Tenant Views on Low-Energy Living: Tales from three city boroughs in Sweden

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\textit{Draft article aiming for Energy Policy}

Abstract

Keywords: energy efficiency, tenants, evacuation, rent increase, evaluation

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1. Introduction

In the European context, energy efficiency measures have played a steadily increasing role for the last decade, and in 2011 the Energy Efficiency Action Plan was finally adopted (COM 2011 109 final; 2006/32/EG). Increasing energy efficiency measures are perceived to be one of the most cost efficient ways to secure energy supply in short and longer term, and to reduce greenhouse emissions (Petersson and Törnquist-Plewa, 2008; Baghat, 2006; Barton et al, 2004). Buildings account for about 40% of total energy use, and about 30% of the total CO₂ emissions in Europe (Gökçe and Gökçe 2013).

An overall energy source transition has taken place within the Swedish field of energy production, as the percentage of oil and coal in the overall energy mix has decreased from 81 to 35 percent over the past 40 years, at the same time as biomass, district heating, hydropower and wind-power has increased from 19 to 35 percent of the overall energy mix.

Table 1. Sweden’s energy mix 1970 – 2010, compared with North Western EU [TWh]

<table>
<thead>
<tr>
<th>(TWh)</th>
<th>1970 (%)</th>
<th>%</th>
<th>2010 (%)</th>
<th>%</th>
<th>difference(%)</th>
<th>North western EU 2009 ‡ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal and coke</td>
<td>18,0</td>
<td>4</td>
<td>25,8</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Oil products incl. crude oil</td>
<td>350</td>
<td>77</td>
<td>190</td>
<td>31</td>
<td>-46</td>
<td>19</td>
</tr>
<tr>
<td>Natural gas and town gas</td>
<td>0,0</td>
<td>0</td>
<td>17,9</td>
<td>3</td>
<td>+3</td>
<td>41</td>
</tr>
<tr>
<td>Nuclear power/electricity</td>
<td>43</td>
<td>10</td>
<td>166</td>
<td>27</td>
<td>+27</td>
<td>26</td>
</tr>
<tr>
<td>Biomass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District heating from heat pumps</td>
<td>0,0</td>
<td>0</td>
<td>5,4</td>
<td>1</td>
<td>+1</td>
<td>5</td>
</tr>
<tr>
<td>Hydropower</td>
<td>41</td>
<td>9</td>
<td>67</td>
<td>11</td>
<td>+2</td>
<td></td>
</tr>
<tr>
<td>Wind power</td>
<td>0</td>
<td>3.5</td>
<td>1</td>
<td>1</td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>452,6</td>
<td>100%</td>
<td>612,8</td>
<td>100%</td>
<td>+160,8</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: †=Statistics Sweden and ‡=the BPIE report 2011 p. 46. *=This number refers to Renewable Energy Sources in total. Northwestern EU here include AT, BE, CH, DE, DK, FI, FR, IE, LU, NL, NO, SE, UK.

This article has been produced within the ClueE-project, Collaborative learning for energy efficiency in residential urban areas, running 2011-2013, financed by FORMAS and the Swedish Energy Agency. We also would like to thank Mistra Urban Futures, University of Gothenburg, for their efforts to launch this project and for all the help throughout the way. In addition, Gothenburg’s Center for Environment and Sustainability (GMV) provided for vital project management assistance.

