## Table of contents

Abstract	7
Resumen general	9
Resum general	11
Introduction	13
Historic perspective on buildings and the environment	16
Life Cycle Assessment and Environmental impacts in the built environment	20
Objectives	25
References	27
Chapter 1	30
Abstract	31
1. Introduction	32
1.1 Context of the case study	32
2. Methodology	33
2.1 Goal and scope definition of the study	33
2.2 Functional unit	34
2.3 Inventory analysis	34
2.4 Life Impact Assessment	42
3. Impact assessment results and discussion	43
3.1 IPCC.GWP 100a method comparative results. Carbon Dioxide emissions	49
3.2 Recipe Endpoint method comparative results	49
3.3 Fiber impact comparison	51
4. Conclusions	52
4.1 Further research opportunities	53
5. Acknowledgements	53
References	53

Chapter 2	56
Abstract	57
1. Introduction	58
<ul><li>2. Materials and Methods</li><li>2.1. Acoustic Simulation Methodology</li><li>2.2. Life Cycle Assessment Methodology</li></ul>	59 62 64
<ul><li>3. Results</li><li>3.1. Airborne Noise Insulation Results</li><li>3.2. Life Cycle Assessment Results</li></ul>	68 68 69
4. Discussion	74
5. Conclusions	75
References	76
Chapter 3	80
Abstract	81
1. Introduction	82
<ul> <li>2. Materials and methods</li> <li>2.1 Airborne acoustic insulation</li> <li>2.2 Thermal insulation</li> <li>2.3 Hygrothermal performance</li> <li>2.4 Life cycle assessment</li> </ul>	86 89 90 91 93
<ul> <li>3. Results and discussion</li> <li>3.1 Acoustic results</li> <li>3.2 Thermal transmittance results</li> <li>3.3 Hygrothermal results</li> <li>3.4 Life cycle assessment results</li> <li>3.5 Further considerations</li> </ul>	97 97 98 99 101 104
4 Conclusions and prospects	106
Funding	108
References	108

Chapter 4	114
Abstract Graphical Abstract:	115 115
1 Introduction	116
2 Materials and Methods 2.1 Description of the building 2.2 Thermal simulation 2.3 Life cycle Assessment	118 118 120 121
<ul><li>3 Results</li><li>3.1 Thermal simulation results</li><li>3.2 Impact assessment results</li></ul>	123 123 124
4 Discussion	130
5 Conclusions 5.1 Further research opportunities	133 134
Acknowledgements	135
References	135
Conclusions	140
Main contributions	144
Limitations	145
Future lines of research	145
Appendices	146
Appendix A. Acoustic and thermal insulation measurement process Appendix B. Acoustic measurements Appendix C. U-value and interstitial condensation	148 153 154
Appendix D. Building plans and construction details	155