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Is green a grey area? Sustainability and inclusivity; the ageing population and recycling

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Abstract

There are growing pressures (political, legislative and environmental) to increase material recovery through recycling. There are two basic recycling schemes in the UK; kerbside and bring-site schemes. With current kerbside schemes, when a householder becomes unable, through age, illness or disability, to physically move their waste containers (bins, boxes or bags) onto the pavement for collection, the refuse collection service provider will enter the property premises, take the containers out to the refuse collection vehicle (RCV), empty them before returning them to the starting point. Obviously, with bring sites, people travel to the site and place the recycling in the banks themselves.

With an ageing population, increasing numbers of older people are requiring specialist recycling services. These are likely to become more time consuming and costly as household numbers increase. Bring sites have obvious limitations for older people with their limited mobility and reduce strength. To date little or no previous research has been undertaken about barriers to recycling for older people and the implications to waste management providers of an ageing population. This paper describes initial work beginning to assess this problem within Lab4Living at Sheffield Hallam University (SHU).

Keywords: Recycling, Waste, Ageing, Landfill, Inclusive

Introduction

Predicting the future is important to enable planning and preparation through investment in appropriate economic, social and technical R&D. With that in mind, there are 3 trends of such significant proportions they are known as megatrends. They are poverty, ageing and environmental sustainability. They are known as megatrends because they are global, rapidly changing and will have wide ranging impacts on society.

What happens when two of these megatrends collide? What impact will the ageing population have on our ability to be environmentally sustainable? This work doesn't address these issues on a megatrend scale but explores potential impact at a local level in the hope of stimulating discussion about wider repercussions. The issues of ageing and recycling are chosen as in the context of the experience and knowledge of the researchers. It does not suggest that recycling is THE issue in the context of megatrends.

Society is ageing. Ageing brings with it a host of problems - amongst them; a population where the majority are likely to have some form of impairment. Some evidence has been put forward to suggest that older people are as likely to recycle as younger age groups [18] and or that there is a positive correlation between age and recycling [14], [7].

However, other studies [9], [1], [2] contradict these findings, suggesting a negative correlation between age and recycling. Collins et al [3] found a deeper negative correlation

between income and recycling suggesting that over 40's on incomes below £14k pa are more likely to recycle as they get older whilst over 40's earning more than £14k pa (males especially) are less likely. Further, Collins also found that car ownership and mobility played a significant part in likelihood of recycling. Recycling participation was likely to decrease as household car ownership decreased. Collins goes further to suggest that, to a slightly lesser extent, than car ownership, physical ability and disability has a similar relationship to recycling in that as physical ability declines, so does recycling.

This disparity of understanding is confirmed by the authors work indicating that waste and recycling behaviour are complex issues. Previous work [10], [11]. [12] and initial indicators of this study, demonstrate complex relationships between current and future old, income, physical ability, mobility and access to recycling facilities.

Project Description

This paper outlines a small element of work in a project in its infancy called 'The Grey Areas of Green Design'. This larger project explores wider issues and impacts of an ageing population on environmentally sustainable. Part of the larger study focuses on waste and recycling and a positioning paper describing the earliest stages of this work is under review in The Design Journal [13]. The work throughout the larger project combines engineering and ergonomic analysis with social and design research methods. This comprehensive programme of cross disciplinary work includes mathematical modelling, surveys, focus groups and interviews, ergonomic analysis of waste containers and users, motion capture and more. It partners are Sheffield City Council (SCC), Veolia as waste management providers for SCC and Taylors who are a recycling equipment manufacturer.

In this paper we are concentrating on the kerbside scheme although not exclusively. It is hoped that this programme of work will culminate in evidence of physical and perceptual barriers to recycling that older people face and explore service and bin/bank designs that reduce these barriers and give some added value to the recycler to aid motivation in participation. The work will ultimately attempt to quantify the economic, environmental and social costs of exclusion and propose solutions to reduce costs.

This work takes place in Sheffield. Here there is a weekly general waste collection (wheelie bin) and a recently introduced fortnightly collection for recyclables; plastic bottles, glass and metal waste (wheelie bin) and card (box). The work has been subject to research governance and ethical review within Sheffield Hallam University's own internal review boards. Consent is requested from all participants and the research work and context is explained to them.

