

GUIDEBOOK 2

Sustainable retrofitting of social housing Financial Schemes



Styria Austria | City of Dublin Ireland | Pomerania and Warmia-Mazuria Poland | Asti, Novara and Verbano-Cusio-Ossola Italy | Lower Saxony Germany | Bulgaria

Imprint

Conception and scientific contents **ROSH** consortium

Author (German Edition) Gerhard Lang **GRAZ ENERGY AGENCY**

Translation Matthias Böck **GRAZ ENERGY AGENCY**

Design Jürgen Brües **ALTANOITE.COM**

Coverphoto **TARGET GMBH**

Publisher **GRAZ ENERGY AGENCY** Kaiserfeldgasse 13/I, A-8010 Graz

PHONE ++43 316 811 848-0 **FAX** ++43 316 811 848-9

EMAIL office@grazer-ea.at **WEB** www.grazer-ea.at

Producer **GRAZ ENERGY AGENCY GES.M.B.H.**

Location of publication and production Graz

Reprint allowed in parts and with detailed reference only.

IEE-Project ROSH

Project-Coordination Gabi Schlichtmann, Erika Villa **TARGET GMBH (DE)**

Project-Partner **AEE-INTEC (AT)**, **AGENZIA TERRITORIALE PER LA CASA DI ASTI (IT)**, **AGENZIA TERRITORIALE PER LA CASA DI NOVARA (IT)**, **AMBIENTE ITALIA SRL (IT)**, **ARCHITECTURAL ASSOCIATION OF LOWER SAXONY (DE)**, **BALTYCKA AGENCJA POSZAWONANIA ENERGII SA (PL)**, **BLACK SEA REGIONAL ENERGY CENTRE (BG)**, **CITY OF DUBLIN ENERGY MANAGEMENT AGENCY (IE)**, **FEDERCASA – FEDERAZIONE ITALIANA PER LA CASA (IT)**, **INSTITUTE FOR BUILDING RESEARCH (DE)**.

This brochure was designed in the context of **ROSH** – Retrofitting of Social Housing. **ROSH** is a European co-operation project for the development and marketing of integrated concepts for energy efficient and sustainable retrofitting of social housing. For further information on the project or on products of the project see:

www.rosh-project.eu

The project **ROSH** is supported by the **Intelligent Energy – Europe (IEE)** program of the European Union promoting energy efficiency and renewables. More details on the **IEE** program can be found on:

http://ec.europa.eu/energy/intelligent/index_en.html

The sole responsibility for the content of this guidebook lies with the authors. It does not represent the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.



Contents

1	Abstract	5
2	Introduction	6
3	Judicial boundaries	8
3.1	Main features of the laws of abode	8
3.2	Civil engineering directives	9
4	Financial aspects	11
4.1	Strategic planning	11
4.2	Individual mix of funding	12
5	Subsidies	16
5.1	Housing improvement subsidy	16
5.2	Subsidy for regenerative energy plants	16
5.3	Municipal subsidies	17
6	Further relevant information	18
6.1	Outline of investment and energy costs	18
6.2	Best practice examples	20
6.3	Links	26

1 Abstract

This guidebook was developed as part of the IEE – Project **ROSH**. The **ROSH** project – **Retrofitting Of Social Housing** – provides support in correlation with extensive refurbishment of social buildings for building administrators and owners, but also for residents. The support includes various products like information about state of the art standards for heating and building, measures for quality assurance, support at presentations for residents or support at specific retrofitting projects.

The **ROSH** project covers the field from project idea to project implementation.

This guidebook "Sustainable Retrofitting of Social Housing: Financial Schemes" describes essential aspects to cope with retrofitting projects from the financial point of view. Especially the lacking willingness to invest represents a big drawback for retrofitting schemes. A professional and anticipating approach to this topic is a very important key to success.

In this guidebook the following topics are addressed:

- • • Judicial boundary conditions
- • • Financial aspects
- • • Sponsorship references
- • • Information concerning investment costs and current energy costs
- • • Successful retrofitting examples from the financial point of view
- • • Continuative information and links

The authors are aware, that in praxis there is no ideal type retrofit concept. Each concept is an autonomous project, in which various emphases influence the outcome of a decision process. Nevertheless, the authors assume that if adapted to the individual circumstances, this guidebook will be applicable for most retrofitting concepts.

This guidebook basically doesn't distinguish between the different housing laws, the focus of this work lies on the Condominium Act, which is a particular problematic area for retrofitting concepts. Parts of this guidebook, which refer explicitly to the Condominium Act, are pointed out.

This English version of the guidebook is based on the Styrian (AT) version. As the contents of this guidebook are focussed on the region of Styria, it presents only a principle way for other regions, how to implement energy efficiency projects in social housing buildings. Besides to the Styrian version four further specific versions exists in their respective languages: Lower Saxony (DE), City of Dublin (IE), Asti, Novara and Verbano-Cusio-Ossola (IT) and Pomerania and Warmia-Mazuria (PL).

2 Introduction

Buildings of the sixties and seventies bear a need for refurbishment after a useful life of 30 years or more, as long as no considerable changes have been made to the initial conditions. In many aspects such buildings are not state of the art: Heat and noise insulation, comfort as well as energy costs are on a much lower level than in new buildings. These deficits were unconsciously known and felt, but not really transparent.

With the introduction of the energy performance certificate for buildings, which is obligate for selling or renting out apartments effective from 2009, the disadvantages concerning energy efficiency become visible.

The energy performance certificate shows – like already known for electrical equipment – within a scale from "A" to "G", to which category a building belongs, and consequently, if high or low energy costs are to be expected. Immediate consequence is that building value will alternate in dependence on the energy category.

Despite existing needs for refurbishment, climate protection discussions and rising energy costs, the rate of refurbishment in social housing stays relatively low at approximately 1 % per year. For residential property buildings, the rate lies even lower. Reasons for this are various – among other things the following barriers can be detected:

- • • Lack of consciousness for the necessity and meaningfulness of an extensive retrofit;
- • • Lack of willingness of the owners to invest in an existing property;
- • • A relatively high need of investment for an all-embracing retrofit, facing relatively low savings or financial reserves.

In the end the question: "To what extent should the building be retrofitted?" is the center of many and long discussions.

Strategic planning: Timely start of a decision process

Residents and flat owners, as well as building owners expect a professional and continuous integration in the concept.

