

Action Research for Sustainable Housing: Theoretical and Methodological Implications of Striving for Research as a Tool for Change

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Abstract: *Critics claim that neither results from sustainable housing demonstration projects nor tools for the environmental impact assessment of buildings are used in mainstream housing practice. This raises the question of how research-based knowledge for energy efficiency and environmental sustainability in the built environment could be transferred to practice in a better way. In this article we propose a model to address this problem by combining reflective research and “green engineering”. The model was developed through applying action research theory on generalized findings of empirical studies by different researchers. The model is called Action Research for Environmentally Sustainable Housing (ARESH). In this kind of research it is permissible to be openly normative and to strive for change, but not to neglect critical reflection. To achieve this, the researcher has to co-operate closely with co-researchers such as residents and housing managers, and, furthermore, to balance between taking the roles of researcher, team member and teacher/preacher. On the positive side, the model permits dissemination of information targeted at researchers as well as practitioners, and also “leaves behind” practical knowledge with the co-researchers after the project proper has ended.*

Keywords: Environmental research, sustainability, action research, housing research

1. Introduction

A large body of literature ranging from scientific writings to “coffee table books” has been written on sustainable building/construction. In it, construction processes, architectural qualities, building materials and energy use in experimental buildings are discussed (for example, Stang and Hawthorne 2005; Gausin-Müller 2002). Eco-villages (Berg et al. 2002), eco-renewals (Kennedy and Kennedy 1997; Femenias 2005; Nilsson 1998), and newly constructed residential areas (Larsson et al. 2003) environmental ambitions have also been thoroughly

studied. However, research has also indicated that the knowledge from these projects is not transferred to mainstream housing; eco-building or environmentally sustainable building seem to be concepts earmarked for a handful of demonstration projects with marginal relevance for the major part of the housing sector. To mention some examples, Femenias (2005), van Hal (2000) and Rubino et al. (2007) observed this with demonstration projects in construction, Nilsson (2003) and Svane (1998) found it in housing refurbishment and management. Also tools for

assessing environmental impacts from buildings face the same problem; they are developed by researchers and used in some demonstration projects, but do not become part of daily practice (Jensen and Gram-Hanssen 2005).

How then, could the research-based knowledge gained from demonstration projects and the development of assessment tools be more widely disseminated to mainstream housing? In this article it is argued that researchers could be agents of this process, and a model research strategy for this dissemination is presented. The model is based on the Action Research (AR) tradition where research is seen as a tool for change. The basic underlying idea is that dissemination is facilitated if:

- the researcher and a group of practitioners cooperate in the research process, and
- the differing means of dissemination that these two categories of participants have at hand are utilized in parallel.

In the following, the proposed model is called Action Research for Environmentally Sustainable Housing, ARESH for short.

Hence, this article firstly provides a presentation and discussion of Action Research (AR). Thereafter the concepts and theory presented are applied on empirical findings from research on environmentally

sustainable housing. The article ends with a summary and a discussion on the relevance, possibilities and problems of ARESH.

The first part of the article is based on a critical reading and compilation of literature on AR. The second part takes as its point of departure previous empirical studies on environmentally sustainable housing, in particular improvements of the existing building stock (Nilsson 2003; Svane 1999; Svane 1998; Malmqvist 2004). Since the model that we present is an “ideal-type”, the empirical findings are generalized to a fictitious example of the renewal of an existing building. Although the main focus is on housing, a secondary aim is to contribute to a more general discussion on methodology in the field of research for environmental sustainability.

2. Action Research

Action research (AR) is a methodology originally developed in the 1940s by psychologist Kurt Lewin (Reason and Bradbury 2001). The main difference between AR and other types of research is that the research process is explicitly and deliberately used as a tool for change; action and research are integrated. AR is often seen as a spiral of steps – an ongoing process rather than as a project delimited in time. The first step is the planning of the action addressed, followed by acting and evaluating the result of the action (see Figure 1). Then another cycle of planning, action and evaluation starts (McTaggart 1997).

