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Pottery in Perspective: Life Cycle Thinking and Environmental Priorities in Craft Practice

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ABSTRACT:
A comparative Life Cycle Thinking (LCT) approach is used to assess the environmental significance of pottery-making within the broader context of everyday lifestyles. While craft ceramics are often seen as local, small-scale, and sustainable, they are also energy- and material-intensive. Drawing on a literature review of LCA studies of ceramic manufacturing, lifestyles and products - and informed by the author's Life Cycle Analysis (LCA) of handmade pottery and ethnographic research in UK workshops - the study discusses Greenhouse Gas emissions (GHG) and other environmental impacts of craft ceramics.

Although many practitioners are already improving efficiency in their studios, this paper argues that placing pottery within a wider lifestyle context reveals overlooked opportunities. The findings compare the impacts of pottery-making with aspects of daily life such as transport and dietary habits, offering a more proportionate view of environmental responsibility. The paper discusses priority interventions for the craft, supporting its role in the broader transition to more sustainable and decarbonized ways of living.

Keywords: Life Cycle Thinking, craft ceramics, studio pottery, Life Cycle Analysis, carbon footprint

1. Introduction

Sustainability has become a growing concern among makers and users of handmade pottery (Bloomfield 2020, Smith 2020). A discipline rooted in local, small-scale practices it is nevertheless reliant on mining virgin materials and energy-intensive processes such as kiln firings. Characterised as both low-tech and high-impact, craft pottery embodies the tensions and opportunities of sustainable transition in the creative industries. Potters share solutions to reduce the environmental impacts of their practices by implementing changes in their studios—reducing waste, reclaiming materials, or lowering firing temperatures— and these efforts are often documented informally through blogs, social media, or grey literature (e.g. NCECA 2022). Scientific studies of the environmental impact of craft ceramics remain scarce (Salani, 2025), and those that do exist tend to focus on larger-scale production and offer limited insight into the everyday realities of studio practices. Life Cycle Assessment (LCA) and Greenhouse Gas (GHG) research provides valuable data (e.g. Lo Giudice et al. 2017, Železný et al. 2023) yet applying these findings meaningfully within the context of studio ceramics remains a challenge.

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Sustainability means meeting our current needs without compromising the ability of future generations to meet their own (World Commission on Environment and Development 1987). This does not impose absolute limits on society but requires us to drastically reduce our negative impacts so that the biosphere can absorb the effects of human activities. To live sustainably we need to understand how our everyday actions affect the planet and find ways for reducing our impacts. LCA and GHG studies are methods to assess the environmental impacts of manufacturing products and are widely used in the ceramic industry. Handmade ceramics may compare unfavourably with industrial ceramics in terms of environmental metrics, but their absolute contribution is presumably small due to the limited scale of the sector. In the UK, the largest association of ceramists and potters reports only over 1,600 members and these include international makers (Craft Potters Association 2025). Researchers suggest that before evaluating LCA outcomes we must attend to the socio-material context in which these practices are embedded (Walker et al. 2024). In our case this means the contexts in which pottery is made, and how it intersects with broader lifestyle habits. Many studio makers operate from home or domestic-like environments, producing at modest scales. In such contexts, it becomes relevant to ask: how does making pottery compare with other routine lifestyle actions, such as commuting, or preparing food?

This paper explores the hypothesis that the environmental impact of pottery-making—particularly for hobbyists and small-scale makers—may be more meaningfully understood when compared to other daily lifestyle choices. By framing the studio as one node within a larger system of living, we can identify leverage points within studio practices and in the lifestyles that surround and sustain them. Rather than focusing narrowly on waste reduction or technical efficiency, this approach supports a broader understanding of sustainability in craft. This research responds – in the context of handmade ceramics - to recent calls made by sustainability scholars to move beyond incremental efficiency upgrades and address deeper levers for change (Ellsworth-Krebs et al. 2023). To this end, the paper addresses the following research questions:

1. How does handmade pottery compare with other daily lifestyle products and choices?
2. What are the priority areas of intervention to reduce a studio maker's overall environmental impact?

