



Policies  
to Promote  
Sustainable  
Consumption  
Patterns

Impact Assessment Paper

Energy Expert

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## Impact assessment of the Energy and Environmental Expert scheme in Finland

The following analysis is part of the EUPOPP project's work on evaluating European policy instruments for sustainable consumption (SC). It forms part of a series of ten in-depth impact assessment papers. All assessments have been carried out in accordance with the EUPOPP Impact Assessment Tool.

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### 3 Setting the scene

Energy Experts are volunteer residents who have been trained to be active in energy issues in their building. The programme was developed by the Finnish state-owned energy agency company, Motiva, and housing services company VVO in 1993. It has been ongoing since 1995, when first experts were trained. It is targeted specifically to apartment buildings. The scheme operates mainly in rental housing companies but also in some owner-occupied apartment blocks.

In Finland, quite a large share of households' energy use in apartment buildings is determined by common solutions. Heating makes up about 50% of households' direct energy use. Buildings are centrally heated and individual residents do not pay for heating or for water according to use, but as part of the rent or monthly charge. Individual residents can influence heat consumption (e.g. windows, thermostat settings), but house-wide issues like adjustment of the radiator network can save up to 15% energy while improving comfort (Motiva 2009). About 20-30% of heat losses occur via hot water, so water use is also important. Again, this is influenced by individual residents, but also by water flow control, meters and water fittings. About 15% of households' electricity use in apartment buildings is for common facilities, such as corridors, outdoor areas, car engine block heaters, saunas, laundry rooms, etc (Adato 2006). This is also paid for as part of the rent or monthly charge. The energy management practices of housing companies vary: while some large rental housing estates are highly professionally managed, most owner-occupied houses are small companies, governed by a Residents' Board, which do not have energy management plans.

Energy Experts are volunteer residents who have been trained to be active in energy issues. They are usually members of the Tenant's Board or the Resident Board in owner-occupied housing (for more details about the Finnish context, see Annex 2). They monitor changes in the water, electricity and heating consumption in their building. They can also provide advice and assistance to other residents about more efficient energy and water use practices. Furthermore, they act as contact persons towards the housing company and facility management providers.

Peer-to-peer communications and train-the-trainer schemes are today popular in energy and climate campaigns, and the Energy Expert scheme can offer interesting insights for such programmes as it is quite old. It arose from the residents' own ideas in some VVO-owned houses, and has since expanded. Some housing companies have since expanded the role of Energy Experts into Environmental Experts, who also monitor waste collection and separation practices and take responsibility for improvements in the yard and gardens. The scheme is thus henceforth referred to as Energy and Environmental Expert (EEE).

EEE is a voluntary, privately organised instrument, which has gained support from the state in the form of Motiva's support for training, marketing and evaluation. However,

housing companies operate the scheme largely with their own resources. The initiative to set up an EEE scheme can come from individual active residents or from the housing management.

Because the EEEs are volunteers they perform differently, their activity varies and there is no centralized and continuous follow-up of their activities (Anttonen 2009). Because of the voluntary nature of the scheme, it can be difficult to attribute any quantitative reductions to any specific activities of the EEEs. There is minimal reporting by housing companies concerning EEE activities (Savolainen and Savolainen 2000). According to housing company VVO (the largest participant), the more important aspect of the EEE concept is the effect on general attitudes towards energy conservation compared to actual energy conservation. Active EEEs can also improve the quality and responsiveness of the outsourced maintenance service, due to prompt notification of technical defects (Anttonen and Halme 2004). There are no comprehensive evaluations of the scheme, and the purpose of this report is to assemble the scattered existing data, fill in gaps where possible, and estimate the current and potential sustainability impacts of the scheme.

This Impact Assessment is based on the IIA framework (Wolff and Schönherr 2009) and builds on the following data. Interviews were conducted with nine stakeholders involved in the scheme (see Annex 1). Because of the scarcity of evaluation data, many of the interviews were conducted with addressees of the scheme, i.e., housing managers. Existing documentary material and studies were carefully reviewed (VVO and Motiva 1997; Savolainen and Savolainen 2000; Anttonen and Halme 2004; Anttonen 2009). Some interview data with active EEEs was obtained from a forthcoming report for a Finnish project called 4V. Moreover, data were collected at a workshop organised by the Finnish Association for Nature Conservation (Helsinki, May 27, 2010), at which tenant and housing company representatives gave invited comment speeches on, e.g., the EEE scheme. Two focus group discussions were organised with consumers: one group for residents of owner-occupied housing and one for residents in rental housing. These interviews and discussions provided valuable material both on current experiences of residents active in similar positions as the EEEs and of the future prospects of the scheme in Finland and elsewhere in Europe.

This report is structured as follows. Chapter 4 introduces the intervention logic of the scheme. It is supplemented by an annex (Annex 2) giving some background information on housing governance and management in Finland. Chapter 5 discusses the effects and effectiveness of the scheme and attempts to estimate its current and potential sustainability impacts. Chapter 6 discusses causes for the successes and failures of the scheme.

## 4 Intervention Logic

The intervention logic of the EEE scheme has changed somewhat over time and varies slightly from one context to another. In a way, there are several 'EEE schemes' operating in different places and housing companies, and the logic has changes somewhat over time. Thus, we first present the original logic as envisaged by Motiva (see also figure 1), one of the launchers of the scheme, and then discuss some slightly alternative logics.

Figure 1: The intervention logic of the EEE scheme

### *Sustainability problems addressed and objectives of the instrument*

The sustainability problems addressed include the following:

- Energy use varies from one building to another. Up to one third of this variation does not depend on the original design of the building, but on how it is used and maintained (Brunlaus 2008). The instrument aims to stimulate better energy management in buildings, as well as the implementation of relatively low-cost improvements in heating, ventilation and air conditioning (HVAC) systems and water management systems, as well as in electricity use for lighting and other equipment.
- There were (and still are) residents who are eager to suggest or make improvements in energy use and other environmental issues but lack the skills, technical knowledge, instruments and contacts to do so.
- Maintenance, facility management and property management are today quite distant from daily life in the house. Even large apartment buildings almost never have a full-time, on-site janitor/caretaker. Thus, even with the advance of distance monitoring and online energy use reports, it is difficult to connect changes or variations in energy use to events on the ground.

