

Cohousing case studies in the UK: Is sharing facilities really resourceful?

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ABSTRACT: Housing is responsible for 26% of total energy consumption in the UK. Co-housing design is posed as a means of reducing resource use as well as a solution for social living, through inhabitants sharing common spaces and facilities. The aim of this paper is to probe the validity of these claims. Three case studies are examined to explore how the use of shared space and facilities changes over time. The shared facilities are holistically considered in terms of space, resources, electricity, water, and material savings. The findings are examined further in terms of the social advantages and disadvantages of shared resource use, drawing on occupant surveys and interviews. While some of the findings support the notion of co-housing as a future typology which saves resource use, others tend to suggest that it is the social processes and communication which are as important as the shared facilities, irrespective of typology. Equally, over time, there can be a development of redundancy and duplication of facilities at an individual and collective level, negating the immediate environmental benefits, if certain social processes breakdown.

Keywords: Co-housing, facilities, resources, space use, sustainability, energy, water

INTRODUCTION

The current housing model in the UK is failing. This has led to the lowest volume of house building in UK over the last decade despite increasing demand [1]. Just over a 100,000 new homes were built in England in 2010-11, whereas official projections expect more than 232,000 new households each year up to 2033 [2]. Housing is unaffordable for first time buyers and the sector is unable to deliver production in times of austerity due to current funding and procurement models. The government would like to see more innovation in house building like this in order to increase housing production [3].

At the same time buildings use 45-50% of global energy, 50% water consumption and as such are a key target for improving sustainability. The One Planet Living Initiative, based on ten principles of sustainability developed by BioRegional and the World Wildlife Fund [4], challenges housing design to move beyond low carbon and consider cultural and ethical issues also. The EU Directive 2010/31/EU now states that all new buildings built from 2021 onwards will have to be 'nearly zero-energy' buildings. This does not include embodied energy which is set to dramatically increase in importance as buildings reduce their energy in use. Culturally, the UK has some of the smallest homes in Europe but research on this does not consider the impact of space standards on either energy use or long term resilience [5]. There is also relatively little feedback in terms of how well our housing is actually performing [6].

Cohousing is a form of communal living comprising individual households, each with separate incomes and shared facilities, often evolved through a participatory design process [7]. It is distinct from other low carbon living developments such as the One Planet Living communities of BedZed and One Brighton in the UK, where some facilities are shared, but there is no participatory design process. It potentially offers a sustainable design model for living which can be both energy efficient and socially responsive to resource use. Cohousing is posed as a means of reducing resource use as well as a solution for social living, through inhabitants sharing common spaces and appliances. The aim of this paper is to probe the validity of these claims.

The electricity and water use are examined in three case studies as these are the principle areas where resource use is claimed to be reduced through use of shared facilities such as a laundry, kitchen and dining area. Ten interviews were undertaken taking one and half hours each. The interviews were designed to be a demographic representative of the residents and house types. A Building Use Studies (BUS) questionnaire was sent to all residents in each development, with a 73% return rate overall. The One Planet Living ten indicators - zero carbon, zero waste, sustainable transport, sustainable materials, local and sustainable food, sustainable water, land use and wildlife, culture and community, equity and local economy, health and happiness - were used to compare the three case studies by coding the interviews. A space analysis was undertaken to compare shared facilities space with household space.

CASE STUDIES

Flyvbjerg suggests that case studies should be carefully chosen to be ‘critical cases’ [8]. Three case studies have therefore been selected from a spectrum of cohousing schemes which represent different building typologies and demographic factors but within a similar climate and culture (Northern England). This allows for a greater degree of comparability (Table 1). Data for the case studies was gathered over one year from March 2012-13.

Table 1: Comparison of Cohousing case studies

	Lancaster Cohousing	Shirebrook Cohousing	Thundercliffe Grange
Completion	2012	1995	1980
Location	Semi-Rural	Urban	Rural
Size + total area of housing	Large 35 units 2496 m ²	Small 4 units 348 m ²	Medium 12 units 1440 m ²
House types	New build terrace houses/apartments in blocks	New build apartments in one block	Conversion of 18 th century mansion house into apartments
Fabric materials	Masonry and timber frame, clay roof tiles, timber floor	Brick and concrete walls, clay roof tiles, timber floor	Stone and brick walls, slate roof, timber floor
Shared spatial facilities + total area	kitchen/dining/sitting areas, bicycle repair shop, 2 guest rooms, storage space, childcare space, laundry 211 m ² total	kitchen/dining/sitting room, laundry, craft space 60 m ² total	kitchen, dining, sitting rooms, meditation room, gym, games area, laundry, workshop, storage space 552 m ² total
Energy features	Passivhaus certified, ‘Zero Carbon’ Code for Sustainable Homes level 6 (UK)	Low energy design	Re-used building, no additional insulation