Ultimately, long-term sustainability in craft ceramics will likely require structural reform, retraining, and education in disciplines such as chemistry and sustainability science (Salani 2024a). More immediate reductions in environmental impacts may be readily achieved by shifting attention from isolated studio practices to a wider spectrum of lifestyle decisions. Even for higher volume workshops, comparing actions and products used in making practices with daily activities outside of work can provide more intuitive understanding of environmental impacts and point out actions for change.

To this end, this study synthesizes existing LCA, energy consumption, Greenhouse Gas (GHG) studies and life cycle comparisons of products and lifestyle activities, drawing from peer-reviewed academic publications, technical reports, and publicly available datasets. The results are compared with preliminary findings from the author's LCA study of the

Leach Pottery workshop in Cornwall, UK (Salani & Yan, in prep.). The study is also informed by the author's experience of ceramic practice and ethnographic fieldwork conducted in British pottery studios over the last 10 years.

The paper proceeds by first reviewing relevant literature on the environmental assessment of ceramic production, it then estimates total emissions for three likely studio scenarios and compares them with lifestyle activities, before discussing the findings and their implications for sustainable craft futures.

2. Life Cycle Analysis of small-scale ceramic manufacturing

Studio pottery (or studio ceramics) indicates the practice of making batches of ceramic products by hand using simple tools and machines, such as a pugmill for mixing and pottery wheels for forming. Clays, rock powders (such as feldspars, silica and carbonates) and metal oxides (iron, copper, cobalt, etc.) are commercially available refined materials - themselves the products of mining and refining industries – and are prepared, mixed and processed in studios. After forming on the wheel or by handbuilding or slipcasting, pots are typically dried and fired to a 'bisque' at 700-1000 °C using electric kilns, then glazed with a mix of powders and water (Fig. 1) before being fired again at higher temperatures (1100-1300 °C) in electric, gas or woodfired kilns. Makers may have access to materials and equipment in shared facilities (e.g. kilns), domestic studios or professional workshops, working individually or in small teams. Potters are aware that the ceramic process requires much energy and results in damage to the environment, so many approaches to making ceramics more sustainably are discussed online and in specialist ceramic literature (see e.g. Bloomfield 2020, NCECA 2022). However, the current discourse generally lacks a scientific assessment of the environmental impacts and the benefits of proposed solutions (Salani 2025).

Figure 1: *Freshly glazed tableware before being fired in a gas kiln at the Leach Pottery, UK (Photo: author)*

The environmental impacts of products or services can be better understood and reduced by adopting Life Cycle Thinking (LCT), i.e. a mindset that considers their entire life cycle, from raw material extraction through production, use, and end-of-life (United Nations Environment Programme [UNEP] 2024). In line with these efforts, a growing literature is assessing the impacts of handmade ceramic production using Life Cycle Analysis (LCA), a quantitative method to assess the environmental loads related to a product or service during all stages of the life cycle and identifying areas for improvement (see e.g. Vieira et al. 2023). Damage categories considered in the analysis include Human Health, Ecosystem Quality, Climate Change and Resources. For studies of tableware, the functional unit (FU) is typically defined as 1 kg of fired ceramics, which enables direct comparisons across cases. Many of the studies currently available discuss small-scale production in factory settings, however these can offer useful insights for studio practices. The author has conducted the first LCA study of studio ceramics in the UK (Salani 2024b) and preliminary results inform this paper. A few existing LCA studies and energy consumption and greenhouse gas (GHG) studies relate to materials and methods used in craft ceramics. These are summarised below.

A study of ornamental ceramic plates in Italy found that the highest environmental impact was linked to the consumption of electricity during the production phase, with the most significant impacts in Global Warming, Respiratory Inorganics and Non-renewable Energy use. Instead, the production of glazes and colours had almost negligible contributions. The impact on Global Warming was measured as 1.26 kg CO2eq./kg. The study recommended implementing measures to reduce energy consumption and shift energy sources to renewables (Lo Giudice et al. 2017). The results align with those from LCA studies of ceramic tiles, for which most environmental damage was also linked to the production phase and especially drying and firing (see e.g. Furszyfer Del Rio et al. 2022).