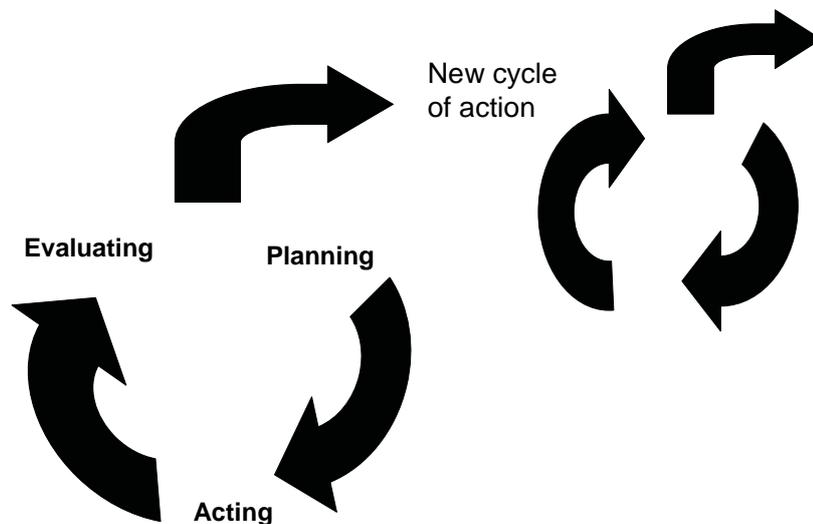


Figure 1. The spiral of action research.

Another characteristic of AR is that all participants, the professional researchers as well as the “researched”, are supposed to participate on even terms. The latter are often called *co-researchers*, and we will follow that practice (Reason and Bradbury 2001). According to McTaggart (1997), AR should be *by* people rather than *on* them. Some writers on AR go even further, saying that AR could be performed without professional researchers (Reason and Bradbury, 2001). However, most of the research described in AR literature seems to be led by a professional researcher or facilitator. Since we in this article address the development and transfer of research-based knowledge to practitioners, only research led by professional researchers is considered.

Many AR scholars emphasise that it should focus on the weaker groups of society. The aim of such AR is often to create emancipatory knowledge that might change the basic social conditions of the co-researchers. However, there is also another widely contrasting type of AR focusing on how to improve corporate management but without emancipatory aims. Since AR deals with learning, empowerment and organisational development it belongs to the social sciences and has been carried out for instance in the fields of business management, educational research and work science (Ladkin 2004). According to Spjelkavik (1999) it is a type of applied research. However, action researchers would agree that it goes beyond consultancy or development work, since it takes its point of departure from researchers such as Habermas.

To give an idea of AR, two examples are used in the following. The first example is an AR project that was carried out in the village of Arama in the South Pacific country New Caledonia. The aim was to start a small-scale fishing cooperative for marketing fish caught by the villagers. Initially the outcome was successful, but after some years the cooperative failed (Delion 1997). The other example was carried out in order to increase the productivity of the Xerox Company in the US (Whyte 1991). This project increased corporate productivity and according to Whyte, AR initiated a successful learning process that also inspired other companies.

2.1 Main Aims of Action Research

As previously mentioned, a main aim of AR is that researchers and co-researchers take action within

the study. In the case of Arama, the change aimed at was the improvement of the possibilities for the villagers to market their fish, and the action taken was to start a cooperative. In the Xerox case, the change addressed was improved working quality and increased productivity. The action taken was a self-study process.

However, equally important as Action is Research; in other words AR also aims at producing new knowledge. This knowledge can be of different kinds. For example, Kemmis (2001) uses Habermas’ theory to categorize knowledge produced in AR. According to Kemmis, a main body of the outcome in AR is what Habermas calls “technical knowledge”, i.e.:

“...oriented essentially towards functional improvement measured in terms of its success in changing particular outcomes of practices” (Kemmis 2001, p. 92).

In the case of the Arama fishermen, the “technical knowledge” produced was that they learned to market their catch, and, probably, it would have been possible to measure how much their incomes increased. In the case of Xerox, the co-researchers learnt how to change their practice in order to increase productivity.

Besides achieving change related to technical knowledge, the aim in AR is also that the practitioners should reflect on their own practice. Argyris and Schön (1978) call this “double-loop learning” and Kemmis uses Habermas’s concept of “hermeneutic (understanding) knowledge” for knowledge gained in this way.

