

Creating a regional service-market for the ecological refurbishment of buildings

Wibke Tritthart, Harald Rohracher and Christian Gummerer, Inter-University Research Centre for Technology, Work and Culture

1. SYNOPSIS

A programme called “Thermoprofit Plus” is set up in the City of Graz, Austria. The goal is to define new services packages for the ecological renovation of buildings.

2. ABSTRACT

Most retrofitting of municipal and private residential buildings is done without properly harnessing potentials for an energy and ecological optimisation. This is partly due to the absence of a market offering competitive services for sustainable refurbishment and to the absence of qualified and articulated demand on the part of house owners.

The paper will present a programme called “Thermoprofit Plus” in the City of Graz, Austria, to pump prime a regional market for new building services aiming at a comprehensive ecological retrofitting. The programme is set up with support of the European Union as the LIFE-project “New services for the ecological renovation of buildings”.

The main elements of this project, which could serve as a model to other cities, are:

1. Stimulation of supply by developing and adapting schemes for the energetic and ecological appraisal of retrofitting options; development of innovative service packages including performance-contracting, joint activities in marketing and continuing vocational training.
2. Stimulate demand for sustainable retrofitting by establishing an information and marketing program aiming at building societies and municipalities; introduction of special brands of service packages and public control of service standards.
3. Model renovations of three housing estates will put the concept to a test.

The project is managed by the Graz Energy Agency and was developed together with the IFZ Graz (Inter-University Research Centre for Technology, Work and Culture). Several other institutions are taking part in the modules of the project.

The paper will focus on the proposed service packages for integrated optimisation of energy and ecological aspects and on the results of a social survey among regional construction companies.

3. INTRODUCTION

Most retrofitting of municipal and private residential buildings is done without properly harnessing potentials for an ecological solid approach. Especially buildings that were built between 1960 and 1980 offer great potentials to improve the energy standard of the building and to implement also sustainability goals during renovation and to yield healthy living conditions after the renovation [1, 2]. Measures could cover insulation of the building envelop, indoor noise reduction, glazing of balconies, new heating systems, etc. But when pursuing these goals the house owner thus has to deal with more issues than for simple renovations: He has to consider a variety of measures. There are various technologies and different materials. Usually he has to co-ordinate more subcontractors.

The idea of the project “New services for the ecological renovation of buildings” is to pump prime a regional market for new building services aiming at a comprehensive ecological retrofitting of the existing building stock. The services should lead to a consideration of ecological aspects, including energy, without causing additional effort for the house owner. They have to comprise design, cost-benefit analyses, financing, construction work and so on. As a consequence services should be offered together as one service package to the owner. The focus is on residential buildings and housing estates.

For newly built houses service packages - though not called like this - are quite common. For instance, pre-fabricated homes are constructed according to the wishes and means of the customer. There is some evidence that service packages are adequate to cope with problems of comprehensive renovations, too. Positive examples of energy performance contracting [3] show that energy conservation can be used as a guiding principle for refurbishments. Moreover institutional barriers, e.g. financing barriers can be overcome. The elaboration of the new service packages for comprehensive ecological retrofitting will draw on these experiences, since the Graz Energy Agency also manages an energy performance contracting programme that should be extended to cover also sustainability goals.

The project “New services for the ecological renovation of buildings” consists of three parts: On the one hand companies should be pushed to jointly offer services within certain service packages. Secondly, house owners should be motivated to use these services, and finally model projects – the renovation of three housing estates – should show the advantages of such comprehensive service packages to both companies and house owners.

In the following chapters firstly the current situation is described concerning the building stock, the legal and financial conditions for renovation and the main actors responsible for renovations in the City of Graz. As a next step the situation of the major owner groups is analysed in more depth: their current practice, their attitudes towards ecological renovation, etc. A series of interviews has been conducted to gather this information. Based on this analysis three service packages are suggested as a strategy to make renovations meet higher ecological standards. Finally some of the results of a questionnaire survey among the companies in the building sector in the province of Styria are presented. They show the type of the companies that are interested, their strengths and weaknesses, and how they judge the importance of this topic.