For VVO, the other originator of the scheme, an initiative taken by residents was the most important motive to launch the scheme. While energy was a key focus for the scheme at the start, the scheme broadened in the late 1990s as more Experts came on board. They were renamed Environmental Experts and also dealt with waste and garden improvements. Since the early days, the energy focus has declined significantly at VVO and Environmental Experts or 'Resident Experts' can select their own line of work depending on their interests. So they are just generally bringing improvements to practical issues in the house. Other housing companies, such as municipal housing providers, also use the scheme in an Environmental Expert format, whereas at other sites, the focus on energy management has been retained.

The original objectives of the scheme were to train and support Energy Experts. Quantitative objectives for practical improvements were not set on a national level. At indi-

vidual sites (buildings or housing companies), quantitative targets for energy conservation were sometimes set, sometimes not<sup>1</sup>.

*The basic governance mechanisms at the centre of the analysis (output 1)*

EEE is a voluntary and procedural instrument. It builds on voluntary action by residents, building owners and building managers. As a voluntary measure, EEE can be applied in a diversity of ways, and it is partly more an idea or concept than a unified programme.

The original logic of Motiva was to support volunteer housing companies by training EEE trainers and providing material for them (e.g., the EEE workbook and briefcase<sup>2</sup>), Motiva has also marketed the scheme and launched an Extranet for the EEEs. Since the early days, there has been limited funding available to improve the scheme (except for the publication of a 2<sup>nd</sup> improved edition of the EEE workbook), so it is largely up to the addressees (e.g., the EEE trainers and housing companies) to keep the scheme going.

The scheme has been mainly implemented by particular housing companies:

- VVO, a tenant-owned large nation-wide housing co-operative with about 39 000 apartments
- Municipal housing companies offering housing to families with children, low-income residents and municipal employees
- A smaller number of owner-occupied housing companies in certain regions where trainers have been active

*The specific characteristics of instrument design & implementation (output 2)*

Design and implementation vary from one housing company to another and even from one house to another. The general idea is that the EEE gets training and an 'official' status, which can include access to e.g., online energy consumption reports or even certain facilities. Basically, the EEE (1) monitors common aspects of the building use like water consumption, heat consumption, electricity and waste, makes observations and suggests improvements to the management of the house. The EEE can also (2) advise other residents (e.g., on their own energy use or waste sorting). It is also ar-

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<sup>1</sup> One of the interviewees noted that quantitative targets can be problematic as the size of the energy (and resource) conservation potential (to be reached using cheap and simple measures) varies from one building to another, and with time. In some cases, when EEEs have been operational for years, merely maintaining the present good standard can be a sufficient challenge.

<sup>2</sup> The workbook includes data on energy use, instructions for monitoring, tables and calculation formulae, etc. The briefcase, at various times, has included e.g. a thermometer, a water flow meter, a pocket calculator and various other equipment.

gued that the EEE (3) creates a social context of taking care of the house and improving the living environment as a common effort of residents. This has been supported by some rental housing companies by directing some of the savings to common improvements selected by residents.

As stated, the scheme has changed somewhat since its origins, especially in some of the larger rental housing companies. The focus is less on energy and more on a wide range of environmental activities. At the same time, some housing companies have placed less focus on specifically energy-related training. This has made the scheme more encompassing, but also more diffuse and less focused.

*Intended and anticipated effects on consumption behaviour/patterns (outcomes)*

As the scheme has so many manifestations, outcomes can vary. Basically, they focus on common aspects of the house, such as:

- Water consumption – which is partly dependent on resident behaviour, but can also be influenced by common measures such as adjustments to the water flow or installation of low-flow fittings.
- Heat consumption – also partly influenced by individual residents (e.g., ventilation via windows), but largely also influenced by issues such as how well the radiator network is balanced so as to have an even level of heating in the entire house).
- Electricity consumption in common facilities, such as lighting of corridors and outdoor areas, saunas, laundry rooms and car engine heaters – also partly controlled by individual users, partly by installation of electricity saving equipment or better planning of use (e.g. saunas).
- Waste generation and sorting is similarly influenced by individual residents (how much waste is generated and how carefully it is sorted), but also by the availability of various kinds of waste bins and separate collection schemes.
- Maintenance and prompt response to problems, e.g. water leaks, broken equipment or vandalism – which can also imply advice to residents, action by the EEE or action by the housing company.
- Other aspects (see next section)

*Potential effects on sustainability (impacts)*

All of the above-mentioned outcomes can have impacts in terms of CO<sub>2</sub> emissions, as well as other environmental problems such as littering, water and other resource use. Additionally, EEEs can have an impact on comfort and amenity of the building as well as on social cohesion and good relations among residents. They can thus – in an ideal case – promote lifestyles that are less consumption-oriented and more oriented toward self-help and improving one's immediate living environment.

*The assumed relationships between outcomes and impacts*

The assumed relationship between the training of EEE trainers and the sustainability impacts follows the following logic:

1. EEE trainers train volunteer residents to become EEEs because the management of the housing company sees this as a sensible way to make improvements. A condition is also that there are volunteer residents who want to become EEEs.
2. Through their training, EEEs gain skills that help them make observations, identify improvements, mobilise the necessary resources to implement the improvements, and influence other residents in the building.
3. As a result, things are managed better in the building: leaks are identified and fixed, radiator networks are balanced, temperatures and water flows are adjusted, waste bins are installed and residents are advised to use the building in a resource-conserving manner, and as a result of this advice, they change their behaviour.
4. As a result, energy and water use is reduced, waste is reduced, etc.