Strategic planning of the refurbishment is needed even long before the actual start of the decision process. In terms of the Condominium Act this happens with the foresight, which is prescribed by law. It presents a prescript at the end of an accounting period for the necessary enhancement costs, which exceed the maintenance cost, for a foreseeable period (not only for the next calendar year). Building appropriate reserves is therefore essential.

Status analysis, benchmarking and suggestion of measures

The actual decision-making process starts with the technical analysis of the building. Thereby the state of the construction and the heating system are surveyed and compared with state of the art standards. Supporting methods like thermography and blower door tests help to understand the need for refurbishment and elevate the acceptance of retrofit measures. From the analysis and benchmarking the necessary retrofit measures – dependant on the goals – are derived and therefore the need of investment can be identified. The results of the survey are summarized in a comprehensive way in a retrofit concept and presented in written form.

Individual mix of funding

Various forms of self funding exist:

- • • In the tenancy law through rental income, in which an elevation of the rent for retrofit measures is possible, if the tenant reserves of the past 10 years and following 10 years are not sufficient;
- • • In the “non profit housing act” through the compulsory maintenance- and enhancement fund;
- • • In the Condominium Act through the building of reserves.

Especially in the Condominium Act, the investment need for an all-embracing retrofit is normally not totally covered through self funding. Other means of funding are necessary. The probability of a retrofit rises with the fraction of own funds.

Apart from the funding through credits (and by that distribution of the investment costs over a wider period of time) the following methods can be used:

- • • Subsidy of the province and municipality: besides the sponsorship for refurbishment of residential buildings mainly solar and biomass projects are sponsored;
- • • Consideration of the coming lower energy costs (effects of the refurbishment);
- • • Energy service contracting: energy service contracting is an energy service with multiple benefits: a specialized partner takes care of the implementation of the retrofit and (if needed) can prefinance different measures.

Essential for all retrofit projects: The decision for a refurbishment should not be delayed. The later the retrofit is implemented, the higher the need of investment will be.

3 Judicial boundaries

Three judicial areas concerning retrofit concepts come to the fore:

- The respective right of abode: law of tenancy, non profit housing act, or condominium act – all of these are federal laws;
- Civil engineering directives: styrian building law including thermal insulation directive and the new energy performance certificate directive, a federal law effective from 2009;
- Laws concerning subsidies: the styrian housing subsidy law and possible municipal subsidies – this issue is discussed in *chapter 5: subsidies*.

3.1 Main features of the laws of abode

3.1.1 Law of tenancy

The law of tenancy is valid for around 30% of all households in Austria. It includes mainly apartment buildings constructed before World War II and apartment buildings in the ownership of area municipality or public companies. Central actors are the building owners – they are responsible for:

- Maintenance of all common parts of the building;
- Maintenance of the apartments in special cases (extreme damages);
- Maintenance of common equipment;
- Retrofit based on magisterial obligations;
- Implementation of measures serving energy economization;
- Enhancement of the building, if adequate financial reserves exist;

Principally, the building owners have to use the rent reserves of the past 10 years for the funding of these measures. The rent reserves consist of the rent income minus the maintenance costs during this period. In case these reserves are not sufficient, the expected rent reserves for the coming 10 years can be used. In case even this is insufficient, an elevation of the rent can be conducted (§ 18 law of tenancy). This elevation has to be approved by the arbitration board.

3.1.2 Non profit housing act

The non profit housing act is comparable to the law of tenancy, except one big difference: In addition to the rent, building owners can levy a maintenance and enhancement contribution. This contribution has an upper limit, which is defined by law dependent on the year of construction. For buildings older than 20 years the contribution is 1.32 EURO per m² living floor space per month. 0.33 EURO per m² per month of this amount are reserved for ordinary maintenance issues, the rest can be used for enhancement measures – for example capacious refurbishment.

3.1.3 Condominium Act¹

Apartment ownership is the secured right of the co-owners of a realty to use a residential property exclusively and to enact reclusively with it. The law prescribes how common parts of the building of the homeowner's association are administered.

Apartment ownership always means co-ownership of a realty, which is combined with the exclusive usage rights of an apartment.

¹ This part is based on the final report of the FRAMES project, AUSTRIAN ENERGY AGENCY, Vienna, 2005, page 45-49

The condominium act distinguishes "ordinary" (like running proceedings) and "extraordinary" administrative measures.

Both, the ordinary measures, as well as the extraordinary measures, are decided with a single majority of the apartment owners, counted in shares of the cadastral register.

Ordinary maintenance includes in general all measures which serve the purpose of maintenance and administration of common goods, which prove necessary and appropriate in the normal course of events, which serve the interests of all co-owners and don't require special expenses. In short, all that suits in a reasonable way to maintain the substance. Costs of repairs for the common substance are regardless the costs, affairs of the ordinary administration.

In the affairs of **extraordinary administration** are included all changes to the common parts of the realty, as well as beneficial improvements or the maintenance exceeding constructional changes. Also for the measures of the extraordinary administration only a single majority decision is required. But a single majority is imperative, since the §29 par. 6 of the condominium act explicitly instructs the property management to obtain a resolution.

The borderline between ordinary and extraordinary administration is not always a straight line, since both areas are regulated exhaustively. For the distinction usually an economical point of view is used. The term "maintenance" can definitely lead to improvements, without the need to assume extraordinary administration. In general this requires a constraint in functionality, viability, an existing defect, or at least a disposedness for damages.

In this context, also measures to reduce energy demand are to be seen as common ordinary maintenance costs, to which purpose also the building of appropriate reserves and the raise of a maintenance credit belong.

3.2 Civil engineering directives

3.2.1 Styrian building law

The implementation of the European Union building directive also leads to essential changes in the building law. Concerning building refurbishment the following changes are relevant valid from 01. 04. 2008:

- ● ● Distinction between all-embracing refurbishment and partial refurbishment:
 - For buildings with a total living floor area of more than 1,000 m² refurbishment is considered all-embracing for continuous refurbishment operations, if
 - the total building costs (construction costs, fees and auxiliary costs) exceed 25 % of the building value (not considering land value), or if
 - at least 25 % of the building shell of the conditioned gross volume are refurbished, or if
 - at least 3 of the following parts of the building shell and building services are replaced or predominantly modernized: windows, roof or upper floor ceiling, facade, HVAC-system.
- ● ● Besides the U-value boundaries, there also exist additional energy concerning requirements: U-values are obtained in a slightly stricter form and are also valid for refurbishment projects (all-embracing as well as partial refurbishments). In addition exist – for residential buildings – requirements concerning heating energy demand, final energy demand and parts of the energy technological system in case of all-embracing refurbishments.
- ● ● Compilation of energy performance certificates:
 - Energy performance certificates for the overall energy efficiency of residential buildings have to be issued at all-embracing refurbishments.