4. CURRENT SITUATION

Graz is the capital city of the Austrian province of Styria, About 240.000 inhabitants are living in the 103.000 dwellings of 32.000 buildings. Graz has a remarkable and well preserved old town, that recently has been added to the UNESCO cultural world’s heritage. Buildings of this part of the city are mostly 80 to 300 years old. Strict preservation requirements must be met. However, besides those historic buildings, the building stock dated from 1961 to 1980 comprises about 10.400 buildings of usually poor thermal standard and therefore is a candidate for renovation.

Before suggesting services to promote ecological refurbishment let us have a look at the current practice of renovations: the main actors involved in decisions about renovations, the legal situation and the availability of additional funding.

Table 1. Owners of the buildings that were constructed from 1961 to 1980 [4]

Owner	Number of buildings from 1961-1980	Number of dwellings in these buildings	Average number of dwellings per building
One or several private persons	95468	147,418	1.5
City of Graz, Province of Styria, other local or regional bodies	3012	9,589	3.2
Social housing companies	1499	21,150	14.1
Other institutions	3407	3,115	0.9

Three main groups of actors can be identified: owner(s) of the building, inhabitants which can be owners themselves or tenants and companies that are in charge of the administration of the buildings. Condominiums are

often managed by a social housing company (which was also responsible for the construction of this building), whereas private persons usually entrust a real estate office with this task.

When it comes to a decision on renovation and on the extent of it, the first important person is the owner. Most buildings are owned by private persons. But housing estates containing many dwellings are mostly owned by social housing companies (see table 1). The inhabitants of these bigger buildings (buildings with more than two dwellings) are either tenants (40%) or the owner of the flat himself (49%). The tenants have quite distinct possibilities to influence the decision on renovation. The reason is the legal situation, where each tenant has to agree upon a raise of the rent when the money is used for “improvements”. There are already several decisions of the court on the interpretation of this term and in any case insulation of the facade was judged to be an improvement. In such a situation it is often not easy to meet advanced standards of energy efficiency or ecology in a renovation.

Another important factor is the possibility to get subsidies for certain types of renovation. Subsidies are granted by the provincial governments for so called “comprehensive renovations” that reach a standard according to the building code for new buildings. In the majority of cases such renovations focus on the facade, resulting in a U-value of at most 0,5 kWh/m², on insulation of the upper ceiling and the replacing of the heating system (e.g. old coal furnaces with district heating or efficient gas heating). Subsidies of 25% and 50% are given on the rate of the loan, when the amount of money per dwelling exceeds a sum of 7 250 Euro and of 22 000 Euro respectively. No extra funding currently is available for realising additional ecological criteria. Not only the renovation measures themselves are subsidised but also the rent in a renovated building – if the tenant fulfils certain social criteria, that is a maximum net income level per year.

5. STUDIES ON THE ROLE OF THE HOUSING ADMINISTRATION ORGANISATIONS

Having given a short outline of the current situation for renovations we will now turn to a deeper analysis of housing administrations – the main actor to define the kind of renovation being carried out. Any successful energy service package will have to meet the needs and special situation of these organisations.

Housing administrations play a crucial role for renovation decisions. All information on the status of the building from complaints of inhabitants to wishes of owners to suggestions of workmen that were inside the building, is collected by these organisations. It is their task to propose necessary renovation measures to owners and tenants. To reach an agreement on minor renovations that are solely maintaining the structure of the building is usually no problem. But innovative housing administrations are also in a strong position to propose comprehensive, ecological renovations and to influence the decision on ecological improvements, both in buildings owned by landlords and in those rented out.