The strength of the relationship depends on a wide range of factors, such as:

- a) the availability and quality of volunteer residents
- b) the support available from the housing company management
- c) the quality and amount of training provided
- d) the technical and social skills of the residents
- e) the relationships among residents in the building, as well as the relations between residents and the various housing management bodies (residents' or tenants' board, property management, facility management companies, etc.)

According to the interviews and focus group discussions conducted, the most critical problems in this equation are points (d) and (e). Ordinary people can certainly learn to make observations, interpret energy reports, calculate potential savings, etc., given sufficient training. However, it may be more difficult to gain rapid and significant improvements in social and interaction skills through short-term training. And even while EEEs can improve relations in the building, this can be difficult if the starting point is very bad (poor relations). Moreover, whereas point (a) was not critical at the start (usually, there have been volunteers available), it is more problematic in the long term as the early volunteer tire and new ones are difficult to find.

The importance of point (c), the quality and amount of training provided, depends on point (a), the availability and quality of volunteer residents. It seems that early EEEs were often quite skilled professionals, who had retired or become unemployed. If volunteers lack background skills, the need for training is greater. The amount invested in

training, on the other hand, depends on point (b), the support available from housing company management. In some cases, about 40 hours of very focused energy management training are provided, including on-site hands-on practice, over the duration of almost a year. In others, training is not as long-term, focused or systematic and depends more on the EEE's own interests and initiative.

The outcomes of individual EEEs' actions in their buildings also depend on the initial conditions. If initial technical conditions are poor, it is fairly easy to make low-cost improvements (i.e., pick 'low-hanging fruit'). Once these problems have been solved, there is less visible work for the EEE in keeping up the achieved good situation. This is one of the reasons why VVO have all but given up on the original Energy Expert concept, as almost all buildings are now in good shape, distantly monitored and with state-of-the-art equipment. Thus, there is less for 'non-professionals' to improve in energy management, according to technical staff at VVO. However, the role of EEEs in waste management, general amenity and good maintenance is still highly valued at VVO.

The stated assumptions are thus valid, but only under certain conditions. As conditions change, this implies changes in the role of the EEEs.

## 5 Effects & effectiveness

EEE can be applied in a diversity of ways, which can lead to diverse outcomes and impacts. Table 1 outlines the most commonly mentioned outcomes expected or observed from EEE activities, in general order of importance or prevalence.

Table 1. Most commonly expected or observed outcomes from the Energy and Environmental Expert scheme

<ol style="list-style-type: none"><li>1. Reduced water use</li><li>2. Reduced heating energy use</li><li>3. Reduced use of electricity in common facilities (outdoor and corridor lights, common equipment)</li><li>4. Better sorting of waste and recyclables</li><li>5. Enhanced sense of community, better communications among residents and housing management</li><li>6. Inclusion of energy and waste concerns in renovations</li><li>7. Prompt response to problems, appropriate maintenance leading to durability of structures</li><li>8. Resident lifestyles: electricity use in the household</li><li>9. Resident lifestyles: other, e.g. car use, carbon footprint of food</li></ol>
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Of the above mentioned, mainly points 1-4 are measurable as outcome parameters, and they also capture part of points 6-7 in the long term. Observed outcomes vary significantly from one place and time to another. There is, unfortunately, little comprehensive evidence available – existing evidence is based on samples or on overall impressions of housing company managers. Table 2 presents the available evidence and the observations on which it is based.

Table 2: Existing evidence on outcome parameters for the EEE scheme

	Data	Results
VVO early experiences (VVO and Motiva, 1997)	Sample, about 150 buildings	5 % decrease in energy use for heating 10 % decreases in electricity consumption 20 % decrease in water usage Overall impact attributed to residents = 5%
VVO current experiences (all 39 000 apartments)	EEEs in almost all buildings – no comparative data available. Great variability among experts' work: some do not focus on energy at all	Reduced energy demand cannot be attributed to experts, energy conservation agreement has a much larger role EEEs do have a clear impact in individual cases (about 5% of houses) Waste and waste sorting probably improved
Espoonkruunu, municipal housing, 263 buildings with 11 594 apartments	EEEs in about half the buildings (N= 136) Comparative data available on energy and waste costs	No systematic difference in energy use among houses with or without EEEs Waste costs are about 10% lower in houses with EEEs due to better sorting "Things would be much worse if there were no EEEs"
Jyväskylä, owner-occupied housing	N=20 houses with energy experts, data on energy costs	average 10 000 EUR annual reduction in energy costs (about 10% of costs, slightly more in kWh); not expected to continue once largest problems solved, thus use of quantitative targets discontinued

Table 2 shows that early experiences were very good, both in selected rental houses at VVO (and in the first owner-occupied houses that applied it in Jyväskylä). This is most likely due to two factors. Firstly, at VVO it is believed that the early EEEs were highly skilled and motivated people (e.g. retired or unemployed professionals). As the

scheme has expanded, EEEs are, on average, less skilled<sup>3</sup>. Another reason is that as improvements are implemented, there are fewer things that the EEE can improve. In spite of the inconclusive evidence, all interviewees agreed that *in some cases*, EEEs do have a clear impact on energy use, waste or other outcome parameters. The impact depends on the initial conditions, on the EEEs' skills and interests and on their co-operation with the housing company management.

Additionally, and not included in Table 2, EEEs may have an impact on their own consumption patterns (e.g., using less electricity in the home, driving less), as well as on the consumption patterns of the neighbours. However, as there is no documentation of such impacts, and they are not included in the BAU calculation. There are also indications that EEE has an impact on waste costs (resulting from better sorting of waste). As it is not known exactly what wastes are sorted better, this outcome cannot be quantified at the present time.

On a national scale, the impact on sustainability from EEEs depends on the magnitude of two types of outcomes: outcome 1 = number of EEEs working actively and outcome 2 = results achieved by EEEs in their house.