Baghat writes: “Currently, the European Union’s oil bill (for imported and domestically produced oil) stands around €250 billion a year, or roughly2.3 per cent of gross domestic product (GDP). These soaring prices have exerted tremendous pressure on European economies and underscored the need for a common European energy policy.” (Baghat 2006).
However, when we turn to the housing sector the picture of the energy mix is rather nuanced, if we check the numbers for 2010 we will discover that 85 percent of the multistory houses are heated by district heating, 4 percent of the heating originated from heat or water-pumps, 2 percent was only relying on electricity and finally we had 8 percent heated by “other” means (ER 2012:07, p. 16). A significant transition has already taken place from fossil based energy production to more green means of energy; but this paper aim to contribute to the present energy efficiency debate focusing on energy efficient homes, refurbished or newly built. More specifically, we will evaluate whether (a) there is a self-selection effect, persons with high interest in environmental matters tend to move to these apartments, and (b) whether the tenants do have a higher energy-aware behavior compared to average apartment tenants. The discussion is important in order to understand the dynamic effects of refurbishing million-program homes, as building new energy efficient homes. If (a) is the case, we could talk about crowding-out effects, where earlier tenants are replaced by new environmentally conscious tenants, who replace the earlier clients. If (b) is the case, the energy efficient design of the apartments seems to support a more energy efficient behavior. Let’s turn to theory in order to check current knowledge in these aspects. We will base this discussion on findings from the research project Collaborative learning for energy efficiency in residential urban areas (the ClueE-project).

2. Low-energy urges in the housing sector – some theoretical findings
Following the ambitious Energy Efficiency Directive at the EU level (2012/27/EU, adopted 25 October 2012), the Second Swedish National Action Plan for Energy Efficiency was adopted already in June 2011, and it lists all the various measures to meet the EU demands. Yet, most of the energy efficiency initiatives are left to the local tiers of government, the municipalities, to carry out the

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5 In this category we find mixed sources such as combinations wood/oil, oil/air heat-pumps or district heating/solar.
6 The project was funded by FORMAS and we also want to acknowledge Mistra Urban Futures for their colloboration, see further www.mistraurbanfutures.org
agreed targets on a more or less voluntary basis. Energy efficiency has blended into the general agenda of restoration needs, as various types of standards for low-energy building (and passive house) techniques have entered the housing market (Hernandez & Kennedy 2010; Thormark 2002).

It is well known within the building sector that a large number of Million Program Areas (MPAs), built in the 1960’s and 1970’s, are getting increasingly older, and are in urgent need of refurbishing. Within the next coming two decades, between half a million and 1.3 million flats must be refurbished, or taken down. For the housing sector in general in Sweden, it is also a fact that the state has retrenched from housing politics since early 1990s. Somewhat similar to the situation in Eastern Europe, Sweden for decades withheld a policy with a large share of public (municipal) housing, which nowadays to some extent is sold out; while the municipal housing companies still are major players in the sector. Of the 2.5 million multi-family apartments, about 1.6 million is owned by municipal housing companies, while 0.9 million is owned privately (2010). There is good reason to believe that a building boom will set off in these suburban, often marginalized, areas – otherwise some of the areas must be demolished (Power 2010). Powers conclude that upgrading the existing stock to modern environmental standards can be achieved more cheaply and cost efficient than demolishing it (Power 2008). Some examples of newly build low-energy houses can be assumed to pave the way for continued low-energy efficient refurbishment also in the existing housing stock.

Energy efficient refurbishment in urban low-income areas – previous experiences

In a London School of Economics report, the Housing and Communities group investigated Edward Woods, a large estate area in northern boroughs of Hammersmith and Fulham, consisting of high rise blocks which were refurbished including improved energy efficiency. 48 residents were