The following passages summarise the results of interviews with authorised persons of five social housing companies and one major real estate office and with officials of the City of Graz (department of housing). These 7 institutions are in charge of 2/3 of all social housing estates in Graz. The questions were grouped around the following subjects: the process of getting houses renovated: competencies and practice, statements on ecological renovation, especially on energy saving measures, barriers to ecological renovations and possible strategies to overcome these problems.

Competencies and practice

All institutions had already been responsible for renovation projects with various depths from simple repair of the plastering, to modernisation of sanitary and heating systems within the flats, to thermal insulation of the building envelop. But no explicit ecological renovation was among these. Whether the institution prefers the stepwise realisation of single renovation measures or the realisation of more comprehensive renovation packages depends on both the possibilities to influence the inhabitants and on the “philosophy” of the institution: Some social housing companies adopted energy and ecological consciousness as part of their corporate identity.

Social housing companies encourage the tenants to accept the renovation of their housing estates (and to raise the rent thereafter). Owners of condominiums are more likely to disagree. Tenants with low income often cannot

afford a higher rent. Also the financing is specific: Social housing companies pre-finance planned renovations. Private owners have to apply for a bank credit. The real estate office will assist them. The municipality has to designate the money for each renovation project in the annual budget.

Interviewees didn't show much imagination regarding possible elements of ecological renovations. The only strategies mentioned were energy saving measures and ecologically sound materials. On the other hand only two interviewees felt the need to learn of innovative and ecological alternatives. Only a few of the social housing companies are experienced in several different construction techniques including e.g. modern timber-frame construction. Ecological materials e.g. paints containing no or a low amount of organic solvents, etc. often have a negative image as being less durable and requiring more maintenance work. The interviews showed that information and model-projects in these fields are still lacking.

Barriers to ecological renovations

The main challenge that is typically mentioned in the first place is the possibility of inhabitants to determine the decision on renovation. Thus much effort is put into information activities. Every interviewee described vividly his experiences with the tenants and building occupants. The interpretation depends on the personal attitude of the interviewee towards user participation, too. Some interviewees (2 social housing companies and the City of Graz) let the inhabitants choose from several variants, others already anticipate that only the cheapest solution has chances for realisation and that inhabitants do not want to be bothered by renovations.

It was stated that the stimulus for renovation comes mostly from the people that are in charge of the administration. Only if there are one or several private building owners, they too might come up with suggestions to renovate or to build extensions.

To summarize the main problems that might lead to a negative decision of the inhabitants on renovation are:

- Some of the most problematic building elements (e.g. sanitary facilities, old heating systems, bad windows) have partly already been renovated by some of the inhabitants who then object to further measures,
- Occupants of the ground-floor flat do not want to pay for the insulation of the roof,
- Facade insulation is impossible because of preservation requirements (alternative insulation measures e.g. indoor are not mentioned),
- Facade insulation does not pay back,
- The construction companies must be skilled to co-operate with the inhabitants,
- The subsidy scheme requires high expenses (300.000 ATS per dwelling) for renovation.

There is still another impediment to ecological renovations. The City of Graz as well as the social housing companies are writing and announcing calls for tender on their own. Usually those tenders are not functional descriptions with desired specifications but very detailed descriptions of each task. Functional descriptions would leave it up to the contractors themselves to choose their own best solution, e.g. to reach certain standards of energy consumption or ecology that are required. The problem with the current standard procedure, i.e. detailed specification of sub-tasks, is their inflexibility. Those calls are all based on the same electronic database called "Standard-Leistungsverzeichnis", which generally does not contain any ecological options. Some social housing companies do also ask for "alternative offers", which – in future – could also be used to ask for "ecological options".

Strategies to overcome the barriers

When asked which services might help them or which services they might require, the interviewees did not know. The only suggestion was to employ an additional consultant for ecology who would also be an accepted expert for the inhabitants. Although outsourcing is not uncommon – some of the institutions are small and have to hire a project manager for a comprehensive renovation project – the idea of service packages did not lead to further associations. To hand over a project to a general contractor is done only by one of the social housing companies. Apparently the others did not want to lose control over the whole process, justifying it with: "So we can guarantee the best price for our clients."