At present, it is difficult to argue for significant impacts, e.g., considering the viewpoints expressed by VVO, the originator of the scheme. However, there are cases where the scheme does lead to improvements vis-à-vis the baseline scenario. Moreover, there are visions for a revitalisation and improvement of the scheme. We can thus construct two scenarios:

**1. Current level of implementation:** In this current level, EEE is implemented in about 7% of the rental housing stock and in 0,6% of the owner-occupied housing stock. In the rental housing stock, EEEs contribute to a 5% energy saving in 5% of the cases (total 0,25%). In owner-occupied housing, annual energy use in all houses with EEEs is estimated to be 5% less than in the BAU scenario.

Annex 3 calculates the impact on heat and energy consumption taking into account the average areas of rental and owner-occupied apartments. The total impact on CO<sub>2</sub> emissions is calculated using emission factors from Motiva (2005). The total estimated impact at present is a reduction of **1327 t CO<sub>2</sub>** compared to a scenario without EEEs. The impact is larger in owner-occupied buildings because of their larger average area and because EEE action is estimated to be more effective in these buildings (can influence both use and investments), even though there are fewer EEEs active.

**2. Enhanced implementation.** In this case, EEE recruiting and training is improved. Improvements are targeted to (a) enhance the energy component of the training and (b) to engage more owner-occupied housing. We can thus assume an uptake of about

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<sup>3</sup> For example, VVO has given up distributing the Energy Expert workbook or briefcases, because the experience was that EEEs do not know how to use the measuring equipment.

30% in rental housing<sup>4</sup> and a 30% uptake in owner-occupied housing by 2030. Due to improved training, buildings with EEEs all achieve a 5% reduction vis-à-vis the BAU scenario. Annex 3 presents a calculation of the impact of the EEE scheme in this scenario of enhanced implementation. The total estimated impact is a reduction of **78 434 t CO<sup>2</sup>**. Again, the owner-occupied apartments have a large share in this total because of their larger average area.

The most important sustainability indicators are reductions in greenhouse gas emissions and non-renewable energy use. Water use is also reduced, but this is not an important sustainability problem in Finland (except in the case of hot water, which is included in the reduced heating energy demand). Even though not estimated here, there can also be impacts from reduced mixed waste generation and increased sorting, in particular of biowaste, which could also be measured in terms of reductions in energy use and greenhouse gases.

The EEE scheme reduces costs for the household and for society. The costs for running the scheme are very small at present, as much of the work is done 'free of charge' or as part of the overall services provided by housing companies or property management companies. For example, in the case of the JKL property management company, additional costs from the EEE training for the housing company amount to about 200-300 EUR/EEE trained, depending on the cost of equipment (meters) purchased. The EEEs thus rapidly save back the costs spent on their training through energy savings.

In terms of social sustainability, EEE can have a positive distributional effect by reducing housing costs and allocating them more fairly. It can also have a positive impact on gender issues, as more women are empowered to learn about the technical aspects of their building<sup>5</sup>.

Context factors have an important intervening role in whether the sustainability impacts are achieved. The most important context factors are presented in table 6.

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<sup>4</sup> Uptake in rental housing is limited by the factor that a growing share of rental apartments are privately owned, leading to mixed-ownership buildings. It is not likely that the EEE scheme would be particularly popular in these.

<sup>5</sup> In the cases examined, EEEs were fairly evenly distributed according to gender at the rental housing companies, VVO and Espoonkruunu. In the owner-occupied houses in Jyväskylä, more men than women participated in the (very technical, very energy-oriented) EEE training, but more and more women were joining each year.

Table 6. Context factors promoting and hindering the effectiveness of EEE

	<b>Promoting</b>	<b>Hindering</b>
Other policy instruments	AESS – voluntary agreement of the residential building sector	AESS may also provide an alternative route to energy efficiency where the EEEs' role is limited
Technology	Increased automation, smart metering and online energy consumption reports can offer a 'tool' for EEEs  Individual metering	If systems are highly automated and well-managed, there may be fewer 'cheap and easy' improvements for EEEs to make or suggest  Individual metering
Market issues	Price of electricity and district heat rising	Commercial services may replace EEEs
Sociocultural issues	Social cohesion  Rejuvenation of collectivism	Resident turnover  Heavy pace of working life  Less commitment to voluntary organisations

The voluntary agreement of the residential building sector (AESS) is the major policy instrument for influencing energy use in apartment buildings. Signatories include the largest providers of rental housing. This can be a promoting factor, in particular, if measures are taken to stimulate EEE activity within the agreement. However, it may also downplay the role of the EEE scheme. At least at VVO, where significant efforts to improve energy efficiency have been invested as a result of the AESS, the general opinion was that VVO staff are now key for saving energy, and that compared to their professional work in this area, the role of EEEs is today very small.

A similar dual role can be seen for technology. Especially rental housing providers have invested a lot in automation, distant metering and online reporting of energy consumption. At the same time, they also have a tradition of long-term repair plans, which are only now starting to take off in owner-occupied housing. The better the buildings are managed, in a technical sense, the less work there is for EEEs (and the less they may feel motivated to engage with energy issues). This was the viewpoint brought up by interviewees at VVO. In contrast, other interviews and observations suggest that, for example, EEEs can have an important role in interpreting energy consumption reports, identifying reasons for increased energy consumption and suggesting improvements. One factor that may explain these opposite perspectives may be the quality of maintenance staff. If building maintenance services are outsourced, staff may not have a lot of understanding of what is going on in the building, and the EEEs may have a

crucial role to play in connecting changes in energy consumption to events in the house.

In the same vein, emerging technologies like individual water meters (now increasingly installed), smart electricity meters and individual heating meters can both support and extend, or undermine the EEE scheme. EEEs can be central in taking the initiative to install such meters (and calculate, for example, when such an investment would be paid back), especially in owner-occupied housing. On the other hand, the meters are in a way an alternative route to energy saving, which partly obviates the need for collective management of energy and water.