3.2.2 Styrian thermal insulation directive

The changes in the styrian thermal insulation directive are not known yet. This part will be implemented in the final version of the guideline.

3.2.3 Federal law on energy performance certificate

The law states, that for new buildings, selling and renting out, an energy performance certificate – according to the countries regulations – has to be presented to the potential client. This law came into force on the 01. 01. 2008. In cases of selling and renting out exists an interim arrangement until 01. 01. 2009.

This law states, that even without all-embracing refurbishment of a building, an energy performance certificate still has to be issued.

4 Financial aspects

Decisions about measures of a retrofit concept are generally based on investment- and resultantly financing costs. Resulting aspects like energy cost reduction, guaranteed value, ability to rent out and comfort, normally don't contribute to this decision for lack of transparency.

A point always to be looked out for is the fact that existing buildings are normally inhabited. This means in comparison to new buildings, that the need to integrate the residents to get the necessary acceptance for a positive outcome of the refurbishment is crucial. Residents who are misinformed or unhappy with the planned retrofit concept, or who are not convinced of the advantages of a refurbishment, already have delayed or even prevented many retrofit projects. In the Condominium Act the duty to inform through the passing of a resolution is anyways obligatory and for the above stated reasons all the more important. Again, essential for all retrofit projects: The decision for a refurbishment should not be delayed. The later the retrofit is implemented, the higher the need of investment will be.

4.1 Strategic planning

4.1.1 Timely start of the decision-making process

Residents and flat owners, as well as building owners expect a professional and continuous integration in the process. Strategic planning of the refurbishment is needed even long before the actual start of the decision process.

In terms of the Condominium Act this happens with the foresight, which is prescribed by law. It presents a prescript at the end of an accounting period for the necessary enhancement costs, which exceed the maintenance cost, for a foreseeable period (not only for the next calendar year). Building appropriate reserves is therefore essential.

But also in the law of tenancy and the non profit housing act, sufficient rent reserves and enhancement contributions build the basis for every all-embracing refurbishment. In the non profit housing act this is executed through the by law defined contributions on a well plannable basis. This is one reason for the relatively high refurbishment rate in the area of non profit housing buildings, and their generally better condition in comparison with law of tenancy buildings or condominium act buildings. In the law of tenancy, building sufficient reserves can be very difficult and is often only achieved through rent elevation. Especially in this situation objective information and awareness raising of the residents for the necessity and the advantages of a refurbishment is essential.

True for all different rights of abode: without own funding, the realisation of an all-embracing refurbishment is more or less impossible.

4.1.2 Comprehensible retrofit concepts

The actual decision process starts with the technical analysis of the building. Thereby the state of the construction and the heating system are surveyed and compared with state of the art standards. Supporting methods like thermography and blower door tests help to understand the need for refurbishment and elevate the acceptance of retrofit measures. From the analysis and benchmarking the necessary retrofit measures – dependant on the goals – are derivated and therefore the need of investment can be identified. The results of the survey are summarized in a comprehensive way in a retrofit concept and presented in written form. These retrofit concepts build the basis for the determination of investment costs and estimation of the following effects:

- • • Improvement of energy class,
- • • Reduction of CO₂-emissions,
- • • Reduction of yearly energy costs.

Standardized criteria catalogues are used more and more for refurbishments. Among other things, new standards for building refurbishment are written – on the basis of already existing standards for new buildings – in the framework of **klima:aktiv**, the climate protection initiative of the federal ministry of life. On one hand side, these **klima:aktiv** standards provide an orientation guide for adequate retrofit goals and benchmark the planned retrofit quality by means of a point system. Through **klima:aktiv** distinguished projects possess thereby a consistent and transparent standard. In any case, retrofitted buildings with this label are value preservative, if not value augmentative.

4.2 Individual mix of funding

4.2.1 Own funds

Depending on the laws of abode, various forms of self funding are existent (compare *chapter 3.1 "Main features of the laws of abode"*):

- • • In the tenancy law through rental income, in which an elevation of the rent for retrofit measures is possible, if the tenant reserves of the past 10 years and following 10 years are not sufficient;
- • • In the "non profit housing act" through the compulsory maintenance- and enhancement fund;
- • • In the Condominium Act through the building of reserves.

In general, especially in the law of tenancy and in the condominium act, the investment need for an all-embracing retrofit is normally not totally covered through self funding. Other means of funding are necessary. The probability of a retrofit rises with the fraction of own funds. Therefore, the timely building of a retrofit budget is an essential help for the implementation of all-embracing refurbishment projects.

4.2.2 Subsidies

In terms of reaching the climate protection goals of federal state and province, energy saving measures and installations of regenerative energy plants are subsidized by the province styria. Retrofit measures should at least be geared to the minimum requirements according to the subsidy guidelines, to actually get a subsidy. Subsidies reduce the share of investment costs, which have to be raised by third-party funds. More information concerning this matter are listed in *chapter 5 "subsidies"*.

4.2.3 Consideration of energy cost reduction

The fact that energy concerning retrofit measures reduce energy costs is obvious. Still this cost category is not or inadequately addressed in the investment decisions. It has to be considered, that the achieved energy cost reduction is effective until the next bigger refurbishment in maybe 30 to 40 years. The question: "Does a thermal energetic refurbishment make sense?" depends mainly on the presentation.

Calculations concerning return of investment are not the right approach! Much more meaningful is the question which retrofit measures are advantageous until the next bigger refurbishment. Therefore a period under review off about 30 years makes sense – this is the customary refurbishment lifecycle of residential buildings. If different retrofit options are compared, for example: refurbishment without thermal insulation, standardized refurbishment and high quality refurbishment, in general it is shown that in total, over the whole period, the option high quality refurbishment is the most cost-effective option.

Such calculations base on the national standard "ÖNORM M 7140" and consider investment costs (minus subsidies), current energy costs, costs of operation, main-tenance costs and financing costs. In terms of energy costs yearly elevations have to be included in the calculations. As an analysis of the **AUSTRIAN ENERGY AGENCY** shows, the energy costs rose in average around 4% each year over the past 35 years. This value has already taken inflation into account (see *figure 1*). *Figure 2* shows that in the last 12 months the energy costs rose faster than the rest of the consumer prices. Based on the rising energy demand worldwide, it can be assumed that the energy costs will continue to rise faster than the consumer price index.