Barriers to Recycling

Reduce, reuse and recycle is the national mantra for resource efficiency to minimise the environmental impact of the plethora of consumer products (and their packaging) that overflow our shop shelves and internet web pages.

With recycling, the UK has lagged behind other EU countries in its material recovery efforts. Figures 1 and 2 [4], [5] illustrate landfilled and recycled waste in five EU countries. They show improvement in the UK figures yet it still lags behind targets and more needs to be done to meet EU commitments on landfill reduction. Understanding what motivates and discourages people to do any kind of activity from exercise to socialising or recycling specifically is the first step towards increasing participation.

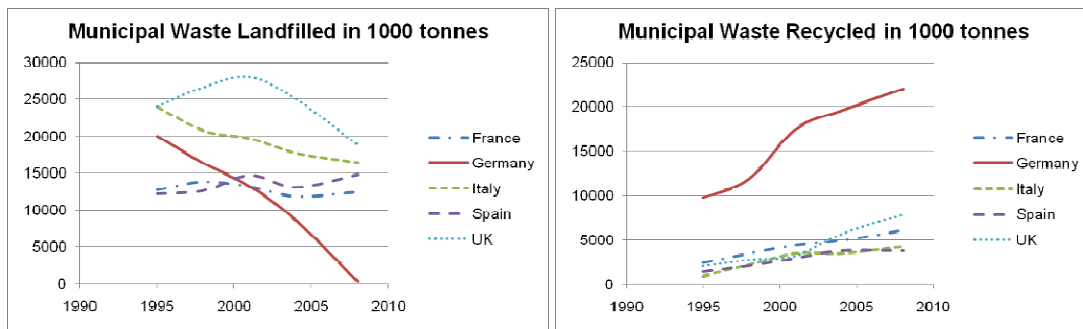


Figure 1: a graph of landfilled waste tonnage for 5 EU countries

Figure 2: a graph of recycled waste tonnage for 5 EU countries

Recent research [19] from Waste & Resources Action Programme (WRAP) found 4 barriers stopping people recycling; physical, behavioural, knowledge and perceptions.

Physical barriers are when containers for collecting recycling are unsuitable; when there is no space for storage, when collections are unreliable; when people have no way of getting to recycling sites, when bins and banks are difficult to use ergonomically.

Behavioural barriers are when if people are too busy; if they struggle with establishing a routine for sorting out recycling; if they forget to put it out, if they find bring sites dangerous, unsafe, dirty and unnecessary.

Lack of knowledge barriers are not knowing which materials can be recycled; not understanding how their local scheme works People's knowledge of how and/or what to recycle is linked to their level of participation. As expected, those who are less knowledgeable about how and what to recycle are less likely to participate, or tend to recycle less material.

Attitude and perception barriers are not believing recycling is good for the environment; not wanting to sort waste; not feeling personally rewarded for recycling. WRAP found that very different messages and actions are needed by local authorities to overcome these barriers. These will include: improving recycling collection services, providing better information and practical advice on how to use the service, and showing why taking part is worthwhile.

A background against all four of these categories is presented in the positioning paper under review in the Design Journal [14]. Due to page count limitations we will only present the physical category as this is most pertinent to issues of the ageing population.

Physical

Provision of the 'special collection' services inherently indicates that wheelie bins are difficult for some people to move. For many people, they are also unsightly; an eye sore that detracts from the appearance of their property. For others, garden sizes are so small that additional bins and boxes can ultimately deprive residents and children of usable garden space for socialising and playing. And for nearly all people, recycling at home for kerbside schemes is still viewed as a chore; an obligatory task that, in the background noise of daily family life, will be pushed down the priority list.

Figure 3 shows a city centre recycling bring-site. The car park that used to allow vehicular access to the bring-site has recently had a barrier post erected in the entrance. People now have to either park on the road and carry their waste into the site or walk with their waste from further away.



Figure 3: a city centre bring-site with a barrier post blocking access to the car park

Figure 4: an older woman recycling at a supermarket bring-site

Figure 4 shows an older woman interviewed at a bring-site. During the interview she said that she didn't enjoy recycling. She did it out of a feeling of obligation. When asked about the physical aspect of it, her comment was '*...well its not hard is it...*'. However, observing her putting material into the bins, it was apparent to the researchers that it was a physical effort for her. Figure 4 shows her balancing a box of waste between her body and the bin whilst trying to hold the lid up with one hand and put rubbish in with the other. At several points, the bin lid nearly slipped out of her hand and fell shut.