For the fishermen such knowledge might mean that they should reflect upon the development of the cooperative and also on why it did not work after a while. For the managers and employees at Xerox, gaining “hermeneutic knowledge” could involve them analysing why the process was successful.

Kemmis also considers a third type of knowledge – in some cases the most desirable one – namely “emancipatory knowledge”. This kind of knowledge requires both technical and hermeneutic knowledge but goes beyond – it aims at changing larger structures than those of the AR process proper:

“This form of action research aims not only at improving outcomes, and improving the self-understand-

ings of practitioners, but also at assisting practitioners to arrive at a critique of their social or educational work and work settings” (Kemmis 2001, p 92).

In the example of Arama, the researcher involved had a critical perspective on the context. According to him, one important reason for the failure of the fishing cooperative in the long run was the weak support from politicians, and the situation in general for fishermen/villagers in New Caledonia. However, we do not know from the text whether the fishermen were aware of these structural problems. In the Xerox case, it rather seems that the aim was to avoid the employees’ questioning the situation, in other words to keep away from conflicts between them and the managers of Xerox.

Thus, the research strategy seems to be affected by the selected approach to knowledge. AR aiming at creating emancipatory knowledge is for example often carried out with marginalised co-researchers, such as the Araman villagers, in order to improve their situation. For such research, the professional researcher, who is considered the more powerful actor, is expected to respect the interests and the integrity of the co-researchers (Stringer 1999).

AR without the aim of creating emancipatory knowledge is often carried out in collaboration with strong co-researchers such as managers of companies. In the Xerox study, the managers were the instigators. For this kind of research it might be necessary for the professional researcher to ensure her/his integrity towards the strong co-researchers (Burlin 2001).

2.2 Methods in Action Research

AR could also be seen as a kind of case study since it is carried out with a holistic approach on a single real-world unit of analysis (Stake 1995). AR-studies, however, consist of three parallel processes instead of one (see Figure 2). One process is the already mentioned cycle of planning, acting and evaluating; this is a shared experience between the professional researchers and the co-researchers. The other two are the processes of reflection of the researchers and co-researchers, respectively. These processes could be more or less integrated, but they have somewhat different aims. For both, case study methodology could be applied (Stake 1995). However, the process of practitioner reflection has less emphasis on scientific control procedures.

In AR’s primary process, the cycle of action, the selection of method depends on the phase. In the