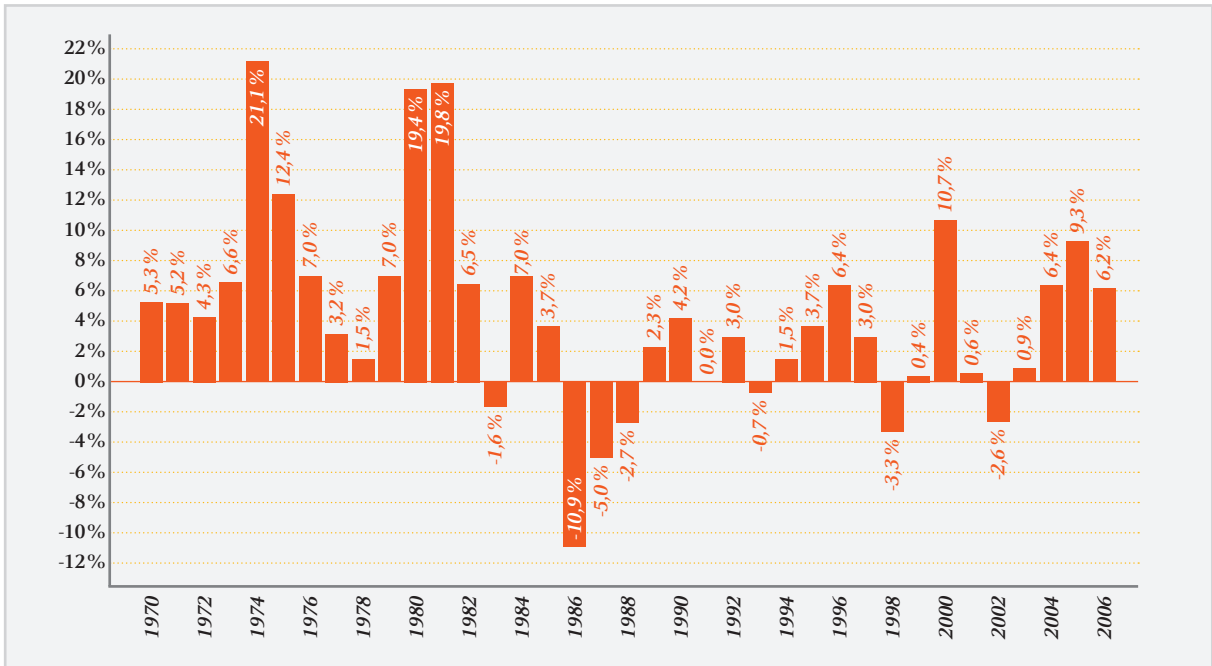


Fig. 1 Energy cost development in Austria: percentage alteration to the prior year, 1970 - 2006; source: AUSTRIAN ENERGY AGENCY

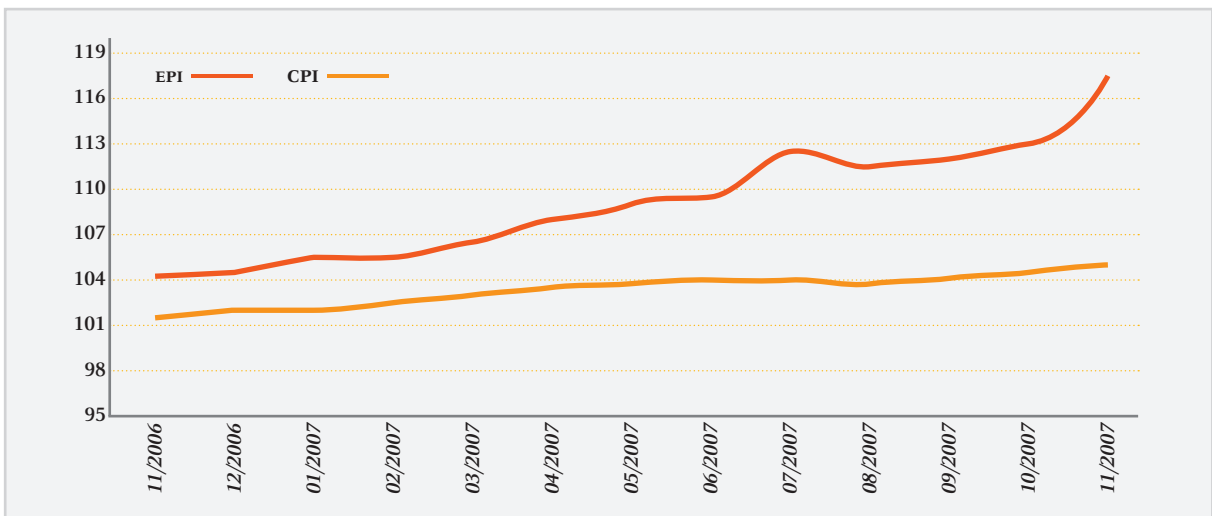


Fig. 2 comparison consumer-price index (CPI) and energy-price index (EPI) from November 2006 to November 2007; source: AUSTRIAN ENERGY AGENCY

4.2.4 Contracting

Contracting is a guaranteed way to lower energy costs, optimize heating systems, switch to energy saving lighting systems or renewable energy sources, implement insulation measures, and a lot of other things. Contracting causes an optimization of the overall costs, that means investment costs as well as operating costs. With contracting measures can be put into effect, which otherwise would have to be postponed or couldn't be implemented at all because financial shortages.

Beside the planning and implementation of measures, contracting can also include a form of funding of these measures. The contractual partner – the contractor – guarantees the building owner contractually agreed energy costs and offers a complete package of services. This package can include, operation, maintenance and accounting.

Quintessential principles of contracting:

••• Single hand Services

One contractor takes control of planning, execution and if required financing of the retrofit measures (e.g. thermal insulation, window exchange, restructuring of the heating system, etc.), as well as maintenance and operation of the systems (heating, cooling, solar systems, air ventilation, etc.).

••• Extensive guaranties

The contractor guaranties the contractually agreed amount of energy costs for the building after refurbishment including predetermined comfort standards. In addition, the guaranties can include other operating costs such as for garbage and wa-ter, or refer to response time or downtime in case of break-down. The service period of the contractor – the policy period – normally has a life-span of 5 to 15 years.

