

1 **A Phenomenological Inquiry of Building and Living in European Earthship Homes**

2

3 **Abstract**

4

5 Earthships remain a relatively under explored type of sustainable/alternative home. This is the first study to  
6 investigate the personal experiences of constructing and living in European Earthship-homes. The aim of this  
7 study is to reveal insights into the ‘hands-on’ practical experience of persons who have constructed their own  
8 Earthship-homes; and to also gather insights into the collective experience of these dwellers on the realities of  
9 living full-time in an Earthship-home. A phenomenological methodology, using an inductive research approach,  
10 was utilised through a qualitative research strategy to solicit insights into the personal experiences of these unique  
11 persons. The main themes and sub-themes that emerge from analysis are that anyone from any background can  
12 make the shift to building/living in an Earthship-home. However, a mixed skillset and knowledge of building  
13 trades, plus a physical and emotional prowess is needed for the long-haul build process, together with access to  
14 financial means and/or available materials are critical factors that influence the outcome of the Earthship building.  
15 Meanwhile, once constructed, off-grid living in an Earthship-home gives dwellers a greater connectivity with the  
16 natural world, raises awareness of consumerism and an enhanced appreciation of human impacts.

17

18 **Keywords:** Recycling and reuse of materials, UN SDG-12, Housing, Sustainable construction.

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## 21 1. INTRODUCTION

22

23 Autonomous-living is a utopian dream for many people, particularly for those who want to remove or minimise  
24 the burden of paying a mortgage/rent or paying utility bills each month. Further, it aids those wanting to reduce  
25 their environmental impact on the planet by reducing their carbon-footprint through the use of natural resources  
26 (sun, wind and rain) to support their home services (heating, cooling, power, water and wastewater treatment) or  
27 improving their sustainable-living by growing their own food (Barr and Gilg, 2006; Aertsens *et al.*, 2009; Hagbert  
28 and Bradley, 2017). For most people, this desire, or lifestyle, remains a dream or becomes a later-life regret of  
29 “*something I should have done*” (DeGenova, 1996; Newall *et al.*, 2009).

30 Making the shift from conventional living to alternative living can be a challenge for those who are  
31 unsure or who are risk adverse, and for those who may not want to jeopardise the security, comfort or investment  
32 that a traditional home can provide (Daigle and Vasseur, 2019). For others they may simply be cautious of  
33 stepping-across into the unknown of leaving their traditions and norms behind to move into an alien surrounding  
34 of off-grid living. However, for some, it may be that they are willing to step forward but they lack the knowledge  
35 and/or the skillsets to build and/or maintain an off-grid home. After all, sustainable building is not a topic widely  
36 covered in educational curricula (CLC, 2019). Acknowledging that many people do become trained trade-persons  
37 (e.g. bricklayer, plumber, etc.), the opportunity to gather the necessary expertise to build an autonomous building  
38 remains limited so the shift still may never happen.

39 Earthships, a type of autonomous building, credited to the innovative architect Michael Reynolds: the  
40 father of Earthships (Prinz, 2015), are marketed as being the exemplar, or epitome, of sustainable housing. First  
41 built in the semi-arid climate of New Mexico, USA, by reusing or repurposing mostly reclaimed urban waste  
42 products (such as vehicle tyres and beverage bottles/cans, etc.), their design includes the utilisation of low  
43 embodied energy materials, passive solar heating and cooling, photovoltaic power systems, rainwater harvesting,  
44 and solar hot water heating, along with black and grey water treatment systems (Earthship Bioteecture, 2005; Miller  
45 *et al.*, 2005; Rockwood, 2014). Architectural designs and instruction manuals for constructing Earthships are  
46 widely available (Reynolds, 1990, 1991, 1993, 2001, 2005; Hewitt and Telfer, 2007, 2012) and these have evolved  
47 to encompass building/living in various climatic zones. For instance, in recent years, Earthships have been  
48 designed and constructed to become homes in both the temperate and Mediterranean climates of Northern and  
49 Southern Europe (Figure 1).

50           The knowledge and skillsets to construct an Earthship is readily available if you are willing to pay to  
51 attend training courses, which are regularly available by Earthship Biotecture, where you are taught how to  
52 construct an Earthship building and given hands-on experience of the processes involved  
53 (www.earthshipbiotecture.com). For those unable to commit to making a payment for training, they can volunteer  
54 to provide the physical labour for free ‘on the job’ training by helping another person(s) construct their Earthship  
55 home (e.g. Grand Designs, 2009). However, to date, no publications have reported the personal experiences of  
56 the builders who have constructed their own Earthship homes.

57           There is a limited number of people who have experienced the lifestyle of living in an Earthship. Whilst  
58 the general public can have the opportunity to pay to stay in an Earthship Guest-hostel (such as those available in  
59 New Zealand or USA) or in an Earthship Eco-resort (such as those available in Fiji or Indonesia), their experience  
60 is often short-lived and does not reveal the practical elements of owning, maintaining and living in an Earthship  
61 building. Therefore, to date, the personal experiences of those who have made the full-time shift to Earthship  
62 dwelling in Europe are also unreported. In fact, Berardi (2013) suggests that the social aspects of any type of  
63 sustainable building are still rarely investigated.

64           The absence of any available evidence to guide individuals or communities on the opportunities and  
65 obstacles of autonomous building/living-in an Earthship home is a research gap that this study addresses.  
66 Therefore, the aim of this study is two-fold: firstly, to reveal insights into the ‘hands-on’ practical experiences of  
67 several people who have constructed their own Earthship homes; and, secondly, to also gather insights into the  
68 collective experiences of these dwellers on the realities of living full-time in an Earthship home.

