2.2.	Extruded Polystyrene.....	141
7.7.2.3.	Rock wool.....	142
7.7.2.4.	Wheat Straw bale.....	143
7.7.2.5.	Sugarcane Bagasse	144
7.8.	DISCUSSION	145
7.8.1.	Dakahlia	145
7.8.2.	Qena	146
7.9.	RESULTS AND FINDINGS.....	148
7.10.	CHAPTER 7 CONCLUSION	149
CHAPTER 8 : CONCLUSIONS AND RECOMMENDATIONS		154
8.1.	SUMMARY.....	154
8.2.	CONCLUSIONS.....	154
8.3.	GENERAL THESIS'S RECOMMENDATIONS	160
8.3.1.	Executive Bodies Institutions	161
8.3.2.	Specialists / Professionals	161
8.3.3.	Future Researchers.....	162
REFERENCES		164
APPENDIX A.....		179

List of Tables

Table 3.1. Images of different conventional insulation materials	44
Table 3. 2. Thermal conductivity, density/specific heat of conventional materials	46
Table 3. 3. Images of different unconventional insulation materials	48
Table 3. 4. Thermal conductivity, density/specific heat of unconventional materials ...	52
Table 4.1. Classification of Environmental impacts	61
Table 4. 3. Health impact rank of conventional thermal insulation materials.....	71
Table 4. 4. Embodied energy /Global warming potential of conventional materials	74
Table 4.5. Embodied Energy ranking of conventional thermal insulation materials	76
Table 4.6. Cost impact rank of conventional thermal insulation materials	79
Table 4.7. Comparison between conventional insulation materials different impacts ...	81
Table 5. 1. Thermal Insulation Market Drivers' percentages based on SDGs	93
Table 6.1. List of Egyptian buildings using thermal insulation materials.....	110
Table 6.2. Egypt's rank in the global Environmental Performance Index	111
Table 6. 3. Egyptian governorates strategic crops' areas in feddans.....	120
Table 6. 4. List of Studied Buildings.....	123
Table 7. 1. Data Input Wall Types (1-6).....	131
Table 7. 2. Data Input Wall Types (2-6).....	131
Table 7. 3. Data Input Wall Types (3-6).....	131
Table 7. 4. Data Input Wall Types (4-6).....	132
Table 7. 5. Data Input Wall Types (5-6).....	132
Table 7. 6. Input Wall Types (6-6)	133
Table 7. 7. Average heat gains of walls and CO ₂ production in Dakahlia	146
Table A. 1. Indicators of thermal insulation market drivers.....	179