••• Performance-related commission

The contractor is paid performance related: In case the actual energy or operating costs exceed the guarantied values, the fee of the contractor is reduced. Therby the contractor has a strong incentive to actually achieve the cost reductions and use high quality standards during implementation.

••• Economical optimization

The financing of the retrofit measures is carried out in such way, that the overall costs for the building owners (investment and operating costs) are kept as low as possible.

Contracting is suited for apartment buildings and residential development

- with an existing or planned central heating system;
- for all-embracing refurbishment with conversion of the heating system;
- with too little existing financial resources.

Types of contracting:

••• Energy Performance Contracting

The goal is the reduction of energy demand and energy costs.

Criteria of Energy Performance Contracting:

- The contractor builds and operates energy relevant systems in the building.
- The contractor provides the energy services (e.g. tempered rooms, air change, etc.) at contractually agreed conditions (contracting-rate).
- The contractor guaranties the energy reduction, or respectively an upper limit of energy costs.
- The contractor is paid performance related (bonus-malus system).

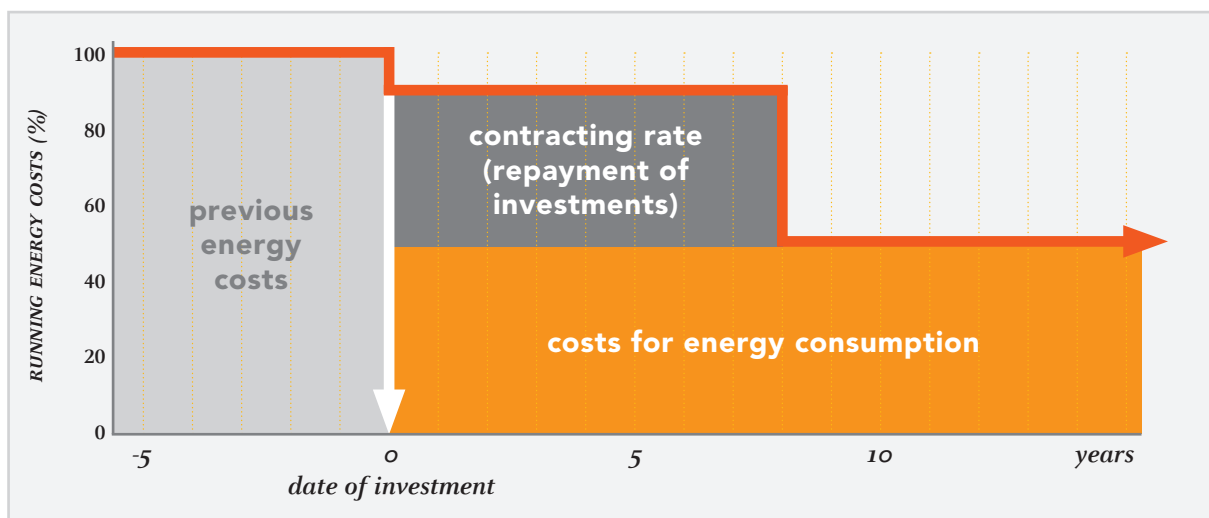


Fig. 3 Model of Energy Performance Contracting; SOURCE: GRAZ ENERGY AGENCY

••• **Energy Supply Contracting**

The goal is the modernization of heating systems or replacement of the energy source.

Criteria of Energy Supply Contracting:

- The contractor builds and operates the power plants;
- The contractor supplies the effective energy (e.g. heat, electricity) at contractually agreed prices;
- The payment is calculated on actual consumption.

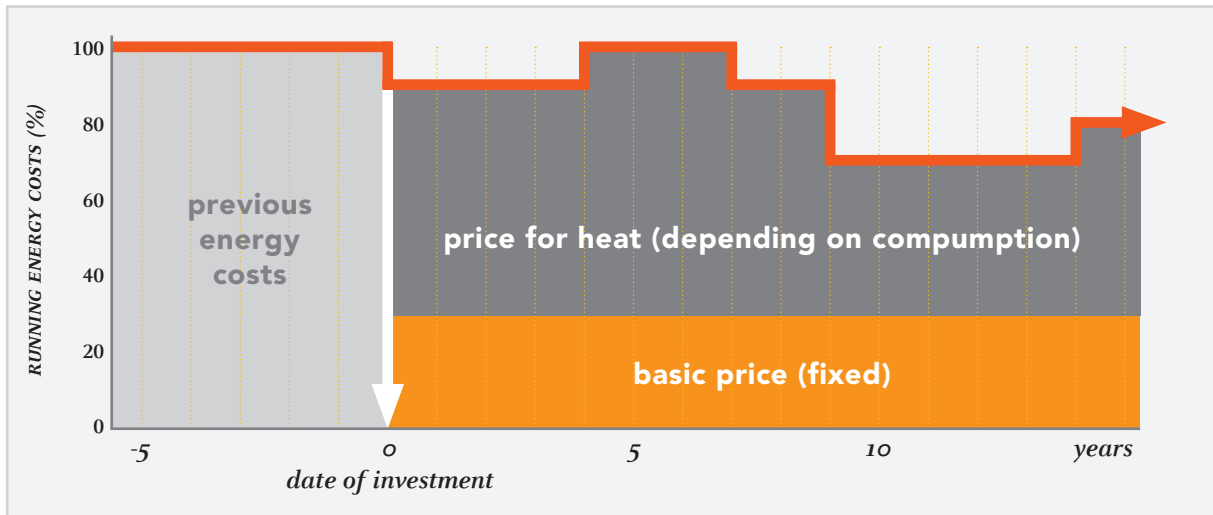


Fig. 4 Model of Energy Supply Contracting; source: GRAZ ENERGY AGENCY

••• **Plant Management Contracting**

The goal is the minimization of heating costs through optimal operation management.

Criteria of Plant Management Contracting:

- The contractor guaranties an upper limit of the operational costs and receives a performance related fee for his services.
- The contractor takes care of a continuous optimization of the system based on his own financial interest.