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7 The Building Committee 2007, p. 27.
8 In the UK, The Environmental Change Institute (ECI) report sets out to reduce carbon dioxide emissions from homes by 60% until 2050. To achieve this, they suggest a clearing rate of 80 000 per year, or four times the current rate (cited in Power 2010, p. 207). In addition, replacement delivery after a demolition takes often takes over 10 years (Turcu 2007).
interviewed by semi-structured questionnaires, and half of the respondents said they were proud to live on the estate, and two-thirds described their quality of life had improved, and they were especially appreciating the concierge service that had been installed. Older residents who had lived longer on the estate were prouder than the younger. Upgrades also included a switch between bathrooms and kitchens in order to meet the Decent Homes standard. Shops located on the estate, as the local café which serves as a local community hub. The previous reputation as a “no-go” area has accordingly faded away with the upgrading measure (Bates, Lane and Power, 2012:7-8). Lessons from the project were that extensive communication is crucial before, during and after the refurbishment; especially for those with extra needs (disabled, illnesses), and keeping the residents well informed about the purpose behind the restoration as about delays in the process. Fuel poverty is a concept used in the report9 which affects about one household out of five in London10, which is a rather unknown phenomenon in the Scandinavian context, meaning that poor families or persons tend to live in cheap apartments with extreme need for fuel consumption, such as many high-rise (energy leaking) buildings. They will end up with disproportionately high energy bills, resulting in turning off the heat, which is followed by coldness and illnesses. If these dwellings were more energy efficient, they would contribute both to decreased climate emissions and improved wealth of the tenants (Barrett et al 2008; Roberts 2008). This conclusion is not shared by everybody, however. Critical voices argue instead that the focus is really not on urban sustainability or the poor, rather the business opportunities in question are driven by large capital and building interests in these transition processes (Webb 2010; Cameron 2006).

After reviewing the international journal articles on the topic energy efficient refurbishing, we conclude that most material originates from the UK, where ambitions plans has been laid out (Building a Greener Future Policy Statement, July 2007) which experienced severe cutbacks after the 2008 recession and onwards. Most studies originate from Northwestern Europe, even if it is known

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9 The concept is primarily been used in UK, Ireland and New Zealand.
that many retrofitting projects also go on in Eastern Europe. Generally, studies are quantitatively orientated on various datasets, estimating the energy efficiency potential. More rarely, the articles report from actual refurbished sites and how case-studies relate to the overall energy policy picture. In addition, data often relates to various energy flows (heat, heated water, house electricity or electricity for home appliances), more rarely to people. The contribution with our study is therefore that we present data from the tenants; how they perceive living in energy refurbished homes, their environmental values and behavior, as their experience of being evacuated and thereon being moved back.

Earlier findings on energy efficient behavior

Turning to what is known about energy efficient behavior, it is well documented that it is primarily driven by “green ideology” and age (Martinsson et al 2011; Hedberg and Holmberg 2005). In addition, income was found to be a third factor, as lower incomes were more probable to predict energy efficient behavior compared to higher incomes. Martinsson et al also discussed that living in detached homes was important, but in relation to heating. As heating is a primary responsibility for house-owners, but not for apartment-owners or tenants in Sweden, we cannot conclude housing-type to be a primary driver behind energy efficient behavior (assumed preference to house-owners). Instead, we aim to concentrate on the “green ideology” argument and if the tenant population in the low-energy apartments were showing any signs of self-selection (argument (a) above), as it is a real possibility that persons with such perceptions tend to move to this kind of apartments. On the other side, we could hypothesize that persons in the apartments were more or less a reflection of people known to live in rental apartments, with no specific lean to green ideology, but with an increased energy efficient behavior due to the design and planning of the low-energy apartments more generally (argument (b)).
3. The Design of the study

In order to respond to our hypotheses, we needed local data from the tenants, but also to relate these results to a more overall picture. Consequentially, we needed to validate our local data results with reliable regional survey data as a point of reference.

The first part of the ClueE-study was designed as follows. We collaborated with the SOM-institute which conducts recognized scientific surveys nationally and regionally. In the regional SOM study 2012, we used a general energy saving question, earlier developed by Hedberg and Holmberg 2005. This general survey question was *How often do you try to reduce your energy use in the following regards?* It was followed up by five sub-questions:

- Heating your dwelling
- Use of electric devices/lights
- Buying of electric devices/lights
- Heat-water use
- Transportation

Each item was answered by a cross on a five degree scale (0=never, 0,25=sometimes, 0,5=rather often; 0,75=very often; 1,0=always). The five item questions were summed up for each respondent, divided by 5 and then multiplied by 100. Then, this energy-saving index took the minimum value 0 and the maximum value of 100.