69

70 In achieving the aim, the study addresses the following research questions:

- 71 •       What ‘lived experiences’ have individuals learnt from building an Earthship home?
- 72 •       What ‘lived experiences’ have individuals learnt from living in an Earthship home?

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75 INSERT Figure 1: Photo of the Brighton Earthship (taken 03/11/2019). Whilst this example is used as a  
76 community building, rather than a home, its appearance and design accords with those of other Earthships.

77

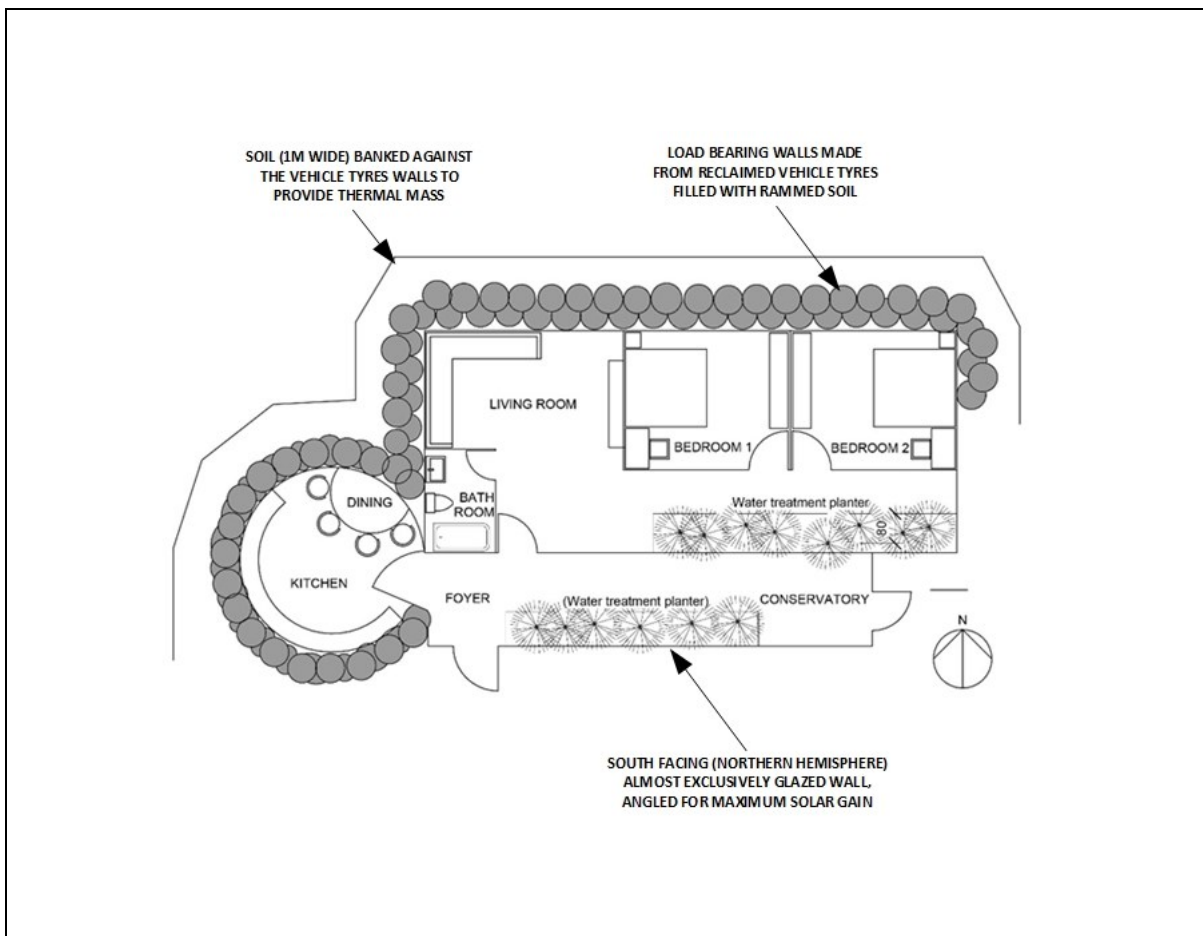
## 78 2. BACKGROUND

79

80 The terms sustainable, green and ecological are seemingly interchangeable nomenclatures used (rightly or  
81 wrongly) to describe many environmentally-sensitive buildings and homes. However, whatever the nomenclature  
82 used, the common feature between all these terms is that they attempt to minimise the environmental impact of  
83 the buildings and their intended use. For instance, Kibert (2008) describe green buildings as “*healthy facilities*  
84 *designed and built in a resource-efficient manner, using ecologically based principles*”; while, Berardi (2013)  
85 suggests “*a sustainable building can be defined as a healthy facility designed and built in a cradle-to-grave*  
86 *resource-efficient manner, using ecological principles, social equity, and life-cycle quality value, and which*  
87 *promotes a sense of sustainable community*”. Whichever label is adopted to describe these buildings, eco-design  
88 is a defining characteristic of them all – with Earthships considered an exemplar in both eco-design and  
89 sustainable living.