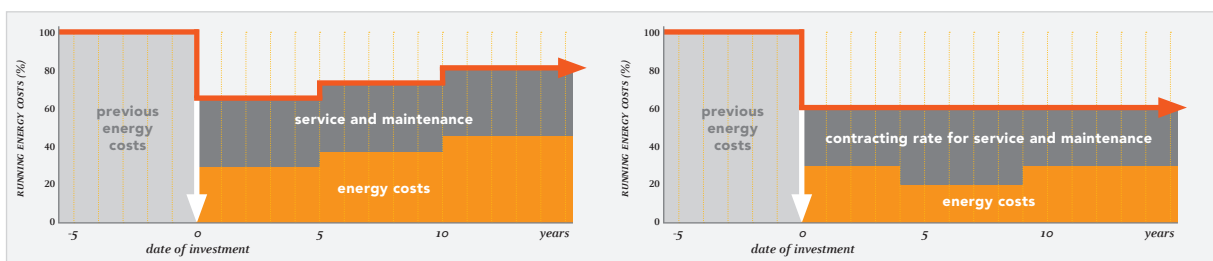


Fig. 5 comparison of autonomous Plant Management (left) and Plant Management Contracting (right); source: GRAZ ENERGY AGENCY

4.2.5 Residual funding requirements: loan

The residual funding requirement has to be financed through loans.

5 Subsidies

The following remarks about subsidies refer to the currently valid directives (effective date: 01. 12. 2007)

5.1 Housing improvement subsidy

Retrofit measures – for example energy saving measures (thermal insulation, window replacement, modernisation of the heating system) – can be subsidized as part of the housing improvement act of the **PROVINCE STYRIA** (SECTION A15).

The actual amount of the subsidy depends on the amount of eco-points. The maximum amount per flat is:

- 30,000.– EURO (basic subsidy, no eco-point),
- 35,000.– EURO for one eco-point,
- 40,000.– EURO for two eco-points,
- 45,000.– EURO for three eco-points,
- 50,000.– EURO for four eco-points.

One eco-point is for example given for the connection to the district heating, for installation of a biomass boiler, a solar system, a heat pump, a ventilation system with heat recovery, or for thermal insulation measures (for the last, all U-values of outer structural elements have to meet the requirements of the thermal insulation directive).

Two eco-points are given for the installation of a biomass boiler or connection to district heating *and* an installation of a solar system, for installation of a biomass boiler *and* the installation of a ventilation system with heat recovery, or for thermal insulation measures if all U-values are at least 20% below the requirements of the thermal insulation directive.

The subsidy consists of the granting of non refundable annuity subventions for eco-logical measures, energy saving measures and retrofit measures, for which at least one eco-point is given. For other improvement and maintenance measures, refundable annuity subventions are granted.

The application takes place at the department of the **PROVINCIAL GOVERNMENT OF STYRIA**, A15 – HOUSING SUBSIDY, Dietrichsteinplatz 15, 8011 Graz, PHONE +43 (0)316 877-3713 OR -3769, WEB www.wohnbau.steiermark.at

5.2 Subsidy for regenerative energy plants

5.2.1 Solar subsidy

The installation of a solar heating system is subsidized by the province of Styria with a direct subvention.

One condition among others is that the regional municipality also grants a subsidy for solar heating systems.

Solar systems for domestic hot water, integration in the heating system and power production can be subsidized up to the following amounts, if certain requirements are fulfilled:

- **For domestic hot water:**
 - Minimum aperture area: 5 m²
 - Subsidy amount: 300.– EURO basic allowance and 50.– EURO per m² installed collector area
- **For integration in the heating system:**
 - Minimum aperture area: 15 m²
 - Subsidy amount: 500.– EURO basic allowance and 50.– EURO per m² installed collector area

••• **For photovoltaic installations:**

Minimum solar module area: 2 m²

Subsidy amount: 500.– EURO basic allowance and 50.– EURO per m² installed solar module area.

The maximum amount lies at around 500.– EURO per apartment for multifamily houses.

The application is carried out after the installation of the system at one of the information centres or the respective municipality.

5.2.2 Biomass subsidy

The installation of a biomass boiler is subsidized by the province of styria with a direct subvention.

An additional subsidy from municipalities is possible (but no requirement).

Requirement (only a selection):

- The combustion plant complies with the regulations of the combustion plant directive;
- The power output of the combustion plant matches the heating energy demand of the building;
- No (economical reasonable) connection to district heating possible;
- The heating system must count as an overall heating system;
- The old plant has to be disposed.

The maximum amount of the subsidy is 25 % of the net investment costs, with the following boundaries:

- Pellet stove: 800.– EURO
- Firewood stove: 1,100.– EURO
- Tiled stove: 1,100.– EURO
- Pellet-central heating systems: 1,100.– EURO
- Wood chip central heating systems: 1,800.– EURO

The application is carried out after the installation at one of the information centres.

NOTE *The installation of solid fuel plants in the city of Graz is only allowed, if the fine dust emissions don't exceed 4 g per m² living floor space and year. In general this means that the installation of these plants in insufficiently insulated buildings is not allowed.*

5.3 Municipal subsidies

Furthermore various municipalities grant different subsidies for thermal insulation measures or installation of regenerative plants. These subsidies can be claimed in addition to the provincial subsidies.

6 Further relevant information

6.1 Outline of investment and energy costs

no.	activity	net amount [€]	reference	VAT [%] [%]	gross amount [€]	average life [a]
o1	insulation of floor over earth	40	/m ² floor	20.0	48	25
o2	insulation of wall to earth	60	/m ² wall	20.0	72	25
o3	insulation of wall to unheated room	40	/m ² wall	20.0	48	25
o4	insulation of cellar floor	35	/m ² floor	20.0	42	25
o5	insulation of outer wall	100	/m ² wall	20.0	120	25
o6	replacement of windows	350	/m ² window	20.0	420	30
o7	replacement of main entrance door	350	/m ² door	20.0	420	30
o8	insulation of attic floor	40	/m ² floor	20.0	48	30
o9	insulation of wall to unheated loft	50	/m ² wall	20.0	60	25
o10	insulation of pitch of the roof	50	/m ² roof	20.0	60	30
o11	insulation of flat roof	60	/m ² roof	20.0	72	25
o12	insulation of floor over air	100	/m ² roof	20.0	120	25