The second neighborhood study proceeded as follows. The ClueE-project selected the neighborhoods Gårdsten in Gothenburg City, and Stadsskogen in addition to Brogården in the municipality of Alingsås. These three neighborhoods all consist of low-energy houses; in Brogården and in Gårdsten we find refurbished million program apartments, while in Stadsskogen we find newly built apartments. All three are owned by municipal (public) housing companies. The

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11 It was also used in the national SOM survey 2011, 2007 and 2004.
neighbourhood study cannot be perceived as statistically significant as it consists of a much too small number of respondents. However, it is generally very difficult to get information on microlevel, in general survey studies such as the regional SOM study, you will end up with 3-4 persons from these areas, a number far too small for general analyses. By law, you are also prohibited to map the tenants in a more systematic way, as researchers we rely on the tenant’s willingness to voluntarily leave information to us. The knowledge about tenants in low-energy houses is also still on a very early level, as general and systematic overviews over these settlements yet does not exist. The total number of low-energy apartment is estimated to a couple of thousands, but a general overview is not in place. Despite of this, we want to know if the tenants are driven by green ideology or not, and how do they behave in their low-energy apartments.

A student was engaged for the data collection during two months 2012, and the research team developed a four page questionnaire with open and closed questions, also including the question described above. The student brought with her this formula during the door-knocking excursions. The tenants had been informed a week before the investigation by an informative letter on the door to their block, respectively. Admission had been given by each housing company in advance, but apart from that the study was performed as an independent university study. The student also kept field-notification during this period of time, and over the telephone the student was regularly in contact with the main investigators.

Bortfallet i områdesstudien är inte helt lätt att uttala sig om. Vi har inte tillgång till fullständig statistik kring de boendes inkomst, härkomst eller hushållsinkomster; och därför är det svårt att med någon exakthet uttala sig om bortfallet. Vi vet att vi totalt har fått in 61 svar från totalt 320 lägenheter, vilket innebär att endast 19 procent har besvarat våra frågor. Vi vet också att av de boende som har besvarat frågorna har 75 procent en hushållsinkomst under 400 000 om året (n=52), vilket kan jämföras med 65 procent av göteborgarna i hyrd lägenhet (n=329) och 71 procent av

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12 We owe many thanks to Johanna Selin who conducted the data collection with great and detailed care.
svenskarna i hyrd lägenhet (n=1 289). Bland de svarande i lägenhetshushållen har 39 procent en eller två föräldrar som vuxit upp utomlands (n=57), medan motsvarande siffra är 26 procent för hyresgäster i lägenhet i Göteborg (n=314) och 23 procent för lägenhetsboende hyresgäster i hela landet (n=1 319). Svarsfrekvensen generellt är mycket låg i lägaresursträden, även om exempelvis Storstads-SOM från 2003 uppföll en svarsfrekvens på 55 procent (Norén Bretzer 2004). Sedan dess har svarsfrekvenserna generellt minskat, och vår erfarenhet från dörrknackningsprojektet var dels att flera boende var bortresa under sommarintervallet, dels att många hade svårt med språket. Vi tillämpade svenska, engelska och spanska vid besöken, och i en del fall valde hyresgästerna aktivt att inte delta i studien. Eftersom urvalet är hämtat från boende i lägenhushus i både Alingsås och Gårdsten, har jag bedömt att nivåerna bland de tillfrågade grupperna har hamnat på tillräckligt tillförlitliga nivåer för att analysera de boendes självskattade energibeteende skan kunna analyseras. Dessutom har intervjustudier med hushåll genomförts tidigare med små populationer, om än inte med standardiserade frågor som ställts i andra undersökningar som referens (Martiskainen, Mari & Coburn 2011; Bladh & Krantz 2008; Karlsson & Kardborn 1996).

All in all, the questionnaire covered four A4 pages. May interviewees could fill in the questionnaire themselves, then it took about 10 minutes to respond. For others with language problems, translation needs or other social problems, it could take between 30 to 40 minutes to fill out the formula.