A study of tableware in the Czech Republic looked at the environmental impacts of various manufacturing scenarios: three studio practices (slipcasting [SP], pottery wheel [PW] and ancient techniques) and two factory processes (Żelezný et al. 2023). The study measured high impacts on Climate Change for SP (8.93 kg CO2eq.) while the other scenarios fell within the 3-4 kg CO2eq. range. The study indicated studio ceramics (PW) as performing better than other methods both in terms of carbon emissions and normalized and weighted results. The cradle-to-gate LCA analysis showed that PW operations had high efficiency in the use of raw materials and lower material losses than factory manufacturing (1-3% vs. 30% respectively). However, they also used electricity more inefficiently, possibly due to using less well-insulated kilns and having limited access to more advanced technologies using in factories such as tunnel kilns and heat recovery.

Quinteiro et al. (2012) investigated the manufacturing of ornamental earthenware ceramics in Portugal. The carbon footprint was measured as 2.9 kg CO2eq./kg. and the manufacturing stage represented almost 90% of the total energy consumption, with an 85% natural gas and 15% electricity mix. Recommendations included the use of pressure control systems (shuttle kilns) and other measures that do not relate to studio ceramic technology.

A study in Thailand looked at energy consumption and greenhouse gas (GHG) emission in 13 small-scale ceramic tableware plants (Chuenwong et al. 2017). The gate-to-gate study showed that 99% of energy consumption came from gas firings, with average GHG emissions of 1.2-1.3 kg CO2eq./kg. The study recommended best practices such as increasing kiln loading capacity, reducing heat leakage and repairing insulators. A more recent study in Thailand performed LCA of 9 tableware pieces of various designs and glazes. GHG emissions ranged between 2.3 and 2.9 kg CO2eq./kg. The manufacturing stage accounted for 73-77% of total emissions. Recommendations included measures to reduce LPG gas and electricity consumption, such as utilising kilns with ceramic fiber insulation and shuttle kilns (Usubharatana & Phungrassami 2021). Again, these would apply to industrial production but not to studio practices.

A study in Vietnam evaluated the carbon footprint of a traditional pottery village (Pham Phu & Kieu Thi 2020). Results show carbon emission of 1.88 – 2.07 kg CO2eq. per pottery product but does not specify the weight of fired products, so the results cannot be directly compared with other studies. However, the study assessed two furnaces (2.5 m3 and 7m3) and interestingly the large furnace showed higher efficiencies, possibly due to differences in heat performance but also in the volume of fired material.

In Ukraine, potter Yuliya Makliuk self-published an insightful carbon footprint analysis of studio ceramics, assessing various scenarios for stoneware mugs (Makliuk 2023). The cradle-to-gate carbon footprint of the 'average' and the 'eco' mug scenarios measured 5.4 and 2 kg CO2eq./kg respectively. Packing the average mug in polyethylene contribute 21% of the total impact. Notably, shipping by cargo plane has higher impacts than producing the mug (7.4 kg CO2eq./kg) and so does using it every day for one year, i.e. washing it 365 times in warm soapy water (7.7 kg CO2eq./kg).

Finally, the author conducted LCA of stoneware tableware made at the Leach Pottery in Cornwall, UK (Salani & Yan, in prep.). The study was cradle-to-gate and covered all stages from the procurement of raw materials to packing products for shipping. The results indicate an impact to Global Warming of 3.2 Kg CO2eq./kg for mugs fired in electric and gas kilns (Salani 2024b). Three glaze options were assessed but no significant difference in their environmental impacts was found. Most impact to Global Warming was due to energy use (73.8 %), with 10.3% linked to electricity used in bisque firing and 36.5% to glost firing in gas kilns. A notable difference from the other studies is that running the studio contributed 21.2% of the impact - roughly half for lighting and half for heating the areas where potters work (Fig. 2). The LCA study also linked 18.6% of GW and 78.6% of Marine Eutrophication impact to packing the pots for shipping using corn starch peanuts, cardboard and interleaf paper (Salani 2024b). Packaging materials, heating and lighting spaces also relate to domestic environments, and this supports the idea that at least in the UK context analysing studio production alongside lifestyle choices can offer opportunities for effective reduction of impacts that are not covered by studies focusing purely on factories or large workshops.