The subsidies of the government of Styria are of central importance for the renovation of residential buildings. This is confirmed by each institution that has been interviewed. The necessary documents, especially the calculation of the expected energy consumption, are either compiled within the institutions themselves or by technicians, e.g. HVAC engineers or plumbers. Improvements would be accepted, e.g. to better account for energy savings and ecological issues.

Several interviewees would like to have support for the meetings with tenants and owners by external institutions like local energy agencies. This was explicitly mentioned by four interviewees without being asked. They think that people have more confidence in an independent organisation. Furthermore this organisation calculates the energy savings and the interviewee's institution cannot be blamed if the actual savings are not as big as expected. It is also an advantage of an energy contracting model that the contractor guarantees that a certain amount of energy is saved by his measures.

The term "Planung" was used in a quite restricted meaning by the interviewees. It must be stated first that "Planung" has a very broad meaning in the German speaking countries. It is used as well in the sense of "planning" and of "design", with both an "artistic" (e.g. architects) and an "technical" (e.g. engineers) connotation. The interviewees thought of "Planung" as compiling a list of measures that are the basis for the call for tenders. Some of the interviewees said they were considering alternative variants which is a bit closer to design. When asked, they all admitted that they were not designing in the sense of an architect (drawing plans, etc.). They do not think that the inhabitants could pay significantly more to improve the design. On the other hand architectural design would be necessary to improve the daylighting possibilities, to reduce noise further, to do outdoor landscaping, etc.

The situation described above results in a majority of renovations reaching only minimum standards of ecology and energy efficiency, and a small number of more ambitious renovations by a few highly motivated housing companies. Energy service packages may help to overcome this problem: they might help to pool the so far fragmented know-how on ecological renovations and make it an easier task for building administrations to design and supervise such renovation projects. Moreover, certain features of service packages – such as payback of investments through constant energy costs – could make it easier for occupants to accept the renovation of their building as no (or very little) rise in rent is involved.

6. SERVICE PACKAGES FOR THE ECOLOGICAL RENOVATION

Service packages are at the present stage addressed mainly to the institutions that we identified as the central actors (social housing companies and the department of housing of the City of Graz). On the one hand service packages have to be build upon current practice, on the other hand they should provide a new model to deal with renovation and to overcome barriers.

For this purpose three types of service packages have been distinguished:

1. Improvement of the current practice of institutional clients towards ecological renovation projects.
2. Extension of the existing performance contracting model "Thermoprofit".
3. Ecological criteria in the specification of the tasks of project managers or general contractors.

The first service package

The first service package should add ecological expertise to the projects of clients who still want to invite bids for specific tasks, and help to choose subcontractors, to supervise the work etc. A list of tasks to ensure ecological quality have been drawn up. It begins with the definition of the goals of the project and reaches from detailing the goals, dealing with trade-offs and information of inhabitants to the concrete text of the calls for tender. These tasks can be performed by a special consultant or e.g. the Energy Agency Graz. This person must be engaged right from the beginning. For trade-off decisions an Austrian assessment tool, the Eco-Building-Total Quality Assessment [5] has been adapted.

The second service package

The second service package relates to "Thermoprofit", a performance contracting programme of the City of Graz that has been started some years ago. It has been developed and is managed by the Graz Energy Agency. "Thermoprofit"-projects start with renewing the heating and heating control system and implement as many energy saving measures as are economic and can be paid back by the saved energy rates. The order is given to the one company that guarantees the biggest savings. Companies have to work out (detailed) energy analyses of buildings, to assess the energy savings potentials, to manage and control the implementation of the planned

measures, sometimes to pre-finance the project and to take over the permanent optimisation of the renewed technical systems.