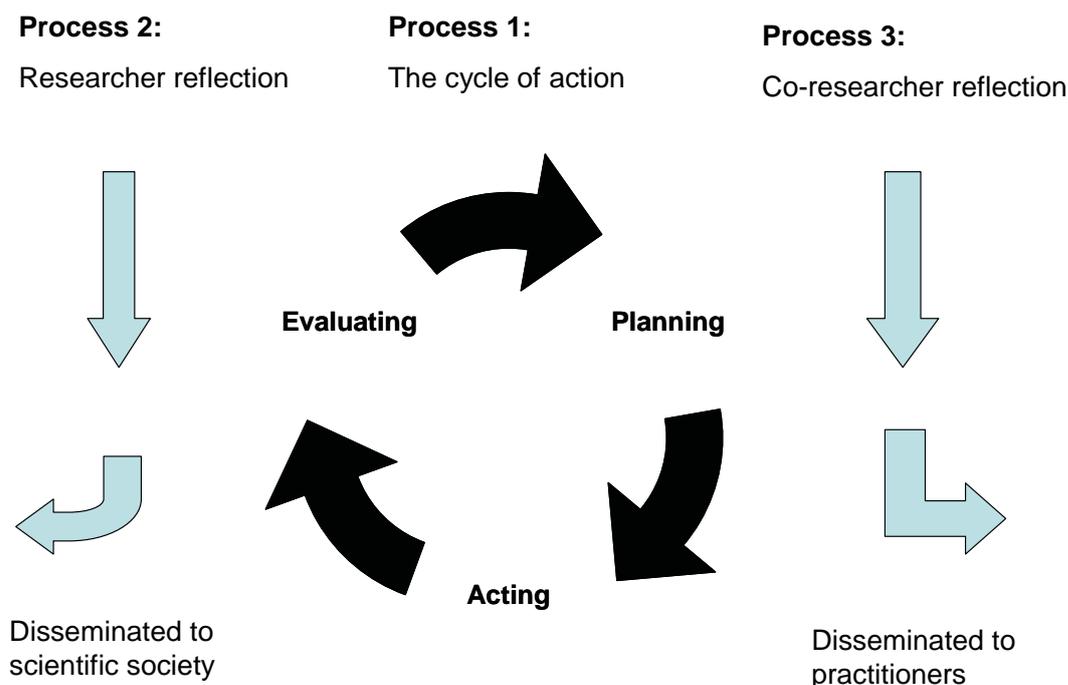


Figure 2. An attempt to illustrate the three parallel processes of AR.

planning phase, conventional methods for data collection could be combined with seminars, focus group interviews and workshops. According to the literature on AR, any method that increases participation and the interest in taking action could be used – from parties to theatres (Reason and Bradbury 2001; Stringer 1999; McTaggart 1997; Greenwood 1999). However, it seems that the attitude of the researcher towards the co-researchers is more important than applying a certain set of methods. Stringer (1999) for instance advocates that AR should be characterised by mutual respect, a non-competitive and non-exploitive atmosphere. He also recommends the professional researcher to approach key persons among the co-researchers. In the example of Arama, the researcher had close contact with Arama's Great Chief, which facilitated taking action. For the evaluation phase the same methods could be used as for the planning phase, for instance case study methods, workshops and seminars.

In AR the concepts of first-, second- and third-person research are used to emphasise that different kinds of investigations are included in a study (Reason and Bradbury 2001). *Third person research* means a process where different categories of people collaborate, normally academic researchers and practitioners. Third person research could be compared to the concept of transdisciplinarity (Lawrence and Després 2004). *Second person research* is similar to the process of peer reviewing – researchers or co-researchers critically scrutinizing each other's work. *First person research* is less emphasized in mainstream research but strongly so in AR; the term indicates that researchers or co-researchers reflect upon their own role in the process. This could be done in different ways. One method is to keep a diary, another one to meditate over biases and unconscious feelings (Reason and Bradbury 2001).

2.3 Dissemination of the Knowledge Produced

Often, AR is considered as being mainly of interest for the co-researchers (Patton 1990). For parts of the outcome this might be true. However, if professional researchers participate, they are probably interested in disseminating their results. According to McTaggart (1997), the process of disseminating knowledge produced in AR is more efficient than in other kinds of research; this follows from researchers and co-researchers having access to two different but equally important institutional and cultural contexts.

In AR as well as in other kinds of case studies, generalisation cannot be done in the same way as in quantitative natural science research; any AR study is directly dependent on its context and cannot be replicated in the manner of an experiment. Instead, case specific knowledge is made more generally applicable mainly through "naturalistic generalisation". In other words it is presented for the potential user in such a way that she/he can internalise it into her/his own experience and apply it to other similar cases (Stake 1995). Another means of generalisation, at least within the scientific community, is through developing methods, theory and concepts based on results from the case (Svane 2005).

2.4 Conflicts in Action Research

According to Spjelkavik (1999), the professional action researcher has several different roles; she/he should for instance be a teacher, researcher, or team member. This might also imply role conflicts. The roles of being a teacher and a team member might for instance be difficult to combine. Noffke (1989), rephrasing the same conflict, argues that the history of AR is characterised by a "tension between democracy and social engineering". Thus, the action researcher could select between being a lecturing teacher (or even a "preacher") or a listening and cooperative team member.

Another role conflict is that between being teacher and researcher. Should the researcher be normative or should she/he put her/his own values aside and just reflect? In AR-theory, researcher normativity is mostly seen as unavoidable. However, it is considered equally important that the researcher is open with her/his normativity, carrying out first-person research or being *critically subjective* (Ladkin 2004).

A third role conflict is between being a researcher and a team member. To what extent should the reflection process of researchers and co-researchers respectively be joined?

"When does research become participatory? And are there or should there be limits to the 'participatoryness' on any piece of research?" (Batliwala and Patel 1999, p. 276).