In summary, the highest environmental damage associated with the production of industrial ceramic tableware is Climate Change, with values ranging from 1.2 to 8.93 kg CO2eq. per 1 kg of fired pottery. Kiln use (for drying and firing) is the activity mostly associated with Climate Change damage - from 46.8% in the UK to 99% in Thailand. The comparison assumes a 100-year GWP time horizon across studies, even if not explicitly stated.

Figure 2: *The production studio at the Leach Pottery, UK (Photo: author)*

3. GHG emissions of studio scenarios

An alternative view on sustainability in handmade ceramics is to compare the annual emissions from pottery production to national per capita emission averages. Indicative studio emissions can be estimated using three scenarios: A) a part-time maker producing 500 pieces a year, B) a full-time potter making 1000 pieces a year, and C) a worker making 2000 pieces a year in a high output workshop. As a reference, the Leach Pottery employs 5-7 full time potters and the production volume in 2022 was just over 13-thousand pieces, which corresponds to the figures for a high output workshop (C). A 350g mug is used as the average size to convert the emissions for the FU of 1 kg to the production volumes considered here. Table 1 presents the estimated annual emissions associated with these scenarios, based on the ranges reported in the literature reviewed in Section 2.

Table 1: Estimated annual emissions of three scenarios based on figures from LCA/GHG literature.

Reference	kg CO2 eq./kg	kg CO2 eq./pc (350g)	Total kg CO2 eq. A (500 pcs/y)	Total kg CO2 eq. B (1000 pcs/y)	Total kg CO2 eq. C (2000 pcs/y)
Lo Giudice et al. 2017	1.26	0.4	221	441	882
Želený et al. 2023 (SP)	8.93	3.1	1563	3126	6251
Želený et al. 2023 (PW)	3.1	1.1	543	1085	2170
Quinteiro et al. 2012	2.9	1.0	508	1015	2030
Chuenwong et al. 2017	1.3	0.5	228	455	910
Usubharatana & Phungrassami 2021	2.9	1.0	508	1015	2030

Makliuk 2023 (ave)	5.4	1.9	945	1890	3780
Makliuk 2023 (eco)	2	0.7	350	700	1400
Salani 2024b	3.2	1.1	560	1120	2240

The studies of studio production highlighted in Table 1 are taken into consideration in the following analysis. These figures show that making pottery as a part-time or full-time occupation may contribute between 0.5 and 3.8 tCO2eq. in annual GHG emissions. On the global scale, GHG emissions show great variation across nations, from 1.5 tCO2eq. per capita in the 45 least developed countries to 7.3 tCO2eq. in the EU, 18 in the USA and 19 in the Russian Federation (UNEP 2024: XIII). These far exceed the targets for lifestyle carbon footprints comparable with the 1.5 °C aspirational target of the Paris Agreement, which are 2.5 and 0.7 tCO2eq. per capita for 2030 and 2050 (Institute for Global Environmental Strategies et al. 2019). Other authors confirm that to limit climate change lifestyle LCA should be very low, i.e. 0.7-1 tCO2eq. by 2050 (Koide et al. 2021). There is a clear need for measures to drastically reduce GHG emissions, especially in developed countries.

The UNEP figures for annual GHG emissions per capita (2024: XIII) include people's professional activities, thus the annual emissions from studio pottery estimated here cannot be considered additional and are only indicative. However, it is notable that they are of the same order of magnitude (tCO2eq.) and may constitute a significant share of the total, highlighting the relevance of sustainability concerns in this sector.

4. Comparing pottery to everyday lifestyle impacts

Shifting focus from annual emissions to daily activities and products, this section situates pottery's impact alongside common lifestyle choices like transport, food and housing.

4.1 Transport

In the UK, transport is the largest emitting sector of greenhouse gas (GHG) emissions, producing 26% of the country's total emissions in 2021 (427 MtCO2eq.), (Department for Transport 2023). Table 2 shows the emissions measured in kg CO2eq./km for various transportation options.