A network of companies called “Thermoprofit”-companies that offer this complete set of energy saving measures, ranging from renewing the heating system to the insulation of the building envelop has been initiated by the Graz Energy Agency. Members of the network are mostly companies in the business of building control, facility management or energy supply and service companies. “Thermoprofit”-companies are obliged to use regional companies for the construction works. To get the approval they have to submit a reference project that shows the competence of the company in the fields of planning, construction, operation, maintenance and financing and that fulfils all requirements (reduction in energy consumption, increase in comfort, extensive services). During last year four companies (from the building automation business and energy service suppliers) have got the certification “Thermoprofit”-company. Until now 12 “Thermoprofit”- projects have been established, among them schools, residential buildings and administrative buildings.

The “Thermoprofit”-Programme and the network of “Thermoprofit”-companies should be extended in order to account for ecological criteria. The emphasis of ecological criteria is on the chosen materials for insulation both indoors (for ducts) and outdoors (for the building envelop). A continuing characteristic will be the energy contracting that is based on the replacing and maintaining of a (central) heating system. But additional ecological measures might not be covered completely by the energy savings.

The third service package

The third service package resembles the second type but is partly modified to better deal with housing estates. Often savings are less and cannot be predicted as precisely as is necessary for performance contracting. In this case an optimum mix of energy savings and ecological renovation measures should be proposed by the companies that take part in the bids. Moreover, additional quality standards should be met, e.g. air tightness, no thermal bridges, etc.

The model projects

The chances and impediments of the service packages are just being studied. The three model-projects serve as a starting point. They will also play a central role for marketing service packages under the brand name “Thermoprofit Plus”. No extra funding currently is available for the “Thermoprofit Plus”-model projects, they will be successfully finished within the next year.

Figure 1. The brand “Thermoprofit-Plus”



The ecological measures that were realised in the first model-project, a multi-family house with about 30 dwellings where only the facade and the community spaces (stairs, loft, cellar) are renovated, comprise:

- Perlite as insulation material for the upper storey (loft),
- Stone wool instead of polystyrol for the facade,
- Mineral instead of synthetic plaster,
- Wooden window frames instead of synthetic ones,
- Halogen-free installation materials,
- Ecologically harmless paintings,
- Energy relevant measures like increased thermal insulation, avoiding thermal bridges at the balcony and a (mandatory) switch to district heating.

Although the first model project contained many ecological measures there were only a few characteristics of service packages, like functional descriptions of some tasks. However, the second model project will go further in the proposed direction. So far the call for tender for general contractors has been launched. Still the description of the desired materials and construction is detailed and does not leave this up to an optimisation

procedure of the general contractor. The third model project will provide this characteristic, too, but is not yet established.

7. INTEREST OF REGIONAL COMPANIES IN ECOLOGICAL RENOVATION

Successful service package will not only have to meet needs of housing administrations – they will also have to be attractive to companies involved in building renovations, as these companies would have to adopt these services as part of their business.

A two step questionnaire has been directed towards all companies of the province of Styria in the construction business and related fields including architects and building engineers. It was the aim to discover their interest in ecological renovation and their capabilities for services. The first – very short – questionnaire was sent to about 6 000 companies. They were asked whether they are interested in this topic and to give the name of a contact person. 206 companies answered (3,5%); virtually all of them were interested in ecological renovation. To these companies a second 4-page-questionnaire was sent which was returned by 123 companies (60%).

Almost all of these companies are strongly motivated and can be called “green” companies: 95% of the companies say ecological renovation will play an important or very important role for their company in the future (72% say this is the case already today). 88% gave detailed answers on an open question asking for their offers in this direction. 80% gave the brand name and the producer of one or more ecological products they are using for their work.

The companies come mainly from eight business sectors: 18% builders or building industry, 15% other construction related trades (roofer, tinsmith, painter, etc.), 13% plumbers, 9% electricians, 21% joiners and carpenters, 8% architects and 11% engineers (HVAC, etc.). The companies are mostly very small companies: 20% have one to two employees, 40% have three to ten employees, 30% have 10 to 50 employees and 10% have more than 50 employees.