List of Figures

Figure 1. 1: Research methodology structure.....	6
Figure 2.1. Section through an external wall in hot climate.....	13
Figure 2.2. Leading Countries in thermal insulation materials	14
Figure 2.3. Illwara Flame House 3D	15
Figure 2.4. Illwara Flame House after construction.....	15
Figure 2.5. Integration of the used systems in BCA Academy	16
Figure 2.6. BCA Academy campus building in Singapore	16
Figure 2.8. Re-traditional designed housing units of 2000 – 2010	19
Figure 2.9. Post-modern designed housing units of 2000 – 2010	19
Figure 2.10. 2000's – 2010's Re-traditional unit of IES-VE model	19
Figure 2.11. 2000's – 2010's Post-modern unit of IES-VE model	19
Figure 2.13. Ewha University green roof and central passage.....	21
Figure 2.14. Cross section showing the green roof	21
Figure 2.15. Vertical section of Ewha campus showing thermal labyrinth	22
Figure 2. 16. Schematic plan view of the Venny Green Roof.....	22
Figure 2. 17. Venny Green Roof	22
Figure 2.18. Vancouver Convention Center.....	23
Figure 2.19. Vancouver Green Roof	23
Figure 2. 20. Consorcio Green Façade	24
Figure 2. 21. Consorcio West Façade greenery coverage	24
Figure 2.22. Bosco Verticale Building.....	25
Figure 2.23. Section in Bosco Verticale for the vertical garden	25
Figure 2. 24. ACROS Fukouka Prefectural International Center.....	25
Figure 2. 25. ACROS Fukouka Prefectural International Center.....	25
Figure 2.26. Hatshpsut Temple in Luxor	26
Figure 2.27. Karnak Temple in Luxor.....	26
Figure 2.28. ELSeheimy house in ELMoezz street 'Mediaeval Cairo'	26
Figure 2.29. Zainab Khatoun house in ELMoezz street 'Mediaeval Cairo'	26
Figure 2. 30. Developed energy codes for thermal insulation materials.....	27
Figure 2.31. Egyptian Residential Code Chapters	31
Figure 2. 32. Missing points in the Egyptian energy code	32
Figure 2. 33. Egypt Energy supply 2017/2018.....	33
Figure 2. 34. Egypt Electricity Consumption 2017/2018, Egypt	33
Figure 2. 35. Importance of thermal insulation materials in Egypt.....	34
Figure 3. 1. Main Benefits of Efficient Energy Use.....	38
Figure 3.2. Scenario of the European energy demand in the residential sector	39
Figure 3.3. Energy Performance types	40
Figure 3.4. List of commercial insulation materials.....	43
Figure 3. 5. List of unconventional insulation materials.....	47
Figure 3.6. Sugar cane (left) and Sugar cane bagasse (right).....	49
Figure 3.7. Panel made of recycled cotton (left) and denim (right)	49
Figure 3. 8. Date Palm elements.....	50
Figure 3. 9. Thermal insulation panel made of rice.....	50
Figure 3. 10. Sunflower panel	51
Figure 3. 11. Viewing panel of a straw bale wall.....	51

Figure 4. 1. Thermal insulation materials impacts	56
Figure 4.2. Classification of the commonly used insulation materials	57
Figure 4. 3. Environmental impact of thermal insulation materials types	59
Figure 4.4. Environmental impact categories.....	63
Figure 4.5. Insulation materials' life cycle key stages	64
Figure 4.6. Key stages description of insulation materials life cycle.....	64
Figure 4.7. Subcategories of life cycle key stages	65
Figure 4.8. Health impact of thermal insulation materials types.....	67
Figure 4.9. Climate change effect on thermal insulation materials.....	69
Figure 4.10. Climate change effect on health.....	70
Figure 4.11. Principles for reduction of Embodied energy	72
Figure 4. 12. Approaches of Embodied Energy	72
Figure 4.13. Breakdown of embodied energy calculations	73
Figure 4.14. Energy used by employees.....	74
Figure 4.15. Embodied Energy of conventional insulation materials	75
Figure 4.16. Global warming potential of conventional insulation materials	75
Figure 4. 17. Average cost of conventional materials.....	77
Figure 4.18. Eco-cost aspects of a building.....	78
Figure 5.2. Asian Thermal Insulation Market	87
Figure 5.3. North America Thermal Insulation Market	87
Figure 5.4. Europe Thermal Insulation Market.....	87
Figure 5. 5. Global Thermal Insulation Market Value for the year 2015 and 2020.....	88
Figure 5. 6. Main Drivers of Global Thermal Insulation Market.....	89
Figure 5. 7. Sustainable Development Dimensions	90
Figure 5.8. Sustainable Development Goals	90
Figure 5.9. Social Dimension related SDGs.....	91
Figure 5.10. Environmental Dimension related SDGs.....	91
Figure 5.11. Economic Dimension related SDGs	92
Figure 5. 12. Importance of Market Drivers in relation to SDGs	94
Figure 5. 14. Residential Buildings Electricity tariff from 2008 till 2018	96
Figure 5. 15. Commercial Building Electricity tariff from 2008 till 2018.....	96
Figure 5. 16. Drivers' weight after addition, based on climate action in Egypt.....	98
Figure 6. 1. Discussed Building Types.....	102
Figure 6. 2. List of Buildings with thermal insulation in Egypt.....	103
Figure 6.3. Dar El-Fouad Hospital- Nasr City	103
Figure 6.4. St. Regis Building	104
Figure 6.5. St. Regis external thermal insulation	104
Figure 6.6. St. Regis plastic washer in thermal insulation	104
Figure 6.7. Grand Egyptian Museum	105
Figure 6.8. Stone wall before cladding.....	105
Figure 6.9. Polyurethane foam thermal insulation	105
Figure 6.10. MB4 Building	106
Figure 6.11. Polyurethane foam spraying thermal insulation	106
Figure 6.12. EFG Hermes Building.....	107
Figure 6.13. Credit Agricole Egypt.....	108
Figure 6.14. ABC Bank.....	108
Figure 6.15. NBD Bank.....	109
Figure 6.16. Reasons why thermal insulation is not generalized in Egypt	112
Figure 6. 17. Circular Economy- Waste Materials concept	115
Figure 6. 18. Circular Economy	115