To what extent is it relevant that the co-researchers participate in data collection and interpretation for

scientific purposes? Also Spjelkavik (1999 , p. 123) poses some questions indicating the problems of full participation:

“How can I secure my own integrity as a researcher? How can I avoid being controlled by the informants’ special interests? How can I avoid going native, getting stuck in the field and falling into the trap of delegating the analysis to the informants?”

From this discussion we could discern conflicts between the roles of being a researcher, a team member and teacher. We could also express it in more general terms as tensions between “social engineering” (researcher normativity), democracy (participation) and research (reflection). These tensions are illustrated in Figure 3. By being critically subjective and aware of the conflicts/tensions, the researcher should be able to balance between these tension lines.

3. Action Research Theory Applied to Research on Sustainable Housing

So far, we have discussed action research (AR) in general, but how can its theory and research strategy be applied to research for environmental sustainability? In this section, the concepts and theories of AR are applied to this type of research. The aim of this “merge” or cross-fertilization is to explore some possibilities for transferring research-based

knowledge on environmentally sustainable housing to mainstream practice. The research strategy proposed takes the form of a model, here called Action Research for Environmentally Sustainable Housing, ARESH.

The model takes as its starting point results from the authors’ previous research as well as that of colleagues. Malmqvist (2004) and Svane (1998) both studied environmental management in housing. Nilsson (2003) developed a strategy for combining necessary, planned maintenance with measures desirable from an environmental management perspective. A common finding was the inertia against change in the practice and habits of the companies and housing areas studied. Nilsson (2003) was for example successful in developing the strategy to get a positive evaluation by residents and managers, but less successful in supporting their continuing the practice after the research project proper was finished. From this observation, the project reported in this article took its main assumption: Research can become a better tool for change if, from the onset, the aim, scope and methods of action are deliberately integrated into the research strategy.

To illustrate the model, we in the following outline a fictitious example, “Suburbia”, which is compiled from key empirical findings of the aforementioned researchers; perhaps it can be labelled an “ideal type”. Suburbia is a European post-war multi-family

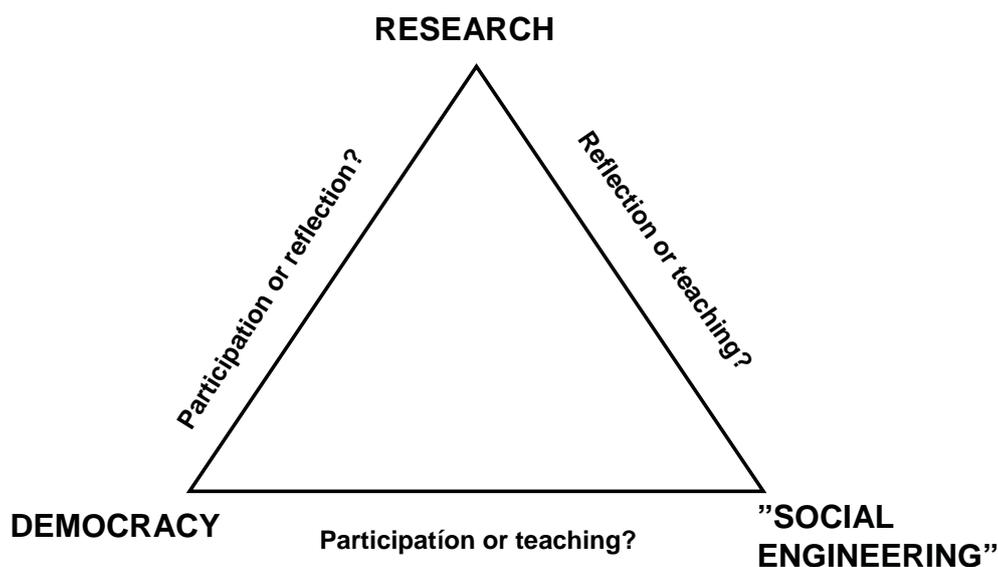


Figure 3. An illustration of potential role conflicts in AR.

housing area from the 1960s with some hundred households, most of them of low or middle income. It is owned by a social housing company that rents the flats to the residents. ARESH is carried out in the area since the researchers and the housing company agree that it is possible to considerably reduce the negative environmental impacts of the area. The need for future maintenance is considered an opportunity for in parallel introducing a process of environmental management. Thus, the main co-researchers are the managers of the area, but since one aim of the project is to involve the residents they, too, are considered co-researchers.

