A Phenomenological Inquiry of Building and Living in European Earthship Homes

**Abstract**

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

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

**1. INTRODUCTION**

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

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

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

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

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

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

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

* What ‘lived experiences’ have individuals learnt from building an Earthship home?
* What ‘lived experiences’ have individuals learnt from living in an Earthship home?

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

**2. BACKGROUND**

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

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

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

Internal walls are usually timber stud partitioned, with colourful glass bottles and decorative drink cans often embedded within the walls to enhance the aesthetics and, in doing so, they concomitantly repurpose everyday household waste. The roof is usually a timber deck (internal ceiling), which is insulated, covered in a vapour barrier and externally it is shielded with metal sheets (Ip and Miller, 2009). Another key feature of Earthship buildings is the utility services are provided entirely from natural resources. For instance, drinking water is mostly captured from rainfall, directed from the roof towards large underground storage tanks where it is filtered and treated for later use by the building occupants; grey waste water is channelled (from the sinks) towards planters to provide water for food–bearing plants growing in the conservatory at the front of the buildings; black waste water (from the toilet) drains to an outside septic tank or botanical wastewater filtration treatment unit, where natural reedbed technology purifies the water; and electrical power is generated by nearby wind turbines and/or several photovoltaic solar panels (positioned on the roof).

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

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

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| **#** | **Location** | **Country** |
| 1 | Strombeek | Belgium |
| 2 | Sazava | Czech Republic |
| 3 | Brighton | England |
| 4 | Rostrenen | France |
| 5 | Tempelhof | Germany |
| 6 | Zwolle | Netherlands |
| 7 | Krzywcza | Poland |
| 8 | Gardunha | Portugal |
| 9 | Oradea | Romania |
| 10 | Kinghorn Fife | Scotland |
| 11 | Valencia | Spain |
| 12 | Skattungbyn | Sweden |

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

**3. RESEARCH DESIGN AND METHODOLOGY**

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

A qualitative research strategy meant semi–structured interviews were adopted as the method of inquiry. This ensured the central questions were posed in the same way to each participant, whilst allowing some flexibility to adjust questions, where necessary, and to follow–up on any interesting replies. The choice of questions was influenced by recent Earthship literature that identified a suite of potential benefits and barriers of Earthship building/living (Booth *et al*., 2021, 2022). Since the main purpose of the interviews was to solicit the personal experiences of dwellers who had self–built their own Earthship buildings and were then living in them as their full–time homes, the interview schedule was divided into four themes: (i) participant demographics and backgrounds; (ii) building an Earthship home; (iii) living in an Earthship home; and (iv) looking back to look forward. Examples of the main questions asked to the participants are listed in Table 2.

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

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| **#** | **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? |

**3.1 Sample Size, Selection and Recruitment**

There has been only a handful of Earthship buildings constructed across Europe (Table 2). For this reason, probability sampling approaches (i.e. random or systematic sampling etc.) were not included because they would not contribute to achieving the objectives of this research. In contrast, purposive sampling (a non–probability sampling technique) was adopted, which used explicit inclusion criteria (namely, participants must have built their own Earthship and be living in their own Earthship). This allowed a specific targeted group of participants to be invited for interview. However, with so few Earthships built in each European country, to date, the specific nations where the study participants are dwelling have not been named to avoid any possible breach of confidentiality for those participants who kindly agreed to support this study. The spread of those persons invited to participate covered both Northern (temperate climate) and Southern (Mediterranean climate) Europe countries. All interviewees were offered the opportunity to have in–person face–to–face interviews or online face–to–face interviews.

**3.2 Data Collection and Analysis**

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

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

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

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| **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. |

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

**4. RESULTS**

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

**4.1 Participant Demographics and Backgrounds**

Seven participants (four male and three female) responded to the invitation to be interviewed about their ‘lived’ Earthship experiences. This sample size accords with the expectations of a phenomenological study (i.e. the sample size should be between 6–8 persons (Gauntlett *et al*., 2017)) and, as such, is similar to those reported by Smith and Osborn (2007) and by Marriott and Thompson (2008), who used six participants and eight participants, respectively, in their phenomenological studies.

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

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

**4.2** **Building an Earthship Home**

All the participants stated that they first became aware of Earthship buildings in the years just before and after the turn of the Millennium – some whilst doing volunteering work and others whilst they were travelling the world. An increasing awareness of global sustainability issues and a growing interest in environmental principles were the overriding drivers that underpinned participants inspiration towards Earthship buildings. This is highlighted by the statement of the participant who [leaning on a chair, and looking up and down] said *“I’ve always felt that the world is in trouble and that people need to change their cultures and I really feel strongly that comes from the way we live in buildings because it shapes the way we interact with the rest of the world so if we build buildings that makes us conscious by the default by the way they are built they make us connected again with nature…I think that buildings are the main element of the change”.* Moreover, they all seemed to have had a burning ambition to self–build their own home, especially with eco–design features. This is evidenced by a participant who [seemingly excited by the question asked] said, “*When I came across the Earthship philosophy, I really loved the idea of being able to build it ourselves. And I also really love the look of the Earthships once they are built.*”