The Lancaster Cohousing development took six years to recently complete using a participatory design process and a partnership contract between the design team, client and contractor. The homes have been bought by the residents individually on a long term leasehold arrangement with the freehold held by Lancaster Cohousing Company Ltd of which the residents are directors. Shirebrook Cohousing was designed by the original group members and initially funded by a housing association. The building is now jointly owned by the residents, not all of whom are original members. Thundercliffe Grange apartments are all leasehold with the freehold held by Thundercliffe Grange Ltd. of which the residents are directors. Virtually the entire building was renovated by the residents themselves in the 1970’s (Figure 1).



Figure 1: Lancaster, Shirebrook and Thundercliffe Grange Cohousing developments

COMPARISON OF RESOURCE USE

Communal space use

Although it is common for homes to be smaller than usual in cohousing [7], Thundercliffe has a generous average for UK of 120 m² per apartment. At Shirebrook the homes are either 54 m² (one/small two bedroom apartment) or 120 m² (three bedroom duplex). These figures are all higher than recommended by the London space standards [5] and suggests that space saving on private accommodation is not always being achieved by sharing shared facilities in these case studies. At Lancaster the two bedroom houses are typically 65 m² and three bedroom houses are 81 m², which are lower than the standard. In Meltzer’s [9] study of 346 households across 18 different co-housing communities in the US, the shared facilities constitute an average of 15 m² per household. This is the same for Shirebrook, but Thundercliffe Grange has three times this value (46 m²) while Lancaster has just 6 m². To put this in perspective, each household in Thundercliffe Grange has an amount of space almost the size of a small apartment again attributed to it in terms of shared facilities. This shows a wide variation in the amount of common space provided per household space depending on the facilities provided (17%, 36% and 8% respectively) which in turn has a significant impact on the amount of additional energy and material costs for space heating, lighting and ventilation attributed to shared facilities to be borne per household.

Communal electricity and water use

The total electricity used by all residents in Thundercliffe Grange (excluding shared facilities) was 49,523kWh for the year compared to total for Shirebrook of 3992kWh. The electricity used in

Thundercliffe shared facilities was 12,253kWh compared to Shirebrook's 1,324kWh. No yearly figures were available for Lancaster.

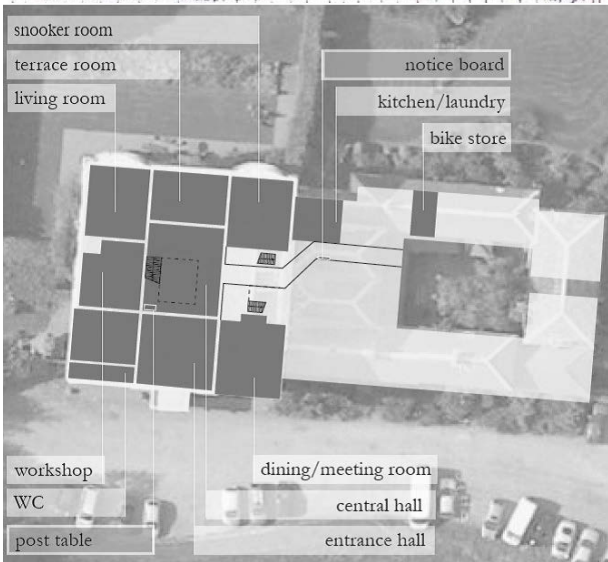
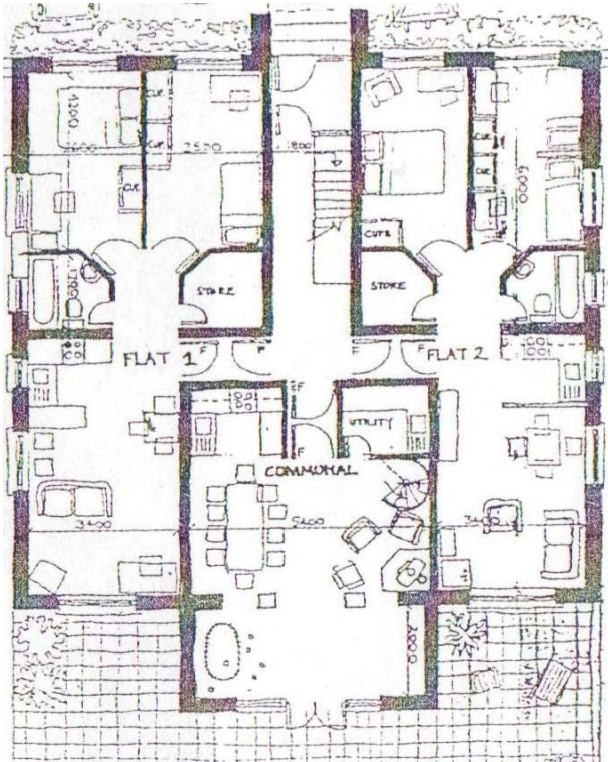