Tab. 1 activities on the building shell

no.	activity	net amount [€]	reference	VAT [%] [%]	gross amount [€]	average life [a]
o1	installation of a condensing gas-boiler	400	/kW	20.0	480	15
o2	installation of a gas-boiler	333	/kW	20.0	400	15
o3	installation of a condensing oil-boiler	400	/kW	20.0	480	15
o4	installation of a oil-boiler	350	/kW	20.0	420	20
o5	installation of a district heating station	500	/kW	20.0	600	30
o6	installation of a pellets-boiler	650	/kW	20.0	780	15
o7	installation of a biomass-boiler with heat storage		/kW	20.0	0	15
o8	installation of an electric heat pump	800	/kW	20.0	960	15
o9	installation of a solar system for hot water supply	500	/m ² collector	20.0	600	15
o10	installation of a solar combi system (for hot water & heating)	530	/m ² collector	20.0	636	15
o11	insulation of piping	30	/m pipe	20.0	36	20
o12	installation of thermostatic valve	50	/valve	20.0	60	15

Tab. 2 activities on the heating system

no.	heating system	fuel	unit [...]	net amount [€/...]	energy content [kWh/...]	efficiency of heating system [%]
1.1	central heating	biomass (district heating)	pm	0.070	1.0	96
1.2		pellets	kg	0.264	4.7	70
1.3		district heating	kWh	0.064	1.0	96
1.4		oil	l	0.600	9.8	75
1.5		gas	m ³	0.063	0.9	77
1.6		heat pump	kWh	0.130	1.0	70
2.1	individual	biomass (district heating)	pm	0.070	1.0	96
2.2	central heating	pellets	kg	0.212	4.7	70
2.3		district heating	kWh	0.060	1.0	96
2.4		oil	l	0.700	9.8	75
2.5		gas	m ³	0.060	0.9	87
3.1	stove heating	biomass	pm	0.070	1.0	96
3.2		pellets	kg	0.286	4.7	70
3.3		oil	l	0.612	9.8	75
3.4		gas	m ³	0.065	0.9	87
3.5		electricity	kWh	0.13	1.0	98
3.6		coal	kg	0.37	7.7	54

Tab. 3 energy costs and efficiency key data of heating systems

no.	heating system	fuel	net amount [€/kWh]	VAT [%]	gross amount [€/kWh]
1.1	central heating	biomass	0.09	20.0	0.11
1.2		pellets	0.07	20.0	0.08
1.3		district heating	0.08	20.0	0.10
1.4		oil	0.10	20.0	0.12
1.5		gas	0.09	20.0	0.11
1.6		heat pump	0.07	20.0	0.08
2.1	individual	biomass	0.10	20.0	0.12
2.2	central heating	pellets	0.11	20.0	0.13
2.3		district heating	0.09	20.0	0.11
2.4		oil	0.14	20.0	0.17
2.5		gas	0.18	20.0	0.22
3.1	stove heating	biomass	0.10	20.0	0.12
3.2		pellets	0.11	20.0	0.13
3.3		oil	0.14	20.0	0.17
3.4		gas	0.18	20.0	0.22
3.5		electricity	0.13	20.0	0.16
3.6		coal	0.12	20.0	0.18

Tab. 4 specific heating costs under consideration of the heating system

6.2 Best practice examples

6.2.1 Daungasse

General information

Building owner GGW (Gemeinnützige Grazer Wohnungsgenossenschaft)

Address Daungasse 4-8, Asperngasse 22-24, Wagner-Birostraße 23-25, A-8020 Graz

Total heated floor area 7485 m²

Year of construction 1960

Year of refurbishment 2001



Initial situation The GRAZ ENERGY AGENCY was responsible for the complete renovation of a residential estate (altogether 150 accommodation units) consisting of three residential buildings arranged around one common green area. The useable floor space is 7485 m² in total, the average useable space amounts to approximately 50 m² per flat. The flats are inhabited predominantly by socially disadvantaged tenants, the City of Graz (Social Welfare Office) is responsible for the allocation of the flats.

Innovative financing model The implementation of the measures for energetic improvement of the "Daungasse" in these properties has to be realised under a contracting model called *Thermoprofit*. *Thermoprofit* is a comprehensive package of services for reducing the energy consumption in buildings. Planning, execution of the measures, optimisation, financing, maintenance and operation during the entire contract term are managed by one single party.

The *property owner* was offered a balanced package of services provided by one single contractor – planning, installation, professional energy management.

The contractor

- • • furnished a contractual *guarantee* for keeping the agreed upper limit for space heating and the entire heating costs and accepts all related technical and economic risks.
- • • was responsible for the *complete optimisation* of the external walls of the properties, the heating and hot-water supply systems (installation and routine maintenance of the systems).
- • • undertook to maintain the *highest quality standards* with respect to the installation and functioning of the systems.
- • • contributed to a general *improvement of the environment* by reducing the level of energy consumption.

Energy related activities

Building shape	Insulation of outer walls (with 8 cm mineral wool) Insulation of cellar floor (with 8 cm mineral wool slabs) Insulation of attic floor (with 20 cm mineral wool) Replacement of windows
Other activities	Installation of seven lifts Improvement of the electric system in the cellar and staircases Information of the residents
Solar system	85 m ² (for domestic hot water supply)

Energy related indicators

	Initial situation	After refurbishment	Reduction
Energy performance	140 kWh/m ² a	77 kWh/m ² a	45 %
Energy consumption	1.052.556 kWh/a	578.906 kWh/a	45 %
CO₂-emission	586 t/a	181 t/a	69 %
Heating system	Individual heating systems (gas, oil, break, wood, electricity)	Gas central heating system	
DHW-system	Individual systems	Solar system	
Monitoring system	No monitoring system	Energy management and controlling system	

Financial indicators

Energy costs	54.300 €/a	29.800 €/a	45 %
Investment costs of the total refurbishment	2.180.000 €		
Investment costs of the energy related refurbishment	1.230.000 €		
Costs per saved kWh	2,60 €		

Statement

Ing. Giulio Insam (GGW)

"The Thermoprofit model has been an approach to improve the energetic quality of existing buildings. In the beginning we were unsure about Thermoprofit, but by now, we know about the advantages of integrated planning models. We intend to apply this model at an upcoming refurbishment project. The cooperation with Steirische Gas Wärme has proven to be very successful."

6.2 Best practice examples

6.2.2 Vinzenz-Muchitsch-Straße

General information

Building owner City of Graz, Department for Residential Buildings

Address Vinzenz-Muchitsch-Straße 29/31, A-8020 Graz

Total heated floor area 2.000 m²

Year of construction 1960

Year of refurbishment 2001



Initial situation The residential estate consists of 30 accommodation units. The average useable space amounts to approximately 68 m² per flat. Before the refurbishment some windows were replaced and some activities for maintenance were realised. The particularity of this refurbishment was realised as a Thermoprofit PLUS-project. The **GRAZ ENERGY AGENCY** was responsible for the process of the complete renovation of this residential estate.