So far only one study has been found that examined the design criteria for disability friendly bins and banks [8]. This study covers age related disabilities and wheel-chair users along with sight, hearing, mental and allergic impairments. Whatever is done now for recycling has to be accessible to older people, so that as they increase as a proportion of our population, this will not count against overall material recovery.

Modelling Change in Assisted Collections

SCC and Veolia, provided statistics about the numbers of 'assisted kerbside collections' in Sheffield, 2006-2010. Using additional population predictions from the Office for National Statistics (ONS) [15] [16] for the UK and for Sheffield, some simplistic modelling was conducted to predict change in demand for 'assisted collections'.

According to SCC, assisted collections cost ~£10/year/household more than standard collections. This is between 20% and 30% increase in cost. If there are two collections per household; a general collection every week and a recycling collection every fortnight, this could cost in the region of £20/year/household for assisted collections.

In the Sheffield area, assisted service for the general waste bins has varied between 9.58% and 8.7% of the total collection between 2006 and 2010. In general there has been a slight decline of 0.6% although in absolute terms, due to wider provision to more homes, this only represents a decrease of ~1000. For the smaller blue bins over the same period, the variation has been between 8.14% and 8.42% of the total collection. This equates to a marginal rise of 0.28% (data supplied by Veolia).

Assisted collections cost more because they take more time for the frontline service delivery staff. In some assisted collection cases, the refuse collectors only have to enter the front garden to access the bins whilst in others, they have to access the rear of the property to collect the bins. With terraced houses, accessing the rear of the property can be across the back of up to 3 properties. This slows down the rate of Refuse Collection Vehicles (RCV's). If the vehicles cannot service the same number of houses in the allocated time, then rounds shrink and more RCV's used, increasing the carbon footprint/tonne of material recovered.

Here, we have tried to quantify the economic cost of exclusion and predict how this may change in the future. At this stage the modelling is simplistic due to a lack of data in

crucial areas. It doesn't account for inflation or efficiency improvements. It assumes that the UK waste collection characteristics are identical to Sheffield's. As the 60+ population in Sheffield is 5 times greater than households benefiting from an assisted collection service, it has been assumed that all assisted collections will be in the 60+ population. Whilst this is unlikely to be completely true, figure 5 illustrates the dramatic increase in probability of having any form of disability, a severe disability and requiring assistance over the age of 65 in the United States of America. This amply substantiates this assumption until more data is obtained.

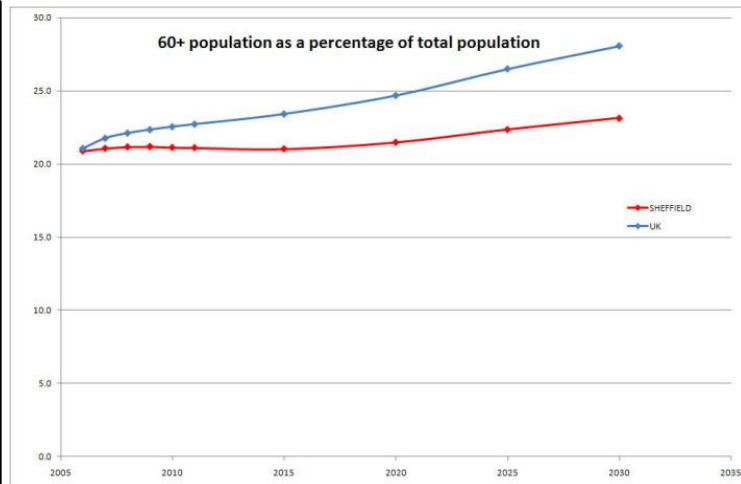
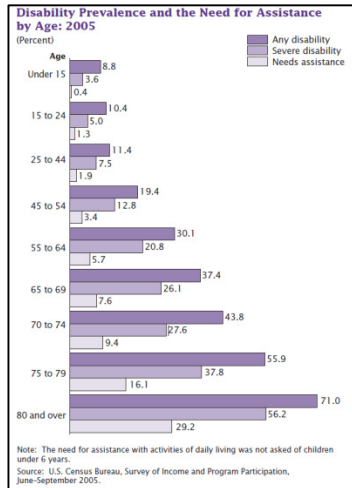


Figure 5: disability prevalence and need for assistance in the United States of America, 2005

Figure 6: a graph of the change in the 60+ population as a percentage of the total population of Sheffield and the UK between 2006 and 2030

Data supplied by SCC or ONS is shown in table 1 and the projections the modelling is based is in table 2. Figure 6 is a graph of change in Sheffield and UK 60+ populations. Sheffield 60+ population growth is lower than UK.