Table 1 show that in total 320 tenants were contacted and offered to participate in the investigation. In sum 41 households were not responding or declined to participate.  

13 At some occasions neighbors told that “they are on vacation”. At a few instances, tenants were moving, and in some cases they could not respond either in Swedish, English or Spanish. This group is counted as gross external omission from possible respondents.
Table 1. Share responding in investigated neighborhoods

<table>
<thead>
<tr>
<th></th>
<th>Brogården</th>
<th>Gårdsten</th>
<th>Stadsskoge</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of apartments (which has not been reachable)</td>
<td>143 (17)</td>
<td>154 (18)</td>
<td>23 (6)</td>
<td>320 (41)</td>
</tr>
<tr>
<td>Number responding</td>
<td>26</td>
<td>22</td>
<td>13</td>
<td>61</td>
</tr>
<tr>
<td>Share responding (%)</td>
<td>18</td>
<td>14</td>
<td>56</td>
<td>19</td>
</tr>
</tbody>
</table>

Compared to traditional survey investigations is the response rate very low (generally response rates in Sweden area round 50–70 percent for net samples, but then a large number of sequential contacts are made on either mail or telephone. Here, we have reached an acceptable level in the pilot study Stadsskogen (56 per cent) which we use as a comparative point with Brogården and Gårdsten, as we expect a significantly much lower response rate here compared with the general population. All in all, this group represents tenants in energy efficient apartments, and 61 persons from this group can be compared with the rental apartment populations in Gothenburg, or in Sweden generally, which we now will detail out.

[Table 2 – Demographics of the respondents]

A follow up with postal questionnaires should have been desirable, but the project resources did not allow for this option.
4. Is there a difference between tenants in rental energy efficient apartments compared with ‘other’ rental tenants?

Table 3 – Economy, age and “green ideology”

People in the million program areas generally have lower incomes than average Swedes, higher shares of persons on subsidy support and higher shares born abroad. One of the reasons is that newly arrived refugees often receive their first accommodations in these areas, and another reason, which is connected to the first, is that mobility is rather high in these boroughs. Professor in social and economic geography, Roger Andersson, has investigated the character of segregation in Gothenburg and concludes that in Gårdsten, Hisings Backa and Tynnered has 90 percent of the population 1990 had moved away ten years later, 2000 (City Council Gothenburg). Separate statistics for “tenants in million program areas” cannot be displayed, as this is not a defined category at the National Bureau of Statistics (SCB), or at other data collecting institutions. However, it is possible to describe the circumstances for “persons renting their accommodation” 15, therefore we display these aspects in relation to the general data from the SOM institute.

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15 Här ingår både hyresgäster som hyr i första hand, i andra hand eller som inneboende.
Figure 1. Household economy, share with total household income < 400 000 SEK per yr (before tax)

Sources: Data source used for tenants in Gothenburg is West-SOM 2012, and data source for Swedish tenants is National SOM 2012. Additional data was collected by the ClueE-project, where n=52, as all participants did not want to reply onto this question.

Figure 1 shows that the people who were interviewed in the areas are relatively poor compared to the tenants of apartments in Sweden in general or compared in the Gothenburg area. There is therefore no evidence to say that there has been some sort of gentrification in these areas (i.e., more resourceful tenants would have moved in), compared to other equivalent dwelling that has not been renovated. Rather, this result indicates that the energy-efficient refurbishment has been carried out despite the fact that the residents had relatively weaker socio-economic position.

Renters in apartment areas usually have essentially grown up in Sweden, based on how they responded in the National SOM 2012. Of the 1,415 respondents, 88 percent had themselves grown up in Sweden, another 7 percent had grown up in Europe and 5 percent had mainly grown up outside Europe. Meanwhile, we know that some neighborhoods in metropolitan areas have a high proportion of residents who were born abroad. Angered SDN in Gothenburg, where Gårdsten is included, has a population where 49 percent is born overseas.  