The two above-mentioned context factors – other instruments and technology – relate to a particular ‘weak point’ in much of the current EEE practice. Many reports (e.g. Anttonen 2009) suggest that EEEs are easily seen as a separate “behavioural track” that is not connected to the “hard core” of technological solutions and investment planning in the buildings. This problem may be more relevant in rental housing, where residents have less say in investments. In owner-occupied housing, the EEE’s role depends on the residents’ board and the residents’ general assembly, which take the final decisions on all investments. But the scheme, at least until now, has stressed small, low-cost, energy management types of measures. If EEEs were more formally and closely involved in investment planning, they might be able to make a larger impact (Anttonen 2009). This is the case in owner-occupied housing, where they are members of the Residents’ Board who takes such decisions, but in rental housing, the Tenants’ Board has only an advisory role.

A factor potentially promoting the role of EEEs is the price of energy, water and waste management; and in particular, its share in housing costs (rents and charges). These prices have been rising in recent years, and today make up about 30% of the running costs (Kiinteistö 2009). Electricity prices are expected to rise significantly in Finland due to European convergence, and this may stimulate more interest in energy as a way to reduce housing costs. On the other hand, the EEEs may have to ‘compete’ with professional and commercial services for reducing energy use.

For the EEE scheme, however, social and cultural issues are the most critical context factors. There is today in Finland much talk about the importance of social cohesion, and various municipalities and housing providers are investing in stimulating resident activism and co-operation among residents (e.g., 4V Project 2009). There is also a lot of discussion about a “new collectivism” and many argue that people are more interested in voluntary work than before. Against this backdrop of media discussion and individual projects, however, participation in voluntary associations has remained almost level in Finland for decades (Hanifi 2007). New associations also tend to be more focused on hobbies and special interests (Kankainen 2009). Many argue that long-term commitment to a particular association is lower than before. This is partly due to

working life, which takes a greater toll from people each year<sup>6</sup>. In particular, commitment to residential associations may be problematic if people move frequently or have to commute over long distances<sup>7</sup>. The interviewees were of the opinion that resident turnover and lack of enthusiasm for local associations are trends that are likely to undermine the effectiveness of the EEE scheme. In particular, it was believed that young people are less eager to do voluntary work in their own residential area than older people, but it is not clear whether this phenomenon is connected to age or generation.

Evidence from the interviews and focus group discussions suggests that social relations within the building and appreciation of the EEE's work are key factors determining whether people are willing to volunteer for this kind of work. The work of EEEs can entail "telling others what to do", i.e., e.g., advising them on energy use or even pointing out mistakes in sorting waste. This type of interaction with others does not come naturally to most Finns, and not all EEEs seem to be doing a lot of this. Many EEEs find these types of responsibilities very difficult. The work is also not very socially rewarding, so turnover is high. Social skills, trust and good interaction within the building are key for effective EEE activity. Thus, it is not likely that there could ever be a well-functioning EEE in each building in Finland.

Problematic interaction between EEEs and other residents was the most commonly identified potential 'side-effect'. All interviewees and focus group participants agreed that "not everyone can be an EEE". In the words of the interviewees, EEEs should not be "policemen", "busybodies", "fanatics", "hyperactive" or "gossipmongers". This can create a problem. As the EEE is a position of trust, EEEs are selected on the basis of volunteerism. If there are not many volunteers, it may in some case happen that a problematic kind of person is selected. Such persons may undermine the respect and appreciation of the entire scheme by giving it a poor reputation and image in their building<sup>8</sup>.

Another potential problematic side-effect identified in the focus group discussions was that the EEE scheme may represent environmental protection as a kind of 'hobby', which people can engage in if they feel like it. Many argued that energy use and waste management in apartment buildings are too important to be left to volunteers (this was also the viewpoint expressed by the VVO managers). Some consumers argued that if the state and the municipality believe that volunteers are taking care of these issues,

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<sup>6</sup> This point is backed up by an observation by the VVO interviewees, who argued that the original Energy Expert scheme was successful because it started after an economic downturn when many skilled professionals were unemployed.

<sup>7</sup> Increased mobility of the labour force is one of the targets of the current Finnish labour policy, which has extended the area from which employment must be sought to 80 km from the home, in order to qualify for unemployment benefits.

<sup>8</sup> This aspect was highlighted in the focus groups. It was also mentioned in the interviews. Additionally, at a workshop, a representative of one housing company said they had discontinued the EEE scheme because of difficulties in recruiting good EEEs and problems caused by 'nosy' and 'annoying' ones.

they may not set up appropriate professional services or apply stronger instruments for the purpose.

At present, the EEE scheme does not as a rule fulfil the original goals of saving energy, but it does work in some cases. The more selective the scheme is, the more likely it is to actually work in saving energy in the building where the EEE works. The more widely it is used (as in VVO), the more diverse the outcomes and impacts are, and the less guarantee there is of any measurable impacts at all. Moreover, the effectiveness of the original EEE concept (measuring and suggesting low-cost improvements) wears out with time as cheap and easy improvements are implemented; hence, the role of the EEE needs to evolve with time and needs to be integrated with the long-term investment plans of the building. However, the current 15 years of ‘testing’ various ways of implementing the scheme in Finland offer material for making improvements and finding the best ways of running the EEE scheme in different contexts.

## 6 Discussion

The overall effects of the EEE scheme are difficult to establish due to significant variation in how it is implemented at various sites and at various times. Because it is a voluntary instrument, this variation is unavoidable. The overall conclusion is that in individual cases, the EEE scheme has had significant effects (up to 5-20%) on water use, heating energy use and electricity consumption for common building facilities. However, these effects are not observable across the board. Moreover, the EEE scheme has been observed to reduce waste and positively influence the attitudes of residents. It has also served to empower (at least some) “ordinary people” as active agents of change, and has thus contributed to an increase in environmental awareness and capacity.