In the context of rising numbers of kerbside collections, Figure 10 shows estimated change in assisted collections as a percentage of the total number of collections. Whilst figure 7 might not show dramatic percentage changes in provision of assisted collections, it shows an increase of 9232 between 2010 and 2030 in Sheffield and 1.8 million in the UK.

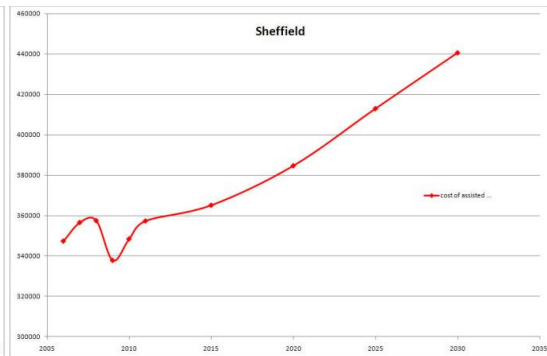
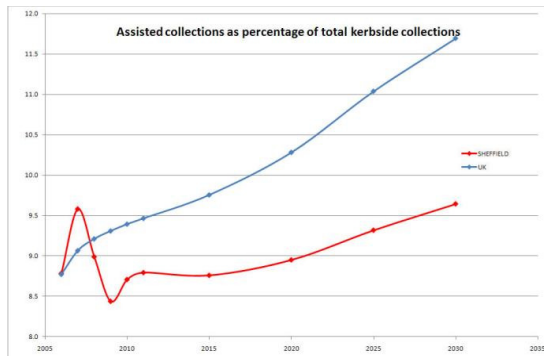


Figure 7: estimated change in assisted kerbside collections as a % of total collections

Figure 8: estimated change in cost of delivering the assisted collection service in Sheffield

Figure 8 illustrates the change in direct costs this growth in assisted collections may have for Sheffield although as previously mentioned this does not account for inflation or efficiency savings in service provision. In Sheffield, this represents a change of £92k between 2010 and 2030 and £18 million for the UK. Whilst this modelling is admittedly simplistic it is indicative of a trend ageing, rising demand for assisted collections and rising costs of provision. It would also be possible to infer from this the relationship with increased carbon footprint per tonne of collected waste.

Table 1: ONS population statistics for Sheffield and UK and Kerbside collection statistics

| | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
|----------|------------------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| | | Sheffield | UK | Sheffield | UK | Sheffield | UK | Sheffield | UK | Sheffield | UK |
| A | Population | 525800 | 60946000 | 528900 | 60973000 | 532500 | 61393000 | 536300 | 61794000 | 540200 | 62222000 |
| B | 60+ pop | 109800 | 12833000 | 111400 | 1326800 | 112700 | 13574000 | 113600 | 13808000 | 114100 | 14030000 |
| C | B as % of A | 20.88 | 21.06 | 21.06 | 21.76 | 21.16 | 22.11 | 21.18 | 22.35 | 21.12 | 22.55 |
| D | Kerbside collections* | 395385 | - | 396062 | - | 397653 | - | 400270 | - | 400079 | - |
| E | Assisted collections** | 34724 | - | 35647 | - | 35742 | - | 33768 | - | 34831 | - |
| F | E as % of D | 8.78 | | 9.00 | | 8.98 | | 8.4 | | 8.71 | |

Table 2: ONS population projections for Sheffield and UK

| | | 2011 | | 2015 | | 2020 | | 2025 | | 2030 | |
|----------|-------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| | | Sheffield | UK | Sheffield | UK | Sheffield | UK | Sheffield | UK | Sheffield | UK |
| A | Population | 544000 | 62649000 | 558000 | 64344000 | 575400 | 66522000 | 593400 | 68648000 | 611800 | 70576000 |
| B | 60+ pop | 114800 | 14234000 | 117300 | 15067000 | 123600 | 16418000 | 132700 | 18188000 | 141600 | 19810000 |
| C | B as % of A | 21.10 | 22.72 | 21.02 | 23.42 | 21.48 | 24.68 | 22.36 | 26.49 | 23.14 | 28.07 |

* Kerbside collections are the total number of kerbside collections for all refuse collections rounds. In Sheffield this will be the total number of weekly general waste bin collections and the total number of fortnightly recyclable material waste bin collections as these are two different rounds.