90 Earthship buildings – designed to promote sustainability – are considered environmentally-friendly  
91 buildings that have no requirement to draw on non-renewable resources to support contemporary living (Purdy,

92 2011). Based on a U-shaped modulus (Kang *et al.*, 2011), most Earthship buildings are designed with three earth-  
93 rammed, load-bearing walls made from staggered reclaimed vehicle tyres, banked with soil (~1m wide) for  
94 thermal mass, and finished with an eco-cement render, which helps to cool the buildings in summer and warm  
95 the buildings in winter (Figure 2). The walls are anchored down, which serves as a connection for a shallow  
96 pitched roof that often supports skylights to brighten the rooms beneath. The fourth wall is often almost  
97 exclusively glazed, positioned south facing (in the northern hemisphere) and angled for maximum solar gain so  
98 no heating facilities are required and only minimal power is needed from solar panels and/or wind turbines.  
99



100

101 INSERT Figure 2: An architectural plan of the typical layout of an Earthship two-bed building.

102

103 Internal walls are usually timber stud partitioned, with colourful glass bottles and decorative drink cans often  
104 embedded within the walls to enhance the aesthetics and, in doing so, they concomitantly repurpose everyday  
105 household waste. The roof is usually a timber deck (internal ceiling), which is insulated, covered in a vapour  
106 barrier and externally it is shielded with metal sheets (Ip and Miller, 2009). Another key feature of Earthship

107 buildings is the utility services are provided entirely from natural resources. For instance, drinking water is mostly  
 108 captured from rainfall, directed from the roof towards large underground storage tanks where it is filtered and  
 109 treated for later use by the building occupants; grey waste water is channelled (from the sinks) towards planters  
 110 to provide water for food-bearing plants growing in the conservatory at the front of the buildings; black waste  
 111 water (from the toilet) drains to an outside septic tank or botanical wastewater filtration treatment unit, where  
 112 natural reedbed technology purifies the water; and electrical power is generated by nearby wind turbines and/or  
 113 several photovoltaic solar panels (positioned on the roof).

114  
 115 Since the first Earthship was built (1970), by Michael Reynolds, others have been refining his designs and  
 116 specifications. For instance, Barnas *et al.* (2017) has proposed modifications to the design of Earthship buildings  
 117 so they can be adapted for colder-climates. However, what has not changed are the principles underpinning the  
 118 Earthship eco-design. Nowadays, there are believed to be thousands of Earthship buildings in existence around  
 119 the world (Kratzer, 2014). These are known to span at least 40 countries and whose purposes range from schools  
 120 or survival shelters to hostels or homes (Booth *et al.*, 2021). They are also located across all the global main  
 121 climatic regions: Tropical (Fiji), Arid (Mexico), Mediterranean (Spain), Temperate (Scotland) and Cold-Polar  
 122 (Canada). Table 1 lists those places where Earthships are known to have been built across the nations of Europe.

123  
 124

125 Table 1: The location of the European Earthship buildings (n = 12 countries).

126

#	Location	Country
1	Strombeek	Belgium
2	Sazava	Czech Republic
3	Brighton	England
4	Rostrenen	France
5	Tempelhof	Germany
6	Zwolle	Netherlands
7	Krzywca	Poland
8	Gardunha	Portugal
9	Oradea	Romania

10	Kinghorn Fife	Scotland
11	Valencia	Spain
12	Skattungbyn	Sweden

127

128 The work of Booth *et al.* (2021, 2022) attempted to gauge public perceptions of the benefits and barriers of  
 129 building and living in an Earthship home. Their findings reveal environmental drivers (e.g. use of recycled  
 130 materials and renewable energy consumption) are the chief motivators towards the uptake of Earthship  
 131 building/living, rather than the social and economic dimensions involved; while, administrative/preparatory issues  
 132 (e.g. acquiring necessary permits/permissions to build and securing financial support (mortgage/loan)) are  
 133 considered the main challenges towards the uptake of Earthship building/living, rather than the principles of  
 134 autonomous housing. They conclude that the general public deem the general principles of Earthships are an  
 135 acceptable choice of building/living but it is the formal means of building or buying an Earthship home are  
 136 considered the greatest hurdles against the uptake of Earthship buildings. Mindful of the insights provided by  
 137 Booth *et al.* (2021, 2022), this study will explore these issues with those who have experienced building an  
 138 Earthship home and are now living in an Earthship home.

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141

142 **3. RESEARCH DESIGN AND METHODOLOGY**

143

144 A phenomenological-based methodology (i.e. gathering personal experiences) using an inductive research  
 145 approach (i.e. an inquiry to synthesise experiences and observations) was utilised to align with the study's aim.  
 146 Phenomenology (Husserl, 1989) aims to produce an idiographic account of lived experience rather than one  
 147 prescribed by pre-existing theoretical preconceptions (Smith and Osborn, 2015). Using a lifeworld perspective to  
 148 obtain insights through a phenomenological lens often allows for deeper accounts of individual experience to  
 149 emerge (Willig, 2013). Phenomenological investigations are widely reported across a host of disciplines but, to  
 150 date, have been rarely reported for housing (Marquez *et al.*, 2019; Serjeant *et al.*, 2021) or lifestyle related (Casida  
 151 *et al.*, 2011; Li *et al.*, 2021) studies.

152 A qualitative research strategy meant semi-structured interviews were adopted as the method of inquiry.

153 This ensured the central questions were posed in the same way to each participant, whilst allowing some flexibility

154 to adjust questions, where necessary, and to follow-up on any interesting replies. The choice of questions was  
 155 influenced by recent Earthship literature that identified a suite of potential benefits and barriers of Earthship  
 156 building/living (Booth *et al.*, 2021, 2022). Since the main purpose of the interviews was to solicit the personal  
 157 experiences of dwellers who had self-built their own Earthship buildings and were then living in them as their  
 158 full-time homes, the interview schedule was divided into four themes: (i) participant demographics and  
 159 backgrounds; (ii) building an Earthship home; (iii) living in an Earthship home; and (iv) looking back to look  
 160 forward. Examples of the main questions asked to the participants are listed in Table 2.