As previously mentioned, findings based on a case study are difficult to generalize, even though results such as conceptual systems can be applied to other cases. Thus, one reason for using fictitious “Suburbia” instead of one of the housing areas studied is the greater potential for generalization.



Figure 4. “Suburbia”.

3.1 The Main Aims of ARESH

Like “ordinary” AR, the ARESH model aims at integrating action with research. In the fictitious case of Suburbia, the action aimed at is assumed to be the implementation of an environmental practice. Over time, this practice should reduce Suburbia’s negative environmental impacts. The changes aimed at are multifaceted; they could range from reduced energy use through extra insulation of the façades to increased environmental awareness among the co-researchers. The total time frame for the turnover is assumed to be around ten years, but with active participation of the professional researchers during the introductory year(s) only.

A second aim is to produce new knowledge. Using Kemmis’ concepts, technical knowledge for the co-researchers could for instance be how to install solar panels. For the professional researchers, the focus is on developing more generally applicable guidelines for the strategy. Hermeneutic knowledge for the professional researchers could be the understanding of daily life and practice of the co-researchers and how this could be combined with environmental measures and more environment-friendly habits. For the co-researchers, such knowledge could involve awareness of how they in their daily life impact on the environment and how these impacts could be reduced. Finally, gaining emancipatory knowledge makes it possible for both researchers and co-researchers to question structures that are supporting and reproducing the unsustainable use of energy and unsustainable practices in general.

3.2 Methods of ARESH

As in AR, it is useful here to visualise the research process as a spiral; it has a close parallel in the concept of “continuous improvement” of environmental management, the ISO 14000 series (2005). Once again, ARESH could be seen as three parallel but different processes: The action cycle and the two processes of reflection of researchers and co-researchers respectively. Methods from AR could to a great extent be used in ARESH. Also the previous discussion on the attitudes of action researchers is relevant, more so than in research of a “normal”, more positivistic kind. Collaboration and action require interaction with mutual respect and a non-exploitive atmosphere. A key contact person among the co-researchers such as the local housing manager could be useful in “opening doors” that otherwise might be closed.

The ARESH model includes assessments of the environmental impacts of the housing unit and the progress of reducing them; for the case of Suburbia it would for example be relevant to study the impacts of the flows of energy, water and materials through the area (Nilsson 2003; Svane 1998). A simplified Material Flows Analysis (MFA) could for instance be carried out before and after the action phase and results could be recorded in key ratios, such as water and energy used per person or square metre per year (Alroth et al. 2003). The key ratios could be used for several purposes. One is to identify the significant environmental impacts: Is for instance energy use very high or is it rather the harmful waste that constitutes the main problem? Another use of the key ratios is the evaluation of the environmental practice, to assess if for instance energy use has been reduced. A third use is that of information to co-researchers – to increase the awareness among residents of their environmental impacts: How much waste does each household produce per year etc.

Participative backcasting is a method that is sometimes used in Futures Studies to free researchers from the limitations of pure prognosis, and it could also be applied in ARESH (Carlsson-Kanyama et al. 2003). In it, the researchers arrange workshops or focus groups where co-researchers create future scenarios of a city, a company etc. The method has for instance been used for involving residents, retailers and NGOs in the discussion on how to make some European cities more sustainable. Participative backcasting could be used in Suburbia in order to more actively involve the co-researchers. The researchers could provide the knowledge on how much environmental impacts should be reduced in order to follow national and international environmental goals, and also on what kind of measures that could be used for that. Provided the knowledge and the tools, the co-researchers could then develop desirable scenarios for Suburbia.

3.3 Knowledge Dissemination

When it comes to the dissemination of results, the introductory discussion on demonstration projects shows how important it is that the knowledge does not remain solely in the case studied. One important reason for carrying out ARESH is that the knowledge then could be spread through scientific communication and popular scientific communication as well as via the co-researchers (McTaggart 1997). In

our example Suburbia, housing managers involved could apply the knowledge gained to other housing areas and also disseminate it to practitioners in other housing companies. Just as AR, ARESH cannot be replicated in the same way as quantitative, natural science research. Thus, naturalistic generalisation and generalisation through concepts and theories are applicable also here.