The great existing variations in energy use due to energy management practices and resident behaviour, as well as the early successes of the first EEEs, show that much can be improved via relatively inexpensive measures. In its original form, EEE focuses on monitoring and improving energy and waste management. Yet, there are limits to how much can be achieved in this way: once cheap and easy measures have been taken, the scope for further improvement is limited. However, the EEE scheme still holds a quite significant untapped potential to stimulate energy efficiency investments and renovations in owner-occupied buildings, but this potential is not as yet captured. It is also likely that the ‘cheap and easy’ improvements are reversed over the years unless an active EEE takes care that they stay on the agenda.

We now turn to discuss the findings in the light of the hypotheses set out in the IIA Tool (Wolff and Schönherr 2009).

*Hypothesis 1: The scale of effects resulting from a SC instrument increases with the validity of the instruments' intervention logic.*

There are multiple intervention logics in the EEE scheme, which is implemented independently in diverse ways at various sites. The basic logic – of potential that can be captured by better resident behaviour, energy management and use of existing technologies – is sound. However, the resources invested in the EEE scheme are not sufficient to spread it to all the buildings where such potential exists. At present, also, it seems that EEE training does not, in all cases, provide EEEs the capacity to serve their role effectively. So some EEEs are achieving the expected outcomes whereas others (or even most) are not. Lack of measurement and monitoring undermines the credibility and potential for diffusion of the scheme. Hypothesis 1 is not confirmed in this case: the problems do not lie with the intervention logic but with the consistency with which it is upheld and monitored.

*Hypothesis 2: The involvement of stakeholders in the development and implementation of the SC instrument significantly fosters the creation of instrument effects, i.e. changes in consumption patterns and resulting sustainability gain.*

Stakeholders – residents and housing companies – were the original initiators of the EEE scheme, which was developed jointly by VVO and Motiva. EEE started as a 'pilot' scheme that was later diffused to more sites. Partly, it is still in this 'pilot' phase as it is implemented in diverse ways, and experiences are not systematically collected or utilised. Due to this enduring 'pilot' character, only limited *new* stakeholders have been involved. Limited resources are available for systematically diffusing the scheme. General awareness of the EEE scheme is low and so is public recognition of the valuable work done by the EEEs. The scheme, as it exists today, is still purely 'internal' to the housing companies, and few outsiders (e.g., municipal officials, NGOs) make contact with the EEEs. Thus, H2 is partly confirmed in the EEE case.

*Hypothesis 3: The scale of effects resulting from a SC instrument increases strongly with the degree to which the instrument acknowledges and accommodates the diversity of consumers' everyday needs and practice.*

Hypothesis 3 is not so relevant for a voluntary instrument, which is not meant to apply to all consumers. However, the diversity of everyday needs and practices is well reflected in the diversity of ways in which EEEs work. It is a highly flexible instrument. Nonetheless, if we consider the training needs of EEEs, more support is needed for different EEEs in different areas (technical competences, social skills, organisational capacities). In particular, there seems to be a need to enhance social skills and offer EEEs 'tools' for effectively influencing the behaviour of their neighbours and to help them to operate in diverse social environments. Here, in particular, more capabilities would be needed to communicate with diverse audiences (young people, elderly people, immigrants).

*Hypothesis 4: The scale of effects resulting from a SC instrument increases strongly with the degree to which the instrument not only addresses consumers, but adjusts the framework conditions of consumption.*

EEE operates, until now, fairly much on a parallel track with a more ‘technical’ approach to energy efficiency in apartment buildings. In principle, the EEE scheme could help to combine ‘human factors’ with ‘technical improvements’, yet this is not in most cases achieved due to insufficient training of EEEs and lacking motivation of professional housing managers and other professional staff to engage with non-professionals. Thus, H4 is confirmed and partly extended – consumer behaviour and framework conditions (including technological solutions) should be considered in combination and not separately.

*Hypothesis 5: The scale of effects resulting from a SC instrument varies strongly with the (synergetic vs. antagonistic) “direction” of policy interaction between the instrument and other policies: while synergetic policy interaction will reinforce an instrument’s outcomes and impacts, antagonistic interaction is a major cause of low levels of instrument effect.*

H5 gains qualified support. Whereas the voluntary agreements for the residential building sector (AESS) is synergetic, it can also be seen as undermining the need for the EEEs by moving energy management more into the hands of housing management professionals. Complementary policy instruments – if they are seen as alternative ways to achieve the same goals - can thus also ‘compete’ for attention and resources by addressees and policy makers.

*Hypothesis 6: The scale of effects resulting from a SC instrument is highly contingent upon a favourable market context.*

Relatively low prices of energy are often mentioned as a factor reducing Finnish households’ interest in energy saving. Prices have recently risen and are expected to rise more in the future. This is not yet very visible in a growing interest in EEE activities, however. Thus, there is no evidence to test H6 in this case.

*Hypothesis 7: The scale of effects resulting from a SC instrument will be influenced by further success factors which are additional to those mentioned in the previous hypotheses.*

Voluntary instruments are a special case and have a particular role in the policy mix. They cannot be expected to apply to the entire population – if this were the case, they would not be voluntary. Often, voluntary schemes are presented as ‘forerunners’, which introduce new practices and ‘raise the bar’ for others to follow (Retallack 2007). The EEE scheme reflects some of these characteristics. However, it is not as yet clear exactly how the EEE practices should be ‘mainstreamed’ without diluting the ‘forerunner effect’. The EEE case thus raises the question whether voluntary instruments have a ‘lifecycle’ and need to eventually evolve into something else – and if so, what the next evolutionary step should be.

The EEE case also raises some concerns about extrapolating the findings from early experiences of voluntary instruments to a broader population, as well as the question of whether good early achievements can be consistently kept up. Due to limited evi-

dence, this question cannot be conclusively answered even in this particular case, but it has pointed to some reasons why volunteers' performance can change over time.