Figure 2. Parent’s origin among tenants in rental apartments

Source: Original question is "Where do you have the, and your father and your mother grew up" Answer options were: a) Pure countryside in Sweden, b) small urban area in Sweden, c) City or major urban area in Sweden, d), Stockholm, Gothenburg or Malmö, e) Other countries in the Nordic region, f) Other country in Europe, g) Other countries outside Europe.

Data for Gothenburg were taken from Western SOM in 2012 and tasks for residents in Sweden are taken from National SOM 2012. Added to this is the data collected by the ClueE project.

Among the most common source countries are Iran, Iraq, Finland and the former Yugoslavia. The residents who were interviewed as part of ClueE project have often foreign origins, compared with the tenants of apartments nationwide (76 percent had themselves grown up in Sweden).

Figure 2 illustrates these relationships further. The residents of low-energy apartments in the ClueE study to a larger extent have parents born outside of Sweden, compared to apartment renters in Gothenburg or in the country at large. This confirms that the residents of low energy flats under investigation do not belong to any particular high-status group - people with indigenous background are not over-represented, and people with good incomes are not overrepresented.
4. Are those living in low-energy flats particularly interested in the environment?

A question posed to us on several occasions from other colleagues was: "It’s probably very environmentally minded individuals seeking to environmental energy lodging," and we found it relevant to consider this issue further. Maybe there are some values that guide the residents of these areas? Is there an element of self-selection in the choice of living in energy-efficient houses, or that these tenants seek out a particular lifestyle accommodation?

There is no indication that this would be the case, as in Brogården we to a large extent find persons who have been staying to their accommodations after renovations have been completed. And they could not know in advance that a low energy refurbishing process should set out, once they settled there. We chose to investigate the tenants’ environmental perceptions in general and their environmental behavior more specifically to answer those questions. When we ask the question "How interested are you in general environmental issues?" it appears that the residents of the low-energy apartments are somewhat less interested in environmental issues compared to Swedish rental apartment tenants generally. 71 percent of the residents in the ClueE study say that they are very or somewhat interested in environmental issues, compared with 78 percent of those who rent their apartment in the entire country.17

When we instead asks how often do you yourself do different things, such as sorting household waste or choose other modes of transport than the car, a different picture appears (see Figure 3). First, only 26 of the 61 households have access to a car; therefore they often choose other modes of transportation (walking, cycling, and public transport). But even regardless of the car, there are 29 of 61 (about half) who say that they always sort their household waste, which is a much more frequent

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17 Compared with 75 percent for the entire population, regardless of tenure.
than among apartment renters in general. In addition, they mention they often switch to CFLs and have no more than 21 degrees indoors in the wintertime.¹⁸

**Figure 3. Environmental behavior among tenants (in Sweden and in low-energy apartments)**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Tenants in rental flats in Sweden</th>
<th>Tenant in low-energy flats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose to walk or bike instead of taking the car</td>
<td>1.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Have maximum 21 degree C indoors at wintertime</td>
<td>3.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Choose public transport instead of taking the car</td>
<td>3.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Change to low-energy bulbs</td>
<td>3.9</td>
<td>4.7</td>
</tr>
<tr>
<td>Sort household waste</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Original question is "How often do you do any of the following things? - Choose to walk or bike instead of taking the car, - Choosing to use public transport instead of taking the car, - Switching to energy lamps – Sorting the household waste. The response was □ Never (this corresponds to 1.0), □ Sometimes □ Quite often, □ Very often, □ Always (5.0), or □ Does not / do not drive. Information for tenants of apartments in Sweden is taken from National SOM 2011. Additional data was collected by the ClueE project.

All in all, the environmental behavior is thus more frequent among respondents in ClueE study, compared with the normal population in rental apartments even though environmental interest is comparatively lower. This indicates that the type of housing (low-energy apartments) supports active environmental behavior, where the dwelling is a planned prerequisite for desirable behaviors to occur. This, despite the fact that we have no evidence which should support that there would be individuals or families with a special commitment to environmental issues that have flocked to these homes (or chosen to participate in ClueE study).