Table 2: Emissions of transportation options in the UK (Dept. of Transport 2023) and km equivalent to 1 ceramic mug (1.12 kg CO2eq.).

Vehicle	Notes	kg CO2eq./km	km eq. to 1 mug (1.12 kg CO2eq.)
Small car - diesel	passenger car	0.14	8.0
Small car - petrol	passenger car	0.14	8.0
Small car - plug-in hybrid	passenger car	0.03	37.6
Small car - battery electric	passenger car	0.04	25.2

Large car - diesel	passenger car	0.21	5.4
Large car - petrol	passenger car	0.27	4.1
Large car - plug-in hybrid	passenger car	0.03	39.5
Large car - battery electric	passenger car	0.05	21.0
Domestic UK flight (ave)	with Radiative Forcing	0.27	4.1
International flight (ave)	with Radiative Forcing	0.18	6.4
Regular taxi	per passenger	0.15	7.5
Average local bus	per passenger	0.10	11.0
Coach	per passenger	0.03	41.2
National rail	per passenger	0.04	31.6

The least emitting transportation choice in Table 2 are coach, national rail and plug-in electric hybrid cars. The GHG emissions from making one 350g ceramic mug (1.12 kg CO2eq.) compare with common daily activities such as driving a small petrol car for 8 km, a large petrol car for 4.1 km or taking a 11 km journey on a bus (highlighted in Table 2). The emissions of a flight between Rome and London are about 250 kg CO2eq., and from London to Tokyo 1.7t CO2eq. Round journeys between these destinations roughly correspond to the range of GHG emissions calculated for a yearly production of pottery studios in Section 3.

4.2 Food

The carbon emissions of personal diets and foodstuffs can provide an intuitive comparison with making pottery. In the UK, the food system accounts for 23% of GHG emissions (Science Council 2025) and it is well known that the consumption of meat and dairy products is linked to high emissions. UK average GHG emissions are 32.4 kg CO2eq./kg for beef (beef herd), 22.1 for beef (dairy herd) and 4.96 for pork. For milk, emissions are 1.33 kg CO2eq./kg (Agriculture and Horticulture Development Board 2025). By comparison, field grown vegetables produce 0.47 kg CO2eq./kg, fruits 0.5, cereal 0.53 and rice 2.66 (Clune et al. 2017). Producing a ceramic mug (1.12 kg CO2eq.) compares with consuming 1 kg of fruit and veg grown in passive greenhouses (1.02) or tree nuts (1.42) and is linked to considerably lower emissions than eggs (3.39) or fish (4.41). Daily dietary GHG emissions from a large UK study are shown in Table 3.

Table 3 GHG emissions for dietary options in the UK - 2,000 kcal (Scarborough et al. 2014).

Diet	Meat consumed	GHG emissions kg CO2eq./day
High meat-eaters	>=100 g/d	7.19
Medium meat-eaters	50-99 g/d	5.63
Low meat-eaters	<50 g/d	4.67
Fish-eaters	0 g/d	3.91
Vegetarians	0 g/d	3.81
Vegans	0 g/d	2.89

Shifting consumption habits and prevailing lifestyles is essential to effectively tackling climate change (Institute for Global Environmental Strategies et al. 2019). Assuming an average daily energy intake of 2,000 kcal in the UK (Table 3), transitioning from a high meat to a low meat diet could reduce an individual's annual carbon footprint by approximately 920 kg CO2eq. Shifting to a vegetarian diet would save about 1,230 kg CO2eq./year, while adopting a vegan diet would lead to a reduction of around 1,560 kg CO2eq ./year (Scarborough et al. 2014). These figures are comparable to the annual emissions of the pottery studio making 1000 pieces a year (B) estimated in Section 3.

4.3 Housing

Domestic dwellings are responsible for around 13% of the UK GHG emissions (Ministry of Housing, Communities & Local Government 2025) so studio settings are also important to consider. A direct comparison of the benefits of home studios vs. commuting to a ceramic studio elsewhere would require a detailed analysis of realistic scenarios that ballpark figures would fail to capture. Even working from home would require trips to suppliers, galleries, clients, ceramic fairs, etc.