** Assisted collections are the total number of assisted kerbside collections for all refuse collection rounds. In Sheffield this will be the total number of weekly general waste bin assisted collections and the total number of fortnightly recyclable material waste bin assisted collections as these are two different rounds.

Data for **A** and **B** are found from ONS documents [19] [20] whilst data for **D** and **E** was supplied by Sheffield City Council and Veolia (Sheffield)

In-depth Interview

To date, 7 interviews have been conducted with 13 scheduled. The participants are generally 60+. Details of the 7 households visited so far are shown below.

Table 3: table of interview participants

| ID | Household size | gender - age - self description of health and ability | |
|----|----------------|---|---|
| | | person 1 | person 2 |
| 01 | 1 | F - 71 - 'just old' | - |
| 02 | 2 | F - 59 - 'getting on a bit' | M - 64 - 'still running but slowly' |
| 03 | 2 | F - 71 - 'arthritis & poor eye sight' | M - 73 - 'arthritis; great difficulty walking' |
| 04 | 2 | F - 67 - 'I'm the young one but I'm getting older & slower. I look after my sister' | F - 74 - 'arthritis. I can't walk really. I need this wheel chair. I can't see well either' |
| 05 | 1 | M - 87 - 'back and joint problems but I keep myself active and involved' | - |
| 06 | 2 | F - 68 - 'I'm registered disabled. I have a deformed spine, arthritis and osteoporosis and so on. But otherwise healthy.' | M - 74 - arthritis of left hand and feet. Also had a stroke 8 years ago so on anti-clotting agents! But otherwise in good health' |
| 07 | 1 | F - 60 - 'old, blind and arthritic' | - |

Household 6 is taken as a case study. The interview was informal and semi-structured, enabling householders' freedom to express their issues. It began with an outline of the individual(s) health, ability and how they spent their time. Once waste and collection services were raised, there was a visit to the bins and discussion of how they were moved (or not). Finally they explored feelings about being able (or not) to do things.

Household 6 is an elderly couple living in Lancashire called 'Janet' and 'Ken'. Both initially described themselves as in good health but it was clear 'Janet' used a walking stick and when queried, admitted she was registered disabled with a deformed spin, arthritis and osteoporosis. This led to revelations that 'Ken' had suffered a stroke 8 years previously and now had arthritis in his left hand and his feet. The stroke has not affected him permanently. 'Janet' used to be a domestic cleaner and home help. Now she visits these people 1-2 times a week to keep them company. 'Ken' used to be a builder all his working life. They live 1½ miles from their 'town centre'. 'Janet' drives but 'Ken' has no license. 'Ken' used to walk or get the bus to town but he can no longer manage the walk.

Their shared leisure is betting on horses. 'Janet' drives them to the bookmakers every morning. They place their bets and then watch or listen to the racing results during the day. 'Janet' drives to the library once a week to use a PC to answer quiz questions. 'Ken' goes with her and reads papers whilst waiting. At home, 'Ken' listens to or watches sport. He is chairman of a local working men's club and used to be driven to evening committee meetings by 'Janet' but she now hates driving at night. 'Janet' is a very keen gardener and used to be in the garden every day no matter what the weather. Now, she says 'Oh, I'll do it when I can'. They do everything together, not just because they like to spend time together but because 'Janet' is now insecure about being alone due to her reduced ability and they feel 'stronger' together. They go to bed around 9pm, not always because they are tired but because there is nothing that they either can or want to do.

They have a weekly general waste collection in a 240l bin, a green waste collection in a 240l bin, a glass and metal recyclable waste collection in a 40l box and a paper

collection in a white plastic bag. The two bins and the box are kept in the rear garden whilst the bag for the paper collection is kept in the shed. Figures 9a and 9b show these.