161

162 Table 2: A list of the questions posed to the Earthship interviewees.

163

#	Interview questions
1	What inspired you to build an Earthship home?
2	What skills, knowledge or help did you assemble to build your Earthship home?
3	How did you choose and source the materials used to build your Earthship home?
4	How did you finance your Earthship home?
5	What were the greatest hurdles you faced creating your Earthship home?
6	What effect has living in an Earthship home had on your everyday life?
8	What have been the greatest challenges in adopting an Earthship lifestyle?
9	What maintenance, updating or alterations to your Earthship home have been required?
10	What interest has your Earthship home provoked from other people?
11	Do you think an Earthship could be sold on the property market?
12	What would ever make you leave this lifestyle behind?
13	What were the greatest hurdles you faced creating your Earthship home?
14	Reflecting on your experience, is there anything that you would change or wish you had done differently?

164

### 165 3.1 Sample Size, Selection and Recruitment

166 There has been only a handful of Earthship buildings constructed across Europe (Table 2). For this reason,  
 167 probability sampling approaches (i.e. random or systematic sampling etc.) were not included because they would  
 168 not contribute to achieving the objectives of this research. In contrast, purposive sampling (a non-probability



169 sampling technique) was adopted, which used explicit inclusion criteria (namely, participants must have built their  
170 own Earthship and be living in their own Earthship). This allowed a specific targeted group of participants to be  
171 invited for interview. However, with so few Earthships built in each European country, to date, the specific nations  
172 where the study participants are dwelling have not been named to avoid any possible breach of confidentiality for  
173 those participants who kindly agreed to support this study. The spread of those persons invited to participate  
174 covered both Northern (temperate climate) and Southern (Mediterranean climate) Europe countries. All  
175 interviewees were offered the opportunity to have in-person face-to-face interviews or online face-to-face  
176 interviews.

177

### 178 3.2 Data Collection and Analysis

179 All narrative interviews were digitally audio recorded (each lasting 50–60 minutes) and then transcribed verbatim  
180 by the researchers. To preserve the anonymity of participants and guarantee their confidentiality, pseudonyms  
181 were applied to the text. As with other phenomenological studies, no computer data analysis software was used  
182 to interrogate the datasets (Capodanno *et al.*, 2020). Moreover, the transcripts were scrutinised by a stepwise  
183 process (Table 3), which involves repeated reading of the transcripts to extract interrelated themes and meanings,  
184 so as to describe the assembly of the phenomenon being investigated (Smith, 1995; Osborn and Smith, 1998).  
185 This is conceivable because the small sample size of most phenomenological studies permits micro-level reading  
186 of participants' narratives.

187 The researchers involved in the study set aside their own pre-understandings so as to accord with the  
188 phenomenological principle of epoche (or bracketing), which attempts to circumvent any preconceptions or  
189 expectations to facilitate the phenomenon of the study objectively. As none of the researchers involved in the  
190 study have been involved in the construction of an Earthship building, nor have they spent any time living in an  
191 Earthship, the researchers' own values should not threaten the interpretations reported.

192

193 Table 3: Description of the stepwise process used to analyse the participant interview narratives (based on Smith  
194 (1995), Osborn and Smith (1998)).

195

Step	Description
1	Interview transcripts were read, and re-read several times, to ensure a general sense was obtained of the whole nature of participant's narratives.

2	Returning to the beginning, the transcripts were re-read and any emerging themes identified and organised tentatively.
3	Attention was then focused on the themes themselves to group and define them in more detail and establish their interrelationships.
4	The shared themes were then organised to formulate consistent and meaningful statements, which contribute to an account of the meaning and essence of the participants' experience grounded in their own words.
5	The superordinate themes and statements were then referred back to the original transcripts to verify their occurrence.

196

197 Ethical approval was sought before the interviews were conducted. Approval meant all participants were informed  
 198 in a participant information cover letter that their consent and involvement was anonymous and entirely voluntary.  
 199 The interviewer and interviewees were accompanied by a companion on site visits to ensure the safety and welfare  
 200 of those involved in the meetings. After which, all interviewees (both in-person and online) were given a two-  
 201 week window to allow them (if they desired) to withdraw their responses. This procedure is compliant with the  
 202 expectations of university research ethics regulations in the UK.

203

204

## 205 **4. RESULTS**

206

207 Using the themes and subthemes generated by the analysis, along with selected verbatim quotes, the findings of  
 208 the study are presented beneath under four main section headings: (i) participant demographics and backgrounds;  
 209 (ii) building an Earthship home; (iii) living in an Earthship home; and (iv) Looking back to look forward. To  
 210 protect anonymity of the participants, no personal information about the participants is used in any of the  
 211 descriptions or in any of the direct comments included.

212

### 213 **4.1 Participant Demographics and Backgrounds**

214 Seven participants (four male and three female) responded to the invitation to be interviewed about their 'lived'  
 215 Earthship experiences. This sample size accords with the expectations of a phenomenological study (i.e. the  
 216 sample size should be between 6–8 persons (Gauntlett *et al.*, 2017)) and, as such, is similar to those reported by

217 Smith and Osborn (2007) and by Marriott and Thompson (2008), who used six participants and eight participants,  
218 respectively, in their phenomenological studies.