## 7 Conclusions

This section summarizes the most important findings and presents an overall appraisal of the instrument's performance (Table 7). It also summarizes some limitations of the case study findings and suggests open questions. It ends with some policy recommendations and considerations on the transferability of the instrument.

The greatest strength of the EEE scheme is that it has persisted since 1995, which is quite an achievement for a voluntary scheme with limited resources. It is also exceptional insofar as it draws on the work of voluntary residents/consumers – ordinary people, who might not otherwise be highly involved in environmental issues. Since its start, the scheme has trained a great many people in Finland in the principles and practice of energy conservation and management in buildings. As buildings are becoming more and more complex, such a 'bridging' role of trained lay people is highly necessary.

Findings from the case study suggest that better energy management by residents due to EEE activism can reduce energy consumption by about 5%. Additionally, there are indications that in some cases, EEEs can significantly promote energy efficiency investments. EEEs can also improve waste management practices. Most importantly, in the best case, the scheme connects these environmentally responsible actions to a broader ethos of community and taking care of one's own living environment.

As EEE is a voluntary scheme, the desired outcomes do not always materialise. It is also highly improbable that an EEE could be active in each and every building. The outcomes of EEE action vary over time and in different locations. Additionally, in order to be effective and make a positive impact on their neighbours, EEEs need highly developed social skills. Training, continuity, monitoring, setting targets and rewarding successful voluntary work are key challenges of the scheme.

The EEE scheme in Finland has evolved in the context of incentives for housing companies to reduce energy consumption – in particular, the voluntary energy efficiency agreement of residential housing sector. It has not diffused far outside the scope of companies participating in this agreement. However, other incentives, such as price incentives, to reduce energy consumption are relatively lower in Finland than in many other countries. Another key context factor is the social status and position of voluntary work in society. Participation in voluntary organisations has been historically very high in Finland, but there are also different types of voluntary organisations, and there are concerns that those related to the local community and immediate living environment are on the decline. The EEE scheme draws on volunteerism, not only by the EEEs but by other residents; hence, it is highly dependent on social cohesion (which it can also promote if well managed). Overall state support has been quite limited in recent years; there is reason to believe that the scheme could be more effective if more support were provided.

Table 7. Overall appraisal of the strengths, weaknesses and dependence on key context factors of the EEE scheme

Strengths	Weaknesses	Context factors
<p>Training of volunteer network of ordinary people, 'lay experts'</p> <p>Capturing of part of the potential for better energy and resource management</p> <p>In some cases:</p> <ul style="list-style-type: none"> <li>• promotion of energy efficiency investments</li> <li>• better waste management</li> <li>• social context for energy conservation</li> </ul>	<p>Variability of outcomes</p> <p>Limits of voluntary schemes: not everyone, not everywhere</p> <p>Problems in continuity</p> <p>Need for highly developed social skills</p> <p>Insufficient training, monitoring, target setting, rewards and recognition</p>	<p>Incentives for housing companies to reduce energy consumption</p> <p>Time available and recognition of resident's voluntary work</p> <p>Social cohesion</p> <p>Overall state support</p>

There was not much systematic monitoring data available on the EEE scheme, either on a national scale or in individual housing companies. In particular, there is no information available on the impact of the EEE training on individual consumption patterns, such as electricity use in the home or car use. There is also no systematic, nation-wide assessment of why people join the scheme, what they actually do, what challenges they encounter, why they leave and what external help they expect. There is also a lack of systematic comparative data on different ways of running the scheme. These open questions will hopefully be answered in later studies and evaluations.

In spite of the data gaps mentioned, the case study suggests a number of policy recommendations. Motiva, the Finnish state-owned company in charge of energy efficiency and conservation, was integral to launching the scheme and training the first EEE trainers. However, since about 2000, the scheme has received little support from the state. Municipalities are only involved insofar as some municipal owners of rental buildings operate the scheme (and more recently, in the context of the 4V project in the metropolitan area). The interviews all suggest that more consistent support is needed. This might take the form of new training events and more consistent evaluation of outcomes. Public recognition of the altruistic work performed by the EEEs was also called for. Additionally, it might be worth considering whether the EEE could be recognised as a kind of official 'degree' or position of trust, which would convey social status to EEEs and perhaps bring personal benefits such as employment opportunities<sup>9</sup>.

<sup>9</sup> In Finland, for example, military service is recognised as an official training, and it is taken into account when applying to educational institutions and for jobs.

As concerns transfer of the EEE instrument to other countries in Europe, there seem to be both opportunities and obstacles. Peer-to-peer advice schemes are currently quite popular. In principle, they provide a low-cost option for bring environmental communication close to the consumer and utilizing the power of social networks and social norms (Backhaus and Heiskanen 2010). From this perspective, the EEE scheme may be highly suitable in some contexts, in particular, where there are great variations in energy use and where simple and easy measures can be taken to capture the efficiency potential reflected by these variations. In particular, the case study has shown that there is potential in the scheme in situations where residents can make important decisions concerning energy efficiency investments.

However, the EEE scheme has evolved in a Finnish context, where many of the energy-related costs in apartment buildings are shared by residents rather than charged individually. This is not the case in many European countries. Thus, significant adaptations are needed to the scheme to make it suitable for different patterns of housing and residential energy management in diverse European countries.

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## 9 Annex 1: List of interviewees

Markku Anttonen, Research Fellow, Helsinki School of Economics, interview, April 6, 2010

Untamo Aukio, Housing Technology Engineer, Espoonkruunu Ltd, interview, April 7, 2010

Päivi Laitila, Senior Consultant, Motiva Ltd, interview, February 15, 2010

Ismo Lievonen, JKL Kiinteistöpalvelu, telephone interview, April 28, 2010

Kari Mähönen and Kimmo Rintala, VVO, interview, March 11, 2010

Merja Nyyssönen, Communications Officer, VVO, e-mail exchange, Jan 17, 2010

Erkki Laitinen, Ministry of Environment, May 23, 2010

## 10 Annex 2: Finnish housing and energy policy context

More than half of all Finns live in apartments or in terraced houses, of which the latter are also usually organized as housing condominiums (or housing corporations as we say in Finland). This means that the residents make major decisions collectively, and annually elect a board to govern the more day-to-day business of housing management. Usually, at least in larger buildings, facility management is outsourced to a professional house manager.