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

 Most of the construction materials used in each of the builds was collected for free, often from garages, recycling centres, companies or friends. For instance, all the interviewees confirmed that the structural walls were made from recycled tyres filled with rammed earth and the spaces between were filled with aluminium cans. Furthermore, they had used glass and plastic bottles in the decoration of their interior walls. This is evidenced by the participant who [enthusiastic and animated] said *“The beer and wine bottles and cans have come from friends, we put out the call to the local garden clubs to collect things for us”* [followed by giggles]. All participants were keen to emphasise their homes were mostly derived from reclaimed salvage – all saying that most of their timber and all their doors were reclaimed materials that were heading for landfill and by them recycling or reusing them, they had now found a second life. This is highlighted by the participant who [grinning] said “*Do you know the Wombles?*” [laughing loudly] and then said “*all of the doors in the place are reclaimed…we pick them up from the sides of the roads or we bought them from people who were getting rid; or some people just have given them to us knowing that we are the Wombles!”*. This latter comment is particularly interesting because the Wombles were children’s TV characters (programmes first aired in 1973) whose environmental ethos was considered to be ahead of its time. Almost 50–years ago they were promoting the reusing and recycling of materials in their home and in their everyday lives from things that others had discarded or no longer wanted.

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

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

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

**4.3** **Living in an Earthship Home**

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

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

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

**4.****4 Reflection on Experiences**

Themes identified from participants suggestions about what they wished they had done differently are changes in the design and size of the building/rooms (e.g. add a double conservatory, add a porch or create a larger bathroom/utility space) or differences in the materials used (e.g. use less cement or use more natural materials). However, the most important message is to choose the best and most appropriate site for the Earthship. This is reiterated by the participant who [seemingly saddened] said, “*The one that we are living in now we had planned 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 then smiled].

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

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

 When reflecting on their experience, most participants identified a lack of professional knowledge at the start of the build as their greatest shortfall in the journey of building their Earthship and, as such, their prerequisite advice would be to upskill before starting. This is evidenced by the statement, “*you’ve got to work out how you are going to gain the skills and the knowledge to make sure that you build it properly*”. Similarly, they all described fitness, stamina, commitment and patience as essential personal requirements needed to complete the build. However, it seems project management know–how is the overriding attribute of advice towards the delivery of a successful outcome. This is highlighted by a participant who [pausing thoughtfully] said, “*cost is so important because all the while you are building you are not earning so where is your money coming from?”* and further highlighted by the statement, *“How [are] you going to manage the budget?...an Earthship is a lot of about reusing materials [but] you do still have to buy some things*”.

**6. DISCUSSION**

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

 The enormity and magnitude of planning and building a self–build home should never be underestimated (Benson & Hamiduddin, 2017; Salet *et al*., 2020), and this seems particularly true for Earthship homes. From the accounts analysed in this study, constructing an Earthship home is without doubt a physical, emotion and lengthy journey for every builder but the reward it seems is worth the efforts and sacrifices. This is supported by a similar housing scheme, the Hedgehog Housing Co–op, which saw a group of people who were in housing need, spend two years building a collection of affordable eco–homes for themselves (Grand Designs, 1999). Like the Earthship builders, none of the group had experience of building houses. However, each of the intended households committed to spending 30 hours of unpaid work per week on site (on top of the many hours they each spent in paid employment), working together until they had all helped build each other’s homes. The ten homes they built were not traditional stone or brick buildings, rather they are highly insulated wooden–frame structures, topped with turf–roofs. Like Earthships, they were positioned south–facing to capture the most natural light and heat from the sun and the layout of each home was individualised to the preferences of each family. It has been more than twenty years since those homes were built, and whilst the children of the households have grown and created their own lives, the self–builders are still living their dream in their eco–homes (Grand Designs, 2001, 2012).

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

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

 Earthship living has also enabled the participants to enjoy improved comfort, particularly in terms of financial savings and self–sufficient security. Several studies have shown that residential satisfaction can be directly attributed to home ownership (Elsinga & Hoekstra, 2005; Huang *et al*., 2015), which in the case of Earthship builders is presumably further enhanced by the achievement of knowing that they self–built their own properties. Homeownership is suggested to provide residents with greater security, higher self–esteem, better social identity and a financial advantage to create/appreciate wealth (Huang *et al*., 2015). Of particular note is the study of Huang *et al*. (2015), which concluded that housing design and its facilities were the most important attributes in determining an individuals' residential satisfaction and life quality. These are both unique features of Earthship homes.

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

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

**7. CONCLUSIONS AND RECOMMENDATIONS**

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

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

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

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

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

* Exploring the practicability of existing funding models (particularly the partnership or locally–led/bottom–up models) that could be utilized for Earthship homes.
* Unpicking a route of least resistance through the bureaucratic obstacles of permissions and licenses needed to gain approval to build an Earthship.
* Development of building standards to regulate the approaches to construction, as well as stipulating quality requirements for Earthship building construction.
* Promoting participatory grassroot community build projects to execute the delivery of Earthship homes.
* Assessing the value of tangible and intangible benefits derived from autonomous low–impact Earthship living.

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