However, as noted above, heating and lighting a workshop can account for a considerable portion of a studio's carbon footprint (21.2% in our UK study, Salani and Yan in prep.). This suggests that notable savings can be made by switching to more sustainable energy sources not just for the kilns but also the space in which potters operate. Priority should be given to replacing gas boilers with heat pumps to save up to 70% carbon related to this operation. Installing photovoltaic panels can further reduce the impact of lighting and electric equipment, including kilns (up to about 26% of total emissions in our LCA study). While these measures may not be viable in all studios, they demonstrate that adopting a more holistic view of the ceramic process within its operating context can result in significant savings.

5. Discussion: Identifying priority interventions for sustainability

Ceramic makers' craft knowledge informs a lively discussion of sustainable studio practices in specialist articles (e.g. Smith 2020), blogs (Galloway 2025, NCECA 2022) and publications (Harrison 2013). Commonly discussed 'studio tips' with clear environmental benefits include reclaiming clay, collecting glaze waste in sink traps, removing hazardous chemicals in glazes (e.g. lead, cadmium, barium, chrome) and using recycled alternatives for packing (Galloway 2025). This study suggests that the environmental gains of other practices discussed on the same channels (e.g. replacing materials or fuels with sustainable alternatives) would be better assessed through LCA or similar analysis, even when they feel intuitively 'right'. For instance, the LCA study in the UK highlighted the high impact of plastic-free packing material, linked to both high emissions and marine eutrophication (Salani 2024b). In Makliuk's study (2023) packing accounted for 5.3% and shipping from Kyiv to New York for 34.7% of cradle-to-grave emissions.

In the absence of a comprehensive impact assessment of the sustainable solutions discussed and adopted by potters (Salani 2025), LCA and GHG studies can help identify priority areas for intervention. For instance, one recent trend consists in substituting or complementing commercial clay with 'wild clay', i.e. locally sourced, unrefined clay collected directly from the environment (Levy et al. 2022). The practice has clear artistic and educational value in fostering experiential learning, reclaiming traditional knowledge and raising environmental awareness. However, at least in terms of emissions, multiple LCA studies show the procurement of raw materials plays a relatively low role, whereas car travel is a significant source of carbon. Assessing water usage and GHG emissions from energy and material sourcing would require dedicated studies and subtle understanding of real-case scenarios. The difficulty in estimating such gains is exemplified by studies of e-commerce vs. store purchases (see e.g. Buldeo Rai et al. 2023). The possible gains of collecting and processing clay vs. using commercially available materials remain to be demonstrated by future research, ideally through the application of comparative LCA methodology.

Evidence reviewed in this paper highlights kiln efficiency as a key concern, especially where fossil fuels dominate the energy mix. Whilst practices such as using self-built kilns or extending the lifespan of machinery reflect a culture of frugality (Steggles 2016), they may conflict with the efficiency gains offered by newer technologies. Measures to reduce the environmental impact of firings include replacing gas with electric kilns powered by renewable sources, increasing the insulation of kiln chambers and reducing firing temperatures where feasible.

The Czech study suggests additional solutions to explore, including the use of hydrogen kilns and a focus on ecodesign (Železný et al. 2023). The latter would employ, for example, manufacturing pottery of acceptable quality as a way to reduce low-grade tableware pieces and ceramic waste, prioritising upcycling of material over aesthetics, in line with recent trends in Regenerative Design (Wahl 2016). More broadly, the three principles of the Circular Economy (Ellen MacArthur Foundation 2024) can help frame current and emerging initiatives to tackle the sustainability of craft ceramics. Most existing literature and online resources (Bloomfield 2020, NCECA 2022) focus on (1) 'eliminating waste and pollution' by optimising material and energy efficiency in the studios. More radical projects are implementing 'industrial symbiosis', i.e. the use of industrial waste to replace virgin raw materials, to reconsider ceramic production around the use of waste material of other industrial or commercial activities, such as mining, soil excavation for construction or factory waste (Smith 2020, Howard 2020), following the principle of (2) 'circulating products and materials'. While all ceramic production involves material extraction, efforts for (3) 'regenerating nature' may include the adoption of sustainable energy sources (e.g. photovoltaics) and a broader consideration of ceramic sustainability within dietary and lifestyle contexts, as discussed in this paper. Finally, although all manufacturing inherently depends on the demand for new products, craft ceramics are not incompatible with post-growth scenarios (Vincent and Brandellero 2023) that prioritise quality and fight overconsumption, particularly when incorporating waste streams to reduce dependence on virgin materials (i.e. industrial symbiosis).