	Apartments in apartment buildings and terraced houses (1,6 million apartments)	
	Rental apartments	Owner-occupied apartments and right-of lease apartments
Resident profile	Younger people	Older people, families
Governance of the building	By building owner (co-operative, limited liability company or municipality)  Tenant participation is ensured by law, but tenants mainly have an advisory role on major investments.	By Residents' Board, appointed by the Residents' General Assembly  Property management services are usually procured from a professional company, also part-time property managers can be used.
Daily maintenance	Usually provided by outsourced service companies serving multiple customers and sites	Usually provided by outsourced service companies serving multiple customers and sites
Energy management	Many of the larger rental housing providers have systematic energy management and long-term renovation plans. Many are signatories to the voluntary energy efficiency agreement for the residential sector (AESS).	Individual properties are usually small. Long-term renovation plans are rare. Participation in voluntary agreements on energy management are rare.

Tenants have different rights depending on the type of rental housing. When their house is built with state interest support, the housing owner is obliged to involve them in decision making, mainly by hearing their views and providing information, and by appointing a member to the board of the housing association under certain circumstances. In buildings that are privately owned and rented, the tenant's rights are more

limited, even though the new Housing Corporation Act (22.12.2009/1599) ensures more information provision and the right to be heard than before. Nonetheless, tenants do not have a veto on renovations or other major decisions in any type of housing.

Energy costs make up a significant share of the maintenance charges or rents. For example, the average maintenance charge in an owner-occupied apartment building in 2008 was 3,71 EUR/m<sup>2</sup>, of which 23% consisted of heating costs and 8% of water charges (Statistics Finland 2009). Energy and water costs are still mostly charged on a m<sup>2</sup> basis. Some newer buildings have individual water meters (and hence, individual water charges), but individual heat metering is still rare.

Daily maintenance is usually provided by outsourced service companies, which may or may not be linked to the housing manager company. These outsourced service companies provide maintenance and daily care (cleaning, gardening etc.) for multiple buildings; hence, service personnel are rarely to be found on site.

Until now, only rental housing providers have usually had long-term maintenance plans. Many are signatories to the voluntary energy efficiency agreement for the residential sector (AEES). Owner-occupied apartment buildings have usually not planned much for the future or saved up for renovations. Participation in voluntary agreements on energy management is rare. Hence, it has not been easy for residents to make decision or agree on renovations, as a major renovation almost invariably implies higher maintenance charges. The new Housing Corporation Act (22.12.2009/1599) requires housing corporations (i.e., owner-occupied apartment buildings) to make five-year renovation and maintenance plans, which is expected to enhance the rate of renovation and facilitate decision-making among residents.

## 11 Annex 3: Calculations on total heating and energy use in rental and owner-occupied buildings and impact of EEEs

### Scenario 1: Current level of implementation

	Rental apartments	Owner-occupied apartments
Total number	750 000	770 000
Average size	45 m <sup>2</sup>	75 m <sup>2</sup>
Total area	33 750 000 m <sup>2</sup>	57 736 200 m <sup>2</sup>
Total heat consumption*	8133,7 GWh	13 914,4 GWh
Total electricity consumption for common facilities**	698,2 GWh	1 197 GWh
Share of apartments influenced by EEEs	7%	0,6%
Specific impact of EEEs	0,25%	5%
Total impact heat	1.42 GWh	4,17 GWh
Total impact electricity	0,12 GWh	0,36 GWh
Total impact CO <sub>2</sub> emissions, heat***	312,4 t	918,35 t
Total impact CO <sub>2</sub> emissions, electricity****	24,4 t	71,8 t
Total impact CO <sub>2</sub> emissions	336,8	990,1
Total impact CO <sub>2</sub> emissions	1327 t	

\*Heat consumption: 241 kWh/m<sup>2</sup> (Nissinen and Dahbo 2009), divided in relation to areas to rental and owner-occupied

\*\*Electricity consumption common facilities: 1 895 GWh (Adato Energia 2006), divided in relation to areas to rental and owner-occupied

\*\*\*Emission factor for district heat (combined heat and power) = 220g/kWh

\*\*\*\*Emission factor for electricity = 200g/kWh

## Scenario 2: Enhanced implementation

Calculations on total heating and energy use in rental and owner-occupied buildings and impact of EEEs.

	Rental apartments	Owner-occupied apartments
Total number	750 000	770 000
Average size	45 m <sup>2</sup>	75 m <sup>2</sup>
Total area	33 750 000 m <sup>2</sup>	57 736 200 m <sup>2</sup>
Total heat consumption*	8133,7 GWh	13 914,4 GWh
Total electricity consumption for common facilities**	698,2 GWh	1 197 GWh
Share of apartments influenced by EEEs	30%	30%
Specific impact of EEEs	5%	5%
Total impact heat	122 GWh	208,7 GWh
Total impact electricity	10,5 GWh	17,9 GWh
Total impact CO <sub>2</sub> emissions, heat***	26 840 t	45 914 t
Total impact CO <sub>2</sub> emissions, electricity****	2 100 t	3 580 t
Total impact CO <sub>2</sub> emissions	28 940 t	49 494 t
Total impact CO <sub>2</sub> emissions	78 434 t	

\*Heat consumption: 241 kWh/m<sup>2</sup> (Nissinen and Dahbo 2009), divided in relation to areas to rental and owner-occupied

\*\*Electricity consumption common facilities: 1 895 GWh (Adato Energia 2006), divided in relation to areas to rental and owner-occupied

\*\*\*Emission factor for district heat (combined heat and power) = 220g/kWh

\*\*\*\*Emission factor for electricity = 200g/kWh