219 The participants came from an almost equal share of both Northern and Southern European countries.  
220 Four of the participants interviewed opted for in-person face-to-face meetings at the site of their Earthships and  
221 three participants opted to be interviewed in online face-to-face meetings. Each of the participants who agreed to  
222 take part in the study confirmed they had personally built and were now living in their own Earthship home.  
223 Therefore, all the participants met the eligibility criteria set out earlier. The timescales that participants have been  
224 living in their Earthships ranged from two to eight years.

225 Most of the participants stated their ages were between 30–40 years, with one between 50–60 years, and  
226 most said they had graduated from university with degree-level qualifications. The range of the participants’  
227 former professions (i.e. teachers, ecologist, software engineer and an artist) is reflective of their high qualification  
228 status. Given these conventional professions, it is perhaps not surprising that the majority of the participants said  
229 they were previously living ‘normal’ lives – with them all keen to state that they had previously been paying rents  
230 and utility bills and that they had been living in ‘traditional’ brick/stone- and timber-built homes (i.e. a Victorian  
231 (pre-1901) building, a Farmhouse and an apartment, amongst others), before they embarked on an Earthship  
232 lifestyle. However, it is noteworthy to mention that two participants also revealed they had also previously tried  
233 alternative living at some point in their earlier lives (i.e. living in a small-hut for five years and living in a yurt  
234 for three years) before deciding to build their Earthship homes. The prompts and decisions they claimed that  
235 underpinned participant’s desires to leave their former lives and construct an Earthship building, so as to adopt an  
236 autonomous lifestyle, varied in their order of importance but, in the main, all the responses revolved around  
237 concerns for their former financial outlays each month (e.g. rents, bills, and maintenance) and discomforts of their  
238 former home/lifestyle (e.g. extreme seasonal inside temperatures, limited natural room lighting and available  
239 outside space).

240

#### 241 **4.2 Building an Earthship Home**

242

243 All the participants stated that they first became aware of Earthship buildings in the years just before and after the  
244 turn of the Millennium – some whilst doing volunteering work and others whilst they were travelling the world.  
245 An increasing awareness of global sustainability issues and a growing interest in environmental principles were  
246 the overriding drivers that underpinned participants inspiration towards Earthship buildings. This is highlighted

247 by the statement of the participant who [leaning on a chair, and looking up and down] said *“I’ve always felt that*  
248 *the world is in trouble and that people need to change their cultures and I really feel strongly that comes from the*  
249 *way we live in buildings because it shapes the way we interact with the rest of the world so if we build buildings*  
250 *that makes us conscious by the default by the way they are built they make us connected again with nature...I*  
251 *think that buildings are the main element of the change”*. Moreover, they all seemed to have had a burning  
252 ambition to self-build their own home, especially with eco-design features. This is evidenced by a participant  
253 who [seemingly excited by the question asked] said, *“When I came across the Earthship philosophy, I really loved*  
254 *the idea of being able to build it ourselves. And I also really love the look of the Earthships once they are built.”*

255 In all the cases each of the participants brought-in additional external support with their build process.  
256 For many of them, they called upon the services of the original Earthship architectural pioneer, Michael Reynolds,  
257 and his support crew, to initiate their Earthship build projects so they did not make any mistakes. This is  
258 highlighted by the statement of the participant who said *“We wanted to make it a really good building, we wanted*  
259 *it to be built to a high specification, short time scale, and be really professional built...the Earthship is like a*  
260 *machine [smile] so if you don’t get the components and parts in the right place the machine is not going to work.*  
261 *So, it was really important that we got the experts in to explain how to put this building together”* [nodding their  
262 head]. Most of the participants also decided to involve specialist contractors at various points of their Earthship  
263 builds, namely companies who could safeguard the performance of the roof structure and water-tightness; and to  
264 mount the solar panels and install batteries to power their homes. It is important to note that all participants  
265 beckoned help from friends, family and/or volunteers to help in the construction of their Earthship homes. Despite  
266 bringing-in this extra support and services, all the buildings took more than a year to construct and one of them  
267 took almost eight years to complete.

268 Most of the construction materials used in each of the builds was collected for free, often from garages,  
269 recycling centres, companies or friends. For instance, all the interviewees confirmed that the structural walls were  
270 made from recycled tyres filled with rammed earth and the spaces between were filled with aluminium cans.  
271 Furthermore, they had used glass and plastic bottles in the decoration of their interior walls. This is evidenced by  
272 the participant who [enthusiastic and animated] said *“The beer and wine bottles and cans have come from friends,*  
273 *we put out the call to the local garden clubs to collect things for us”* [followed by giggles]. All participants were  
274 keen to emphasise their homes were mostly derived from reclaimed salvage – all saying that most of their timber  
275 and all their doors were reclaimed materials that were heading for landfill and by them recycling or reusing them,  
276 they had now found a second life. This is highlighted by the participant who [grinning] said *“Do you know the*

277 *Wombles?*” [laughing loudly] and then said “*all of the doors in the place are reclaimed... we pick them up from*  
278 *the sides of the roads or we bought them from people who were getting rid; or some people just have given them*  
279 *to us knowing that we are the Wombles!*”. This latter comment is particularly interesting because the Wombles  
280 were children’s TV characters (programmes first aired in 1973) whose environmental ethos was considered to be  
281 ahead of its time. Almost 50–years ago they were promoting the reusing and recycling of materials in their home  
282 and in their everyday lives from things that others had discarded or no longer wanted.