We have gone further and investigated the tenants’ energy-saving behavior, to see if it makes any difference to visualize each tenant’s energy consumption, or not (Figure 4). With regard to transport and travel behavior, the energy saving behavior is in line with that of apartment renters in general in

¹⁸ Some would argue that they ‘have no other option’. Other specifically emphasize that they think the temperature is too low in the passive-house apartments in the wintertime. Some buy additional heat in order to raise the indoor temperature at this time of the year.
Gothenburg or in Sweden. Probably, this is connected with the fact that only about a half actually have access to a car hence, they are already an energy saving group (!). As for home heating the ClueE participants are slightly above averages for apartment renters in general, and the same applies to the purchase of electric appliances/lighting. However, we note significant differences for hot water consumption and the use of electric appliances/lighting, compared to apartment renters generally which has been interpreted by us that the studied ClueE group actually are more aware of their energy behavior compared to “normal” apartment tenants, and they are awaringly trying to reduce their consumption of water and electricity. If this actually exists may be shown by other researchers who have access to data on water flow volumes and electricity use.

We have interpreted these results in Figure 3 and 4 as an indication that the energy refurbished apartments actually leads to a change in consciousness (and perhaps a change in behavior). This, despite the fact that the residents are not very different from the general population in terms of environmental interests. That they also sort ones household waste to a greater extent compared to the general population in this respect also suggest that the behavior is supported in a positive direction. Environmental conscious restoration is possibly supporting behavior in a positive direction when sorting options and consumption patterns (heat water, electricity) are simplified. Planning for sustainable housing and sustainable neighborhoods is therefore important prerequisites for sustainable lifestyles to be achieved. Environmentally friendly behavior is not only a responsibility that can be imposed on the individual citizen, but equally important is that the property owner takes such.
Figure 4. Energy-saving behavior among tenants in rental apartments (Sweden, Gothenburg, low-energy flats)

Source: The original question was "How often are you trying to reduce your energy use in the following context? - Heating homes, - The use of electric appliances/lighting - the purchase of electric appliances/lighting - Hot Water - Transport/travel. The response was □ Never (this corresponds to 1.0), □ Sometimes □ Quite often □ Very often, □ Always (5.0).

Information for tenants of apartments in Sweden is taken from National SOM 2011, data for apartment renters in Gothenburg from Western SOM 2012. Additional data was collected by the ClueE project.

Conclusions

• Those living in energy efficient houses are relatively economically prosperous compared to apartment living tenants generally in Western Sweden or Sweden. These cases of Brogården, Gården and Stadsskogen point to the fact that energy efficient refurbishment has been carried out despite the fact that the residents have a relatively weaker socio-economic position. However, we do not know about the tenants in these neighborhoods were even poorer before the renovation, compared to those who live there in the current situation.

• Among those interviewed in ClueE study, it is also common for one or both of their parents to have grown up abroad, compared with the average apartment living among the population. A higher percentage of first or second-generation immigrants do live in the surveyed areas, which you must pay special attention to when considering renewal of similar areas.
• Are there any specific tenants looking for energy-efficient living-styles, through self-selection processes? Our answer is a clear no to this, people who were interviewed in the ClueE-the study has a slightly lower interest in environmental issues compared to the normal population in rental apartments. Paradoxically, tenants living in energy-efficient apartments are environmentally friendly than the average Swede as 43 percent of the respondents do not have a car, and they sort household waste more often than the average Swede in rented apartment. This can be interpreted as the planning and design of the dwelling actively encourages environmental behavior to occur. This is further confirmed by the energy-saving behavior among the ClueE tenants compared to the normal tenants, driving unaccounted, as a substantial proportion of the respondents also lack car-ownership.
References...


COM 2011 109 final; 2006/32/EG


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