Figure 2: Contrast between Shirebrook and Thundercliffe Grange shared spaces (not to scale)

The amount of electricity used by the shared facilities at Thundercliffe Grange is excessively high, largely because there is so much space to service (Figure 2), while at Shirebrook it is relatively lower, partly because the shared facilities sit centrally in the building and partly because the Thundercliffe shared facilities are

so poorly insulated and energy inefficient. In both cases, about a fifth of the total electricity use for the developments can be attributed to the shared facilities. There is no indication that sharing facilities is actually reducing individual house space heating bills, given that there is no space saving in the size of these homes. Residents are also paying an additional 20% on top of their individual electricity bills to cover the extra running costs associated with the shared facilities. This includes space heating, lighting and ventilation, which are over and above the costs normally born by households for shared appliances such as washing machines, freezers, ovens and tumble dryers.

Shirebrook and Thundercliffe Grange both used 140 litres/per household/per day water over one year. In Lancaster the mandatory Code 6 requirement for usage of water < 80lr/per household/per/day was met without the use of rainwater harvesting by specifying low water use appliances and plumbing. The shared facilities in each case include a laundry which is used frequently. One interviewee at Thundercliffe Grange commented she often had to take a number of trips to the laundry before finding a free machine. This limiting factor meant that a few individuals had installed their own washing machines in their apartments, duplicating resources. Shared facilities therefore have to be close enough, and available enough for people to use them. On the other hand, in Lancaster, three households interviewed said they hadn't changed their laundry habits, two said they had, and the other was still using their old washing machine and tumble dryer. When exploring this in more detail, those who said their habits had changed were now more conscious of their use. As a result they were ensuring they had fuller loads before using the laundry, or contemplating sharing loads with other residents when using one of the two communal washing machines available for the 35 households.

"Having communal washing machines seems like a really radical crazy idea; but in practice, you've got a much better washing machine, if it breaks down it is not leaking over your floor and it's a social thing."

One household had reduced the number of times they washed clothes due to the distance of the communal laundry. On balance, water savings have been made in terms of use through the reduced number of washing machines in each development and all are under the UK national average of 150 litres/per household/per day.

SOCIAL LIVING THROUGH SHARING SPACE

Resourceful sharing

All interviewees commented extensively on their enjoyment of the shared facilities, despite these being used much less at Thundercliffe Grange than at Shirebrook and Lancaster Cohousing. At Thundercliffe

the shared spaces are partly underused due to the apartments being some distance away from these. At Shirebrook, the only criticism was that the common space was 'too big'. However, each apartment front door is positioned exactly the same short distance from access to the shared area, which contributes to its greater use. The Common House, with its shared facilities, in Lancaster Cohousing is situated half way down the long thin ribbon development of terraced housing and apartments. As such some households have to walk more than 100 metres to reach the shared facilities - fine in good weather, but not so attractive in the cold, wet winter weather, particularly for older and more frail people.

Interview coding revealed that all the case studies do particularly well in the One Planet Indicator categories of 'Health and Happiness', 'Sustainable Food' and 'Zero Waste'. The shared facilities play a major role here. There is an informal re-use system at Thundercliffe, where unwanted items can be placed on the communal letters table, and adopted by other members. A similar sharing happens at Shirebrook, where books and CDs are kept additional for communal use. Sharing of garden tools is also happening in all case studies as is sharing of food in terms of communal buying, storing and cooking. Clearly communal facilities can encourage sharing and saving of resources where this is enabled in an easily utilisable way. 'Zero Carbon' and 'Water' indicators, however, are not high on the agenda for Thundercliffe Grange and Shirebrook, although there is clear awareness of these issues among Lancaster interviewees and questionnaire respondents with many commenting on how they have changed their habits around water use.