283           When it came to financing the building of the Earthships, most of the participants stated that they were  
284 able to afford the material and construction costs of their Earthship homes without the need to borrow funds (e.g.  
285 mortgage or personal loans). This was possible by using equity funds accumulated by the sale of their own  
286 ‘conventional’ homes. For the a few that did need to seek some financial support, they only borrowed money in  
287 the latter stages of the build to finish–off the project. This is highlighted by the participant who [fidgeting before  
288 replying] said “*At the beginning we saved up money...but when it came time to install the roof and the solar*  
289 *system we took out a loan, which was expensive. We paid it back within eight years so it is all paid now*” [and  
290 expressed with some obvious relief at this outcome]. It is noteworthy to mention that all these loans were  
291 public/government financial supported opportunities.

292           Planning permission and the associated bureaucracy attached to building a home of this type were  
293 deemed as the overwhelming challenges aired by all the participants. This is highlighted by the statement of the  
294 participant who [paused and firmly] said “*Planning permission is not a problem...well, it is a problem but not*  
295 *because it is an Earthship. It is a problem because of the way that permits are given to live on land*”. However,  
296 some were keen to also point–out that once planners became understanding and appreciative of the Earthship’s  
297 principles, its design played in its favour with the planning authorities. This is evidenced by the participant who  
298 [convincingly resolute] said “*you have an advantage because an Earthship is aligned with the future, where*  
299 *everybody knows we need...the whole kind of low carbon thinking*”.

300           The other notable challenges shared amongst the participants was the sheer physicality of the build  
301 process and the incessant time it takes to build an Earthship home. Several participants felt that having some  
302 building experience would have somewhat addressed both these issues. In fact, all participants enforced the need  
303 for experienced persons to be involved in the construction process – particularly constructing the roof structure as  
304 this was a physical and time–consuming task, which became expensive when professional persons were needed  
305 to make it fully functional.

306

### 307 4.3 Living in an Earthship Home

308

309 There was overwhelming agreement amongst the participants that living in an Earthship has meant they have  
310 become better connected with nature and this has influenced their lifestyle behaviours. For instance, the majority  
311 stated they regularly spent time watching the weather, leading them to monitor the performance of their solar  
312 panels and, as a consequence, this has led them to being mindful about their personal energy use. Several  
313 participants described the experience of living in an Earthship as feeling like being outside all the time but having  
314 the comforts of being inside. Participants also highlight the enforced shifts in adopting an environmentally-  
315 friendly lifestyle and awareness of consumerism. This is evidenced by the participant who [in a stern voice] said,  
316 *“It enforces its inhabitants...you cannot buy toxic or polluting soap and things like that, because it would kill the*  
317 *bacteria in your planter...you have to make the right choices at the market”*. It is noteworthy to also highlight the  
318 choice of the words the range of participants used to describing the experience of living in an Earthship – these  
319 included: comforting, luxurious, spacious, heated, quiet, relaxed, easier and sensory.

320 The consensus amongst the participants was that living in an Earthship was a much more comfortable  
321 lifestyle than they had originally envisaged. This is highlighted by the participant who [in a passionate tone] said  
322 *“They can be built so beautifully and you can make it as comfortable as you like, if you have the creativity and*  
323 *maybe money or time”*. Moreover, two entwined themes emerged around the benefits participants had experienced  
324 from living off-grid, namely, cost savings made from not paying utility bills and the security provided to them,  
325 in terms of self-sufficiency of energy, water and heating. This was often exclaimed with immense pride towards  
326 their home and lifestyle and is highlighted by the participant who [beaming with pride] said *“we have a home*  
327 *which is very desirable”*.

328 Most participants shared a view that the ongoing upkeep of outside wooden features (e.g. window frames,  
329 etc.), which are regularly exposed to weather stresses, was the greatest maintenance challenge. However, their  
330 greatest maintenance worry was the need to one-day have to replace their solar panels. Otherwise, all participants  
331 listed routine maintenance requirements you would expect from living in an Earthship (e.g. cleaning water filters,  
332 checking and filling batteries, caring for food-bearing plants, amongst others) and nothing that they could not do  
333 themselves. This is evidenced by the statement, *“Because you built it yourself, you understand how it works so I*  
334 *think the maintenance is easier”*.

335

### 336 4.4 Reflection on Experiences

337

338 Themes identified from participants suggestions about what they wished they had done differently are changes in  
339 the design and size of the building/rooms (e.g. add a double conservatory, add a porch or create a larger  
340 bathroom/utility space) or differences in the materials used (e.g. use less cement or use more natural materials).  
341 However, the most important message is to choose the best and most appropriate site for the Earthship. This is  
342 reiterated by the participant who [seemingly saddened] said, “*The one that we are living in now we had planned*  
343 *it to be the test one...I mean it is not in a bad position it is just not where we would have had the main one*” [and  
344 then smiled].

345 When asked to reflect on the journey of experiences they had gone through, the majority of participants  
346 believe most of society are not physically and/or emotionally ready to make the shift to an Earthship. It was  
347 suggested that some nations have almost zero demand for anything sustainable. However, most believe there is  
348 an acceptance that Earthships could be sold just like other homes on the open market but they would never be  
349 mainstream because homes are treated as an investment. This is evidenced by the participant who was nodding  
350 and gesturing whilst saying “*The supply is not adequate and the demand is not adequate because people are*  
351 *conventional. When people think about buying a house they do think about it like an investment, it is their financial*  
352 *future...people’s choices are towards conventional because investment is conservative*”.