3.4 Two Different Approaches of ARESH

As mentioned earlier, AR could aim at questioning the context, i.e., producing emancipatory knowledge, or it could aim at organisational change producing mainly technical and hermeneutic knowledge. In the context of environmental sustainability these aims could be compared to the concepts of Deep Ecology and Ecological Modernization (eco-modernisation), respectively. According to Deep Ecology, extensive structural change of society is necessary in order to achieve sustainable development (Naess 1981). This view has similarities to the questioning approach of emancipatory knowledge. On the other hand eco-modernization argues that environmental problems can be solved without changing the basic conditions of society; it is enough to make the processes of production and management more eco-efficient (Hajer 1995). Hence, this view has similarities to the aim of organisational change in AR.

Just as AR aiming at emancipatory knowledge differs from other types of AR, ARESH with the underlying normativity of Deep Ecology would certainly be different from a study with the aim of eco-modernisation. To exemplify: Having the view of eco-modernisation in the study of Suburbia, the main aim would be to introduce technical measures and develop eco-efficient management routines. Maintaining the view of Deep Ecology, the researchers might for instance ask themselves and the co-researchers how necessary it is for comfort to retain an all-year indoor temperature of 20°.

However, as mentioned earlier, the aim of producing emancipatory knowledge is most common when studying marginalised groups. When powerful interests such as corporations participate in AR, the aim is normally to produce technical and perhaps hermeneutic knowledge. If applying this reasoning to the study of Suburbia, the residents would be seen as the marginalised and the housing company as the (relatively) powerful. Thus, the emancipatory

approach would be for instance to question to what extent the low-income residents of Suburbia should reduce their indoor temperature or shower less, when households in high-income residential areas use much more energy per capita.

It is probable that a study of Suburbia would aim for technical measures and changed routines as well as questioning the “obvious”. However, we can see that the underlying normativity of the professional researcher might affect the research questions. This in its turn would also affect the kind of action aimed at: Is it to introduce eco-efficiency measures or is it to question the conventional, unconscious habits of (over-) comfortable living? Is the aim to reduce negative environmental impacts from social housing, or is it rather to switch the focus to residential areas with high-income residents?

3.5 Conflicts in ARESH

In the same way as AR is characterised by the tension between “social engineering” and “democracy”, ARESH includes a tension between “green engineering” and “democracy”. Returning to the example of Suburbia, the researcher that possesses a large body of knowledge about environmental problems might hope for profound change. The housing managers are also interested in reducing environmental impacts; otherwise they would not participate in the study. However, the managers also want satisfied costumers and a well-functioning, profitable company. The residents of Suburbia, too, might in general be positive to environmental measures, but most important for them is probably affordable, safe and comfortable dwellings. Thus, an environmental practice might create positive synergies, for instance extra insulation that saves energy and money and also improves the indoor climate. However, there are also conflicts between the environmental practice and other interests: solar panels are costly, lowered indoor temperature gives less comfort etc.

This implies that the approach could vary, from “green engineering” to “democracy”. If a purely democratic approach is used in our example, the co-researchers (residents and managers) formulate the environmental goals and suggest the measures. The professional researcher acts as a facilitator trying to co-ordinate the different aims. Engberg and Haugbølle (2005) uses the concept of “negotiated sustainability” to describe such an approach. If

the approach has more of “green engineering”, the researcher might try to teach and to persuade the co-researchers to implement also the less attractive environmental measures.

In ARESH, there is also a conflict between research and participation. To what extent should the co-researchers participate in for instance the process of data collection? Like the villagers in Arama, the residents of Suburbia might be seen as the “powerless”, at least as compared to the staff at higher levels of the housing company. The researcher might then stand in-between, and have to balance between supporting the powerless with her/his status as an academic and retaining the academic integrity against the interests of the company.

Just as in AR, the concepts of first-, second-, and third-person research and critical subjectivity are useful in ARESH. Critical subjectivity can for instance be used by the researcher to evaluate her/his own role: Is she/he mainly a researcher, a team member or a teacher trying to persuade the co-researchers to become environmentalists? It can also be used to reflect upon the aim of the study: Is it to question the setting, to improve the practice or something in-between?