The eight summary variables for the BUS survey covering air, comfort, design, perceived health, lighting, needs, noise and temperature all scored higher or better than the UK 2011 BUS Housing benchmark for Lancaster, correlating well with the interview coding. Residents again commented on the benefit of the shared facilities including using the guest rooms, the childcare space and the food store. One commented that the common room was an extension of their own living room. All three case studies additionally had woodstoves or open fires in their common rooms. Wood burning is being increasingly challenged as a sustainable form of heating. One resident in Lancaster commented that having a central wood burning facility to gather round takes away the need for a focal fire in individual homes. This not only reduces overall wood fuel use but also reduces the embodied energy involved in supply of individual woodstoves. BUS return rates from Shirebrook and Thundercliffe Grange (17%) were too low to be statistically significant for small numbers and were discounted.

Changes over time

A key issue in relation to the environmental merits of having shared facilities in cohousing relates to changes in use over time which can undermine original design intentions. The two older cohousing developments were deliberately chosen to examine this factor.

After thirty three years of living together, the shared facilities in Thundecliffe Grange are not used much now apart from the laundry and workshop. There was a conscious choice not to install central heating in the shared facilities given that these large rooms were being used infrequently. In recent years a highly inefficient portable electric heater has been introduced as the rooms are too cold even for the cleaners to work in. The cold means that the common rooms are used even less in the winter. The group now sees other members casually, but does not normally share meals – undermining a basic intention of the shared facilities. Residents share food three or four times a year as a whole group, and, as a smaller group, approximately once every two months. These 'safari suppers' are limited to up to twelve people, as they are hosted in individual apartments rather than the shared facilities. This was felt to be more convenient for cooking purposes.

In Shirebrook, most of the residents share meals regularly after eighteen years of living together and still use the shared space as an extension of their individual homes. This suggests a strong element of stability and continuity in a relatively small group. The early years saw the group sharing aspects of childcare with meals shared together four nights a week (midweek). Sharing of meals has now become much less formal. One household has withdrawn completely from group activities, and is not using the shared facilities.

"Up until recently ...that was part of the agreement that you cook once a week, but since somebody new has moved in and we don't have children anymore and we all have evening activities, it's just not as important. We do it more as a social thing"

The group still has regular social occasions with people beyond the cohousing, which are also hosted in the common living area.

Meltzer finds a strong improvement in recycling and composting practices in cohousing developments, compared to earlier residence, while repair and reuse as strategies to reduce unnecessary consumption and waste, are not well applied (Meltzer 2000). At Thundercliffe Grange the shared spaces are maintained on the assumption that individuals will perform a certain number of hours of work each year. If this work is not completed, there is a financial penalty, payable to the company. Evidence from meeting records indicates that eight apartments do all of their work hours, and in most cases more. At Shirebrook maintenance of the shared facilities is done in turn, and regulated by a rota, which is kept in the hall. Residents took a group decision to

recycle garden waste but stopped composting the common kitchen's waste as it got forgotten:

"we all compost individually, but we've kind of stopped composting communal because sometimes it just gets left for too long, gets really smelly, so we just take individual responsibility" (

Technical skill sharing and maintenance is still happening at Thundercliffe Grange, facilitated by presence of the communal workshop:

"You learn from the other residents. Electrical work, bits of plumbing, that kind of thing, you just kind of pick up knowledge"

Thundercliffe Grange had a communal bike store but the residents do not cycle much anymore, partly due to the increasingly dangerous roads. Those interviewed at Lancaster who live further away from the communal bike store, are tending to keep their bikes either in a shelter close to their terrace or inside their house.

Clearly a number of significant changes have happened to reduce the use of shared facilities in the two older cohousing developments. It is too early to say what will happen at Lancaster. This means that it is essential for communal spaces to be designed to be adaptable to changing circumstances and to be able to be repurposed for different functions to avoid redundancy.