353 All participants were clear that now they had built their dream home, they had no immediate intentions  
354 of leaving their Earthships, as revealed by the statement, “*we are not planning to ever move*” [the participant then  
355 gave a smile and self-reassuring nod of their head]. However, when encouraged to describe circumstances that  
356 may force them to move, most participants indicated that caring for aging relatives or their children wanting  
357 move-on could cause them to reconsider the lifestyle choices. Others joked that it would take a natural disaster to  
358 uproot them from their Earthship. This is highlighted by the participant who [after lots of laughter] said “*I guess*  
359 *some disaster...like an earthquake*” [and laughed again]. To appreciate the context, they had spent 8 years building  
360 their Earthship and had only lived in it for short time since finishing so they were still exhausted by the process.

361 When reflecting on their experience, most participants identified a lack of professional knowledge at the  
362 start of the build as their greatest shortfall in the journey of building their Earthship and, as such, their prerequisite  
363 advice would be to upskill before starting. This is evidenced by the statement, “*you’ve got to work out how you*  
364 *are going to gain the skills and the knowledge to make sure that you build it properly*”. Similarly, they all described  
365 fitness, stamina, commitment and patience as essential personal requirements needed to complete the build.  
366 However, it seems project management know-how is the overriding attribute of advice towards the delivery of a

367 successful outcome. This is highlighted by a participant who [pausing thoughtfully] said, “*cost is so important*  
368 *because all the while you are building you are not earning so where is your money coming from?*” and further  
369 highlighted by the statement, “*How [are] you going to manage the budget?...an Earthship is a lot of about reusing*  
370 *materials [but] you do still have to buy some things*”.

371

## 372 **6. DISCUSSION**

373

374 This study suggests local authority planners maybe hostile towards an Earthship application at the beginning of  
375 the formal process; however, it seems there is a likelihood of them favouring the proposed building when they  
376 pause to truly value the Earthship philosophy, as guidance within National Planning Policy Frameworks highlight  
377 that developments should be planned to reduce carbon emissions and protect the environment (e.g. MHCLG,  
378 2021). In the UK, for instance, soon after the first Earthship was built (completed 2006) in Brighton, England, the  
379 local council then gave permission for the development of sixteen Earthship homes (one–bed, two–bed and three–  
380 bed houses), including some for social housing, to be built on the seafront overlooking Brighton marina. In fact,  
381 the Head of Sustainability at Brighton and Hove Council, was reported to have said “*This is just the sort of*  
382 *forward–thinking scheme that we should be championing*” (BBC, 2007). Therefore, it seems once a precedent has  
383 been set and there is an acceptance and appreciation of Earthship homes, the perception that planning will be a  
384 cumbersome obstacle can be spurned and shelved.

385         The enormity and magnitude of planning and building a self–build home should never be underestimated  
386 (Benson & Hamiduddin, 2017; Salet *et al.*, 2020), and this seems particularly true for Earthship homes. From the  
387 accounts analysed in this study, constructing an Earthship home is without doubt a physical, emotion and lengthy  
388 journey for every builder but the reward it seems is worth the efforts and sacrifices. This is supported by a similar  
389 housing scheme, the Hedgehog Housing Co–op, which saw a group of people who were in housing need, spend  
390 two years building a collection of affordable eco–homes for themselves (Grand Designs, 1999). Like the Earthship  
391 builders, none of the group had experience of building houses. However, each of the intended households  
392 committed to spending 30 hours of unpaid work per week on site (on top of the many hours they each spent in  
393 paid employment), working together until they had all helped build each other’s homes. The ten homes they built  
394 were not traditional stone or brick buildings, rather they are highly insulated wooden–frame structures, topped  
395 with turf–roofs. Like Earthships, they were positioned south–facing to capture the most natural light and heat from  
396 the sun and the layout of each home was individualised to the preferences of each family. It has been more than



397 twenty years since those homes were built, and whilst the children of the households have grown and created their  
398 own lives, the self-builders are still living their dream in their eco-homes (Grand Designs, 2001, 2012).

399 This study has shown that whilst many of the materials acquired to construct Earthship homes may be  
400 recycled or reused resources, and can often be available for free, Earthship builders will need to pay-out for some  
401 goods and services that they may not have originally planned or budgeted. Longer-term, this may lead to regrets  
402 in the choice of materials used (i.e. possibly increasing the building's carbon footprint) or the likelihood of needing  
403 to take-out loans to finance their builds. However, on the positive side, as most European nations have  
404 implemented energy efficiency strategies (e.g. EU Directive on Energy Efficiency, 2018), several governments  
405 are offering financial initiatives to incentivise the delivery of residential energy efficiency. Therefore, it is highly  
406 likely that these will be available to Earthship builders because their eco-design accords with the expectations of  
407 net zero/low carbon buildings. Many of the world's governments acknowledge the need to address the anticipated  
408 impacts of climate change so one strategic approach has been to minimise building energy usage. For instance,  
409 the Scottish Government's HEEPS (Home Energy Scotland Loan Scheme) was offering £15,000 interest-free  
410 loans towards the use of energy efficient measures. Such a scheme could certainly be appealing to an Earthship  
411 builder.

412 Earthship living has reportedly had a positive influence on the lives of all the participants – the study has  
413 shown it has brought them closer to nature. This could be hugely important for those choosing to live in Earthships  
414 because there is a growing volume of evidence to indicate that engaging with natural environments is associated  
415 with a range of positive health, wellbeing and pro-environmental outcomes (Lovell *et al.*, 2018). Several studies  
416 have shown that nature connectivity improves personal happiness and life satisfaction (Mayer *et al.*, 2009), plus  
417 it provides reductions in both physical and psychological stress levels (Ewert and Chang, 2018). Furthermore, this  
418 could also be a useful factor in determining the monetary value of an Earthship building because 'natural capital'  
419 is becoming increasingly recognised in accounting for the wealth it provides (McKenna *et al.*, 2019). However,  
420 others may suggest that attempting to monetise nature is putting a price on something priceless (Helm, 2015).