Figure 6. 19. Map of EU top 5 and bottom countries' CE ranking.....	116
Figure 6. 20. Natural thermal insulation materials - Circular Economy concept.....	119
Figure 6.21. Egypt strategic crops areas 2011/2012	119
Figure 6. 22. Egyptian Governorates crops' areas chart	121
Figure 6. 23. Dakahlia's Leading Crops	121
Figure 6. 24. Qena's Leading Crops	122
Figure 7. 1. Egypt climatic zones	127
Figure 7. 2. Thermal Insulation materials simulated in research by Design builder....	128
Figure 7. 3. Created prototype.....	129
Figure 7. 4. Janna residential units	130
Figure 7. 5. Revit Model	130
Figure 7. 6. Strawbale thermal insulation addition in DesignBuilder	133
Figure 7. 7. Rice husk thermal insulation addition in DesignBuilder	134
Figure 7. 8. Sugarcane bagasse thermal insulation addition in DesignBuilder.....	134
Figure 7. 9. Walls heat gains (No insulation case) - Dakahlia	135
Figure 7. 10. CO ₂ production (No insulation case) - Dakahlia	136
Figure 7. 11. Walls heat gain (XPS case) - Dakahlia	136
Figure 7. 12. CO ₂ production (XPS case) - Dakahlia.....	137
Figure 7. 13. Walls heat gain (Rock wool case) - Dakahlia.....	137
Figure 7. 14. CO ₂ production (Rock wool case) - Dakahlia.....	138
Figure 7. 15. Walls heat gain (Wheat Straw bale case) - Dakahlia.....	138
Figure 7. 16. CO ₂ production (Wheat Straw bale case) - Dakahlia.....	139
Figure 7. 17. Walls heat gain (Rice husk case) - Dakahlia	139
Figure 7. 18. CO ₂ production (Rice husk case) - Dakahlia	140
Figure 7. 19. Walls heat gain (No insulation case) - Qena.....	140
Figure 7. 20. CO ₂ production (No insulation case) - Qena	141
Figure 7. 21. Walls heat gain (XPS case) - Qena	141
Figure 7. 22. CO ₂ production (XPS case) - Qena.....	142
Figure 7. 23. Walls heat gain (Rock wool case) - Qena.....	142
Figure 7. 24. CO ₂ production (Rock wool case) - Qena.....	143
Figure 7. 25. Walls heat gain (Wheat Straw bale case) - Qena.....	143
Figure 7. 26. CO ₂ production (Wheat Straw bale case) - Qena.....	144
Figure 7. 27. Walls heat gain (Sugarcane Bagasse case) - Qena.....	144
Figure 7. 28. CO ₂ production (Sugarcane Bagasse case) - Qena	145
Figure 7. 29. Average walls heat gains for Dakahlia and Qena	147
Figure 7. 30. Average CO ₂ production for Dakahlia and Qena	147
Figure 7. 31. Sustainability through natural thermal insulation materials	151