4. Final Discussion

In the introduction of this article it was assumed that knowledge on environmentally sustainable housing is often not transferred from research and demonstration projects to the practitioners and users of mainstream housing. In the following sections it was suggested that the approach of action research (AR) could be useful as a strategy for disseminating environmental knowledge to practitioners within the framework of a research project, and for researchers and practitioners alike to learn from the introduction of an environmental practice. Thus, AR and related concepts were described and discussed, and then applied to research for environmentally sustainable housing. The outcome of the article is a model research strategy called Action Research for Environmentally Sustainable Housing (ARESH).

Furthermore, it was suggested that visualizing AR as a spiral has a close parallel in the continuous improvement of environmental management. Many of the AR methods could be used, however combined with other methods such as for instance Material

Flows Analysis and participative backcasting. The general attitude advocated in AR was also found to be useful: It is more fruitful for the professional researcher to strive for collaboration and action instead of just being a distant observer. However, in this role it can be dangerous for the researcher to become too much of a “team member”, as well as being too much of a “teacher” or “preacher” of environmental issues. These three tensions/conflicts were illustrated by the triangle in Figure 3. Unlike positivist-oriented research, it is not considered possible in AR for the researcher to be fully objective, which also is the case for ARESH. Instead, the aim would rather be to be critically subjective.

AR and ARESH have three parallel processes of action and reflection, as discussed in relation to Figure 2. The knowledge produced in these processes can be disseminated via as many channels: First the in-depth knowledge with the co-researchers, which they could develop and disseminate locally. Besides this, researchers and co-researchers have access to separate, more indirect means of dissemination to colleagues via their respective journals, home pages and other communication media. This gives a wider dissemination potential than ordinary research, and also one targeted at a wider audience. If the first dissemination channel is very case-specific, the two latter can encompass more of generalization. The one targeted towards practitioners could use naturalistic generalization, the one for the research community could also generalize to concepts, theory etc.

The discussion of the article also indicated differences between AR and ARESH. One such difference is the action aimed at. In AR, the aim is mainly action in order to improve the situation of the co-researchers. However, even if environmental measures such as improved biking facilities and reduced energy costs can be beneficiary for the co-researchers, the main aim of environmental action is not to improve their situation but to reduce environmental impacts. This is a profound difference, and one that could create goal conflicts that need even more of balancing than in “ordinary” AR.

In the article, two contrasting approaches of AR as well as ARESH were discussed. One approach aims at creating technical and hermeneutic knowledge, while the other in addition to this also aims at emancipatory knowledge. The approach of eco-moderni-

sation is to some extent connected to the approach of “green engineering”, aiming at environmental sustainability mainly through the development and exchange of technical knowledge and assuming that that knowledge could quite easily be transferred. On the other hand, the approach of Deep Ecology can be compared to the aim of reflective research, where it is seen as necessary to produce hermeneutic and emancipatory knowledge in order to understand the structures that are guiding the non-sustainable development of today.

This article, however, is an attempt to join these contrasting approaches, to propose and discuss a research methodology combining “green engineering” and reflection. It was argued that this might be more effective in disseminating knowledge than demonstration projects. Thus, the aim of the scientific researcher would be to teach the co-researchers as well as to learn from them. The discussion also indicates that it is not always possible to resolve conflicts; sometimes the approach becomes more reflective, sometimes more action-oriented or participative. Therefore it might be necessary to balance between reflection, action (“green engineering”) and participation.

How can the ARESH model be implemented? In a future research project, it would be interesting to test and evaluate the ideal-type model with a housing manager as partner. This should lead to improvements as well as another few steps in the process of dissemination. Besides, the model in its present state of development has recently been presented to housing managers and other potential users via a pdf publication (Elfors and Svane 2007). This might inspire implementation where direct action takes the dominant role, the role of academic research having been restricted to that of initiator.

Finally: Housing and research on housing have been the topics of this article. However, it is hoped that it can contribute to a discussion on methodology also relevant for other kinds of research dealing with environmental sustainability, and where research is used as a tool for change.

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