The study has estimated that a whole year of pottery making for a small or medium volume studio can produce CO2eq. emissions comparable to return flights within Europe or to Japan, respectively. Also, switching from a high meat diet to a vegetarian or vegan one results in emissions reductions comparable to those of operating a medium-output pottery studio annually (Scenario B). Studies of lifestyle carbon footprints suggest the changes that would yield the most benefits are in the areas of meat and dairy consumption, fossil-fuel based energy, car use and air travel (Institute for Global Environmental Strategies et al. 2019). Literature sources identify lifestyle changes such as car-free travel, renewable electricity, electric vehicles, vegetarian diets, and improved vehicle efficiency as key mitigation options, each with a potential impact of 500 to over 1,500 kg CO2eq./year per capita if fully adopted (Koide et al. 2021). These figures are comparable to the pottery studio scenarios outlined in Section 3. Although this analysis does not compare pottery with other occupations, the results indicate that ceramic production may significantly affect an individual's ability to maintain a sustainable lifestyle, but its influence is comparable to that of other common lifestyle choices.

6. Conclusions

In the absence of Life Cycle Analysis (LCA) studies of real-case scenarios assessing the production of handmade ceramics within the context of potters' lifestyles, this study has applied a Life Cycle Thinking (LCT) approach to make initial comparisons between craft ceramics and other common lifestyle choices. Although the impact of a single item - such as a mug - is relatively small and comparable with daily activities such as driving short distances or consuming common food items, the annual emissions of a studio practitioner can approach the magnitude of national per capita emissions (tCO2eq./year).

The study also highlighted that scientifically assessing environmental impacts can yield counterintuitive results. Practices considered sustainable—such as using plastic-free packaging or digging your own clay—may in fact have higher environmental impacts than expected. This highlights the importance of applying comparative LCA or greenhouse gas (GHG) analyses to evaluate the effects of technical choices, and of using LCT to interpret results within broader patterns of production and consumption. Together, these tools support more informed and effective decision-making in studio practice. The results of such studies should be discussed within the wider context of craft production, with careful consideration of practices (such as woodfiring) that may not comply with modern environmental standards but carry important socio-cultural values for many makers and users of ceramics. Finally, environmental aspects constitute only part of Elkington's concept of 'triple bottom line' (1997) alongside social and economic sustainability. For instance, the use of cobalt in ceramic decoration may not present significant environmental concerns, but it raises serious ethical issues due to its association with labour exploitation in mines (Smith 2020).

The author acknowledges that the analysis presented here is subject to several limitations. The scarcity of high-quality data and case studies reveals a significant gap in knowledge: many sustainability strategies currently discussed or adopted by studio potters have yet to be evaluated through scientific methods. Furthermore, the generalized process descriptions found in existing LCA studies often fail to reflect the nuanced material choices and techniques characteristic of studio ceramics, limiting the precision of cross-case comparisons. Železný et al. (2023) also noted that the inventory analysis of small-scale ceramic studios revealed poor-quality data on production inputs and outputs. Future research ought to fill this gap in knowledge by conducting granular analysis of distinct studio scenarios, such as choice and sourcing of materials, firing technologies, geographical locations, home studio vs. commuting, and other aspects discussed here. The author's current investigation into Best Available Technologies for studio ceramics is an example of research in this direction, informed by LCA analysis and comparison of multiple sites.

By reviewing existing LCA and GHG literature and applying an LCT perspective to the sustainability of studio ceramics, this study seeks to empower ceramicists to make more informed choices and to understand their role in sustainability transitions. It also calls for the integration of LCT principles into craft education and advocates for more scientific research focused on sustainable practices in studio pottery.

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