421 Earthship living has also enabled the participants to enjoy improved comfort, particularly in terms of  
422 financial savings and self-sufficient security. Several studies have shown that residential satisfaction can be  
423 directly attributed to home ownership (Elsinga & Hoekstra, 2005; Huang *et al.*, 2015), which in the case of  
424 Earthship builders is presumably further enhanced by the achievement of knowing that they self-built their own  
425 properties. Homeownership is suggested to provide residents with greater security, higher self-esteem, better  
426 social identity and a financial advantage to create/appreciate wealth (Huang *et al.*, 2015). Of particular note is the

427 study of Huang *et al.* (2015), which concluded that housing design and its facilities were the most important  
428 attributes in determining an individuals' residential satisfaction and life quality. These are both unique features of  
429 Earthship homes.

430           Since the first experimental Earthships where built in the 1970's, there has been a surge in the number  
431 of Earthship buildings constructed across the globe. Nowadays, there are believed to be thousands of Earthship  
432 buildings in existence around the world (Kratzer, 2014). Therefore, it seems there are an increasing slice of society  
433 that is ready to make the shift to Earthship homes and the lifestyle they provide. This study has shown there is a  
434 common belief that Earthships could be readily bought and sold and, moreover, they would not be considered an  
435 investment risk. Fortunately, as alternative and autonomous housing is becoming more commonplace, some  
436 sustainability-driven lenders (e.g. the Triodos Bank and the Ecology Building Society) (Thompson and Cowton,  
437 2004; Yip and Bocken, 2018; Seyfang and Gilbert-Squires, 2019), are recognising the shift towards  
438 alternative/autonomous housing and they are now providing the financial backing for such endeavours. This swing  
439 may be strengthened by the knowledge that earth-sheltered houses in Nottinghamshire (The Hockerton Housing  
440 Project (Vale and Vale, 2013)) have readily sold and resold on the open market and their values have sizeably  
441 increased alongside market prices.

442           Like the residents of the Hedgehog scheme who have been living in their homes for >20 years, none of  
443 the Earthship participants involved in this study are considering moving-on anytime soon. Given the shortage and  
444 affordance of traditional mass housing, it seems there has never been a greater need for an alternative self-build  
445 solution to meet housing needs than now. Anybody wanting an Earthship (or similar) home may need to start the  
446 planning and building process for themselves sooner rather than later. Foremost because the option of  
447 self/community building is becoming a prevalent choice across many northern European counties. For instance,  
448 the Homeruskwartier neighbourhood of Almere (106 hectares of reclaimed land, 26km east of Amsterdam,  
449 Netherlands) is expected to create 20,000 assisted self-build homes for lower- and middle-income households  
450 (Bossuyt, 2020). However, before starting one of these projects, the advice gathered from the participants of this  
451 study is for anyone beginning the Earthship journey is to obtain as much of the necessary knowledge and skills  
452 before starting.

453

## 454 **7. CONCLUSIONS AND RECOMMENDATIONS**

455

456 In this study, we have explored the personal experiences of European Earthship self-builders and, by adopting a  
457 phenomenological stance, allowed the analysis of those experiences to be categorised into themes and sub-themes  
458 that reveal unique insights into the encounters of those who have built their own Earthship homes and exposed  
459 the perspicacity of living in their own Earthship homes. In doing so, we have answered both of the research  
460 questioned posed earlier in this paper.

461 According to the findings of our study, anyone from any background can make the shift to building/living  
462 in an Earthship home. Nonetheless, it is clear that a mixed skillset and knowledge of building trades, plus the  
463 physical and emotional prowess needed for the long-haul build process, alongside access to sufficient financial  
464 means and/or available materials, are critical factors influencing the outcome of an Earthship building.

465 Earthship living has been revealed to have a positive influence on the lives of its dwellers and it has  
466 brought them closer to nature, which is known to improve personal health and well-being traits. It has also enabled  
467 them to enjoy improved comfort, particularly in terms of financial savings and self-sufficient security. Despite  
468 some maintenance issues, not too different from conventional homes, having self-built means making repairs can  
469 be easier because of their personal confidence, insight and understanding of their own building

470 Earthship buildings are likely to remain on the margins of housing supply/demand. However, for those  
471 who have gone through the process of creating their own Earthship dream home, and are now rejoicing in the  
472 fruits of their labours, their collective voices suggest they have no intentions of relinquishing them for others just  
473 yet. Therefore, for those in society still exhuming a passion towards sustainable homes and green living it is likely  
474 they will need to drive the vision of their Earthship building/living themselves if they want this home/lifestyle to  
475 transpire.

476 There are many paradoxes to unravel and a host of unpalatable truths to confront before we can achieve  
477 sustainable buildings/living (Horton and Horton, 2019). Therefore, based on the findings of this study, the  
478 following is a list of recommendations for future research on Earthship buildings:

- 479 • Exploring the practicability of existing funding models (particularly the partnership or locally-led/bottom-  
480 up models) that could be utilized for Earthship homes.
- 481 • Unpicking a route of least resistance through the bureaucratic obstacles of permissions and licenses needed  
482 to gain approval to build an Earthship.
- 483 • Development of building standards to regulate the approaches to construction, as well as stipulating quality  
484 requirements for Earthship building construction.
- 485 • Promoting participatory grassroots community build projects to execute the delivery of Earthship homes.

486 • Assessing the value of tangible and intangible benefits derived from autonomous low-impact Earthship  
487 living.

488

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502

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