Sharing space, governance and management

At Thundercliffe Grange just over half the households attend the monthly management meetings. There are then sub committees which manage particular aspects that do not need whole group approval. At Shirebrook residents still meet formally once a week for an hour and make joint decisions regarding the group. At Lancaster, monthly management meetings are attended by most of the households, but it is still early days as the residents have been in place less than a year. It is at these general meetings that all decisions are taken and any powers delegated. A management committee run things on a day-to-day basis with member from each household. The management committee delegates defined areas of responsibility to a series of sub-committees.

The shared facilities provide meeting space for this form of collective governance. However, space is not the only factor here:

"nearly everybody comes, and nearly everybody says 'oh that was good, we should do it again' and then we don't...things need quite a lot of pushing and quite a lot of keeping going"

This comment suggests that enabling shared activities is a question of management or leadership. Providing shared facilities does not guarantee their use – it also needs careful management. Time is also a significant factor in the management of these resources in all of the case studies. Lancaster and Thundercliffe Grange interviewees commented particularly on the pressure of collective management as something very time consuming. The suggested reasons for reasons for

abstaining from group management at Thundercliffe include length of meetings (a common feature in consensus based management) and disinterest in the process.

The amount of resources going into the housing market is growing, partly due to the rise in number of single person households (Jarvis, 2011), leading to more appliances and space serving fewer people. Shared facilities have the potential to reduce appliance resource use in real terms. However, sharing is not exclusive to cohousing as a typology. There are examples of community composting schemes at other housing schemes such as the One Brighton development in Brighton or Saxton Gardens in Leeds. Shared laundries have also featured in traditional social housing tower blocks in Scandinavia. The social groups in both the older case studies discussed here were maintained rather than created by the common spaces. Added to this, a sense of community can be equally present at developments such as BedZED, where residents could name on average twenty of their neighbours, and Saxton Gardens where "a real sense of community" has been noted by residents (Urban Splash, n.d.). The unique self-management aspect of cohousing is, however, more resource efficient: if the building were being externally managed, there would be little that could be done to make people care for the shared facilities and it is questionable whether they would be maintained so well without significant additional resource input.

Governance and management are therefore important factors for the functionality of the designed shared spaces, and, within this, the need for leadership was noted. This is consistent across other examples of sustainable communities. BedZed attributes much of its sustainable success to sustainable lifestyle strategies rather than expensive infrastructure (Hodge, et al., 2009).

CONCLUSION

Redundancy and resilience in design

Two of the three developments analysed here provide additional space rather than substituted private space for their shared facilities. While an overall space saving is not necessarily achieved in UK co-housing, there are good reasons for designing in shared facilities from a resilience view point in relation to resource use. These facilities provide communal back up to private resources, in case these fail – e.g. a fused circuit in the home, a broken cooker or a burst water pipe. This type of spatial and facility 'buffering' in housing developments will be increasingly necessary as essential energy and water supplies as well as other services become less reliable due to climate change and the dwindling availability of natural resources. The social connectivity provided by shared facilities is also

fundamentally robust in nature, as it provides different ways to do the same activities, so that if one way fails another can take over. This additional 'buffering' challenges the conventional models and norms of housing development which seek to optimise space use. Instead this 'buffering' deliberately builds in a degree of redundancy in housing which facilitates more resilient functioning. It is inherently difficult to 'optimise' housing against the uncertainty of climate change and 'buffering' is arguably a more appropriate way of dealing with risk. It is perhaps time to accept that new models of housing should not necessarily have to trade shared space for private space, but deliberately augment private space with shared space for good reason.

Facilitating culture change through design

This study has also discovered that over time shared facilities in housing can become disused if they are not appropriately located, appropriately sized or able to be adapted to different functions. These are architectural design issues which can make a difference between having energy efficient shared facilities and energy inefficient ones. At the same time shows that design alone will not provide the solution. New housing processes are needed which effectively link social governance and management with resource use and spatial design.

A unique sense of ownership and identity through the self-management of shared facilities can help to develop a sense of self-maintenance and self-reliance in housing communities – something increasingly needed in times of austerity. The governance arrangements in these case studies gave greater social and financial empowerment to the groups involved. Residents could also afford to build additional shared facilities whereas individually they could not. Members of the cohousing groups gained financial backing for their project as a group. Individually the members could not have afforded to design and build their own homes using a full professional design team but collectively they could. Social empowerment was also increased through cohousing members co-designing their own houses as a group and sharing new skills within the group. In this sense, the design of housing with shared facilities can work hand in hand with new social processes to generate positive culture change.

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