Figure 9a and 9b: General and green waste bins, recyclables waste box and the waste paper bag
Figure 10: 'Ken' dragging the general bin out to move to the front for kerbside collection

'Ken' puts the waste out for collection but increasingly struggles with it. The hardest part is moving them from where they live. Figure 10 shows 'Ken' lifting the front edge of the bin up to drag it forwards. With the arthritis in his left hand, this task is increasingly painful. However, it is unlikely they will seek an assisted collection as this would be 'surrendering' to old age. When initially asked about putting bins out 'Janet' says: *'Oh, I can't do that. It's just one more thing I can't do because I'm old; it makes me feel older'*.

Impressions built up by the interviewer are that 'Ken' is more philosophical and forbearing about his reduced physical ability and older age. When he was working he was active at work and came home to rest and 'do less'. His leisure time was watching sport. So for him reduced activity at home is perhaps easier to come to terms with.

'Janet' comes across as being angrier about getting older although this anger may be frustration and fear. 'Janet's' leisure time was always active, working in her garden and there is resentment that she can no longer do this freely. She has to wait for a *'good day within herself'* and then only if the weather is also favourable. 'Janet' also resents how she is treated for being old and in this 'Ken' supports her. An example of this is related to 'Janet' is losing feeling in her finger tips and struggling to get change out of her purse. She says that she feels stupid for keeping people waiting for such a simple task. In her experience it is common amongst service providers who often make her feel that they don't really care nor have real concern for old people. They give the impression of having to deliver a service as speedily as possible without any consideration for age except where some form of due diligence requires them to. In 'Janet's' words, *'they only do some of these things because they would be liable for more claims for falls if they didn't, not because they really care.'* This is why they do so much together and feel stronger together, to maintain their independence and, in their own words *'to not be a burden'*. What this demonstrates is the fine balance between maintaining people's independence and dignity as they get less able whilst providing support and provision of services that can fill in gradually, not by simply taking over the activity but by better enabling a person to do it themselves for longer.

Discussion and Conclusion

In order to meet commitments to material recovery and reduction of landfill, there is a need to increase recycling participation. This will require participation from marginalised groups. There are a couple of case studies of good design addressing the 'recycling isolation' of

marginalised groups. For example, the Bottle Bank Arcade Machine (Figure 11) is an initiative by The Fun Theory [6]. A bottle bank was built with arcade game design features adding sounds, lights and 'points'. The user had to put their bottles in the highlighted hole and were rewarded with points. In one evening, this machine was used by 100 people as opposed to the 2 that used the nearest 'normal' bank. This 'added value' of fun turned a chore into an enjoyable activity motivating people to participate.



Figure 11: the bottle bank arcade machine by The Fun Theory

Figure 12: the Cowbins™ in situ in Lewisham

Figure 13: Recycling Node in situ at the North Lanarkshire high rise apartments

Similarly, the 'Feed the Cows' project in Lewisham [17]. The pavement of a highly visible site was painted a 'grass green' and billboards situated behind the bins were decorated with grass, meadow flowers and cows. 4 black and white Continental Cowbins™ where put on the site (Figure 12). The 'Feed the Cows' campaign specifically targeted children. In the first quarter of 2006 there was a 61% increase compared to the same period in 2005. In addition, there was no graffiti or vandalism.

Another example is the introduction of the 'Recycling Node™' in North Lanarkshire for the residents of 6 high rise apartments and several low rise, multi-occupancy dwellings (Figure 13). The result of this was a 300% increase in the numbers of people recycling, an increase in material recovery from 1.24kg/hh/week to 2.09kg/hh/week, out performing many kerbside schemes provided for high rise apartments in other councils. Previously, recycling bring sites had not been considered in these locations or even taken away due to misuse, abuse, vandalism and general neglect. The Node is easy to install and lock down, but can be easily moved, with keys, enabling flexibility with initial installation to determine an agreeable location with residents input. The Node has remained un-vandalised and residents feel safer, even proud of their recycling facilities and their contribution to North Lanarkshire's targets, increasing the councils overall performance by 0.3% from just one installation. Importantly, this was communicated to the residents. Previously the residents in these apartments had been marginalised in terms of access to recycling, through perception and poor design. This story has been repeated on an estate in Haringey.

Significantly, the solutions considered in this section are all street solutions not kerbside. However, they all address issues of inaccessibility to recycling. The issue of ageing will require a solution to both social exclusion and physical exclusion, enabling people to continue recycling for themselves, maintaining their dignity and perceptions of self worth, enabling them to make a positive contribution to meeting nationally important targets and reducing the costs of waste collection.

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