This corresponds with the size of Austrian construction companies (including the construction related companies but without architects and engineers) where 43% have one to four employees, 26% have five to ten employees, 27% have 10 to 50 employees and 4,5% have more than 50 employees.

The companies gave three main fields of their activities: carrying out the construction itself (24%), design (22%) and giving advice (22%) to clients. Other activities were far less important (6% consulting, 6% general contracting, 1% marketing and public relations, etc.). Sources of information on ecological products and technologies that were used on a regular basis were technical journals (22%), trade fairs (15%), the own suppliers (13%) and producers in general (13%). Remarkable is the importance of the internet, which 11% use regularly. Less important (among others) is information from trade (7%) and own customers (4%).

The qualification need in the field of ecological renovation is judged as being high (30% of the companies). 60% say it is medium, and only 7% say it is small or there is none (3%). This can be seen as well in the field of design (93% would appreciate good offers for qualification) and of processing or carrying out ecological measures (92%). The main weak spots of ecological products and technologies are their high price (87% agree to this) and that they are not well known (90%). Moreover, companies do not know where to buy these products (68%) and do not know how to process or apply them (52%). Furthermore processing costs more time (43%). There is also a lack of demand from customers (62%). However, only 12% see a shorter lifetime of the products as a problem.

97% of the companies would consider taking part in a companies network. So there is a high agreement to ecological aspects of renovation and to further activities in this field. Two other modules of the project are dealing with the establishment and the operation of a network of service providers agreeing to controlled quality standards of services.

8. OUTLOOK

In the course of the project “New services for the ecological renovation of buildings” it has been studied whether service packages could be a useful strategy. An impediment has been that the term “service package” is not clearly defined and hence is not easily understood by actors in the construction business. On the other hand the interest in ecological renovation is great both of the building owners and of companies. Therefore three types of service packages have been developed that allow to deal with the specific situation of the owner and of the renovation project.

As could be seen from the questionnaire the typical company in Styria is very small. But only bigger companies are capable and might be interested to offer the described service packages (and not only single services). It will be necessary to encourage the companies to work in a team together with other companies and provide know-how in this direction. Furthermore it appears to be difficult to develop an easy-to-handle assessment scheme that enables the companies themselves to optimise various possible measures.

An essential factor of success will be to stimulate the demand for ecological and for energy saving renovation measures. Building owners and companies that are offering housing administration and building management services are the target group of a marketing campaign. Evaluation of the three model projects shall show them the possibilities of sustainable renovation. Until now, it seems that there is a great interest and not only the three model renovations but also two more housing estates could become “Thermoprofit Plus”-projects.

The continuation of the programme “Thermoprofit Plus” is guaranteed since the Graz Energy Agency will make this one of its future tasks.

9. BIBLIOGRAPHY

- [1] Harald Rohracher, Andreas Simetzberger: Raumwärme und Warmwasser – Maßnahmenanalyse und Potentiale in Graz, KEK Bericht 10, Graz, 1995
- [2] Gerhard Bonelli *et al.*: Ökologie der Althausanierung (Ecology of the Rehabilitation of Old Buildings), final report of the EU-SAVE Project SA/35/95/AU, St.Pölten, 1997 (ISBN: 3-901967-02-8)
- [3] Clemens Leutgöb, Robert Freund: Einsparcontracting für kleine und mittelgroße Gemeinden, Vienna, 1998
- [4] Statistik Austria: Häuser- und Wohnungszählung 1991, Hauptergebnisse Steiermark (National census 1991), Vienna, 1993
- [5] Susanne Geissler, Manfred Bruck: Eco-Building – Optimierung von Gebäuden durch Total Quality Assessment, Vienna, 2000. See <http://www.iswb.at/index.htm?room=ecobuilding&page=home.htm&mm=ecobuilding>