Innovative financing model The implementation of the measures for energetic improvement of the "Vinzenz-Muchitsch-Straße 29/31" in these properties was realised under an ecological refurbishment model called *Thermoprofit PLUS*. *Thermoprofit PLUS* includes special ecological measures in addition to a standard *Thermoprofit*-project.

The heating- and solar system is financed by the costs for heat, a so called "sale & lease back"-modell.

The contractor

- installed the heating system for the building owner (he got the full payment)
- leased the system during the term of the contract of the heat supply
- charged the leasing rate against the tenants (by the heat flat rate)

Energy related activities

<i>Building shape</i>	Insulation of outer walls (with 10 cm mineral wool) Insulation of cellar floor (with 8 cm mineral wool slabs) Insulation of attic floor (with 18 cm mineral wool) Insulation of thermal weak points (e.g. at the balcony-plates) Replacement of windows (wood-profiles)
<i>Other activities</i>	Replacement of blindness with titanium zinc plate Replacement of electrical installation (free of PVC)
<i>Solar system</i>	no solar system

Energy related indicators

	Initial situation	After refurbishment	Reduction
<i>Energy performance</i>	138 kWh/m ² a	51 kWh/m ² a	63 %
<i>Energy consumption</i>	340.000 kWh/a	131.000 kWh/a	62 %
<i>CO₂-emission</i>	85 t/a	34 t/a	60 %
<i>Heating system</i>	Individual heating systems (gas, oil, break, wood, electricity)	District heating system	
<i>DHW-system</i>	Individual systems	District heating system	
<i>Monitoring system</i>	No monitoring system	Energy management and controlling system	

Financial indicators

<i>Energy costs</i>	19.520 €/a	7.856 €/a	60 %
<i>Investment costs of the total refurbishment</i>	440.000 €		
<i>Investment costs of the energy related refurbishment</i>	124.280 €		
<i>Costs per saved kWh</i>	2,11 €		

Report of the investment costs

<i>Loan</i>	342.001 € (Loan from the Country of Styria) The investments are financed through the Maintenance and Improvement Contribution.
-------------	--

Statement

Gerd Schalk (leader of the management of accommodation units)
"The city of Graz is very proud of the ecological refurbishment, the savings of energy costs for every tenant and the reduction of the CO₂-emission about 60 %.
This is a very important step towards a sustainable development of the city of Graz.
We are striven to refurbish further old buildings in an energetic and ecological way."

6.2 Best practice examples

6.2.3 Denggenhofsiedlung

General information

Building owner Ennstal-Neue-Heimat Wohnbauhilfe, Gemeinnützige Wohnungsgesellschaft m.b.H.
(a non-profit housing association)

Address Bozenerstraße 17-19, Hammer-Purgstallgasse 21-23, A-8020 Graz

Total heated floor area 25.000 m²

Year of construction 1940

Year of refurbishment 2001



Initial situation The residential estate consists of 12 independent economic units with altogether 72 buildings and 447 accommodation units. The heating system were splitted in 50% individual heating and 50% district heating. The center of attention of this project was to improve the tenant's quality of life and to involve the tenant's interests in the decision making.

Innovative financing model The implementation of the measures for the energetic improvement of the "Denggenhofsiedlung" in these properties was realised under an ecological refurbishment model called *Thermoprofit PLUS*. *Thermoprofit PLUS* includes special ecological measures in addition to a standard *Thermoprofit*-project.

This kind of refurbishment combined the general optimal realisation with comprehensive garanties for the operating companies. There are advantages for die building companies and for the tenants.

for the building companies:

- the flats get high-order (more significant)
- less work for the management of the tender

for the tenants:

- improvement of the quality of life
- no additional costs

The investments are financed through the Maintenance and Improvement Contribution with energy savings of 100.000 EURO per year.

Energy related activities

<i>Building shape</i>	Insulation of outer walls (with 10 cm mineral wool) Insulation of cellar floor Insulation of attic floor Replacement of windows
<i>Other activities</i>	Renewal of the outdoor installations Development of green areas
<i>Solar system</i>	no solar system

Energy related indicators

	Initial situation	After refurbishment	Reduction
<i>Energy performance</i>	130 kWh/m ² a	63 kWh/m ² a	51 %
<i>Energy consumption</i>	3,5 Million kWh/a	1.7 Million kWh/a	51 %
<i>CO₂-emission</i>	564 t/a	282 t/a	50 %
<i>Heating system</i>	50% District heating systems 50% Individual heating systems	District heating system	
<i>DHW-system</i>	Individual systems	District heating system	
<i>Monitoring system</i>	No monitoring system	Energy management and controlling system	

Financial indicators

<i>Energy costs</i>	200.000 €/a	100.000 €/a	50 %
<i>Investment costs of the total refurbishment</i>	4 Million €		
<i>Investment costs of the energy related refurbishment</i>	unknown		
<i>Costs per saved kWh</i>	2,20 E (referring to the total costs of 4 Million €)		

Statement

Julius Rozner (leader of the property management)

"The general refurbishment, especially the thermal insulation of the outer walls, resulted in energy savings of 50%. We are very proud of the tenant involvement process, which has been taken a very important part for a successful and satisfying refurbishment – without additional costs for the tenants.

6.3 Links

European Union

- **Project ROSH**
www.rosh-project.eu
- **Intelligent Energy Europe Programme (IEE)**
http://ec.europa.eu/energy/intelligent/index_en.html

Austria with the Region Styria

- **AEE-Institute for Sustainable Technologies**
www.aee.at
- **Department for Subsidies of Residential Buildings (Styria)**
www.wohnbau.steiermark.at
- **Grazer Energie Agentur**
www.grazer-ea.at

Bulgaria

- **Black Sea Regional Energy Centre**
www.bsrec.bg

Germany with the Region Lower Saxony

- **Architektenkammer Niedersachsen**
www.aknds.de
- **Institut für Bauforschung e. V.**
www.bauforschung.de
- **target GmbH**
www.targetgmbh.de

Ireland with the Region Dublin

- • • **City of Dublin Energy Management Agency**
www.codema.ie

Italy with the Regions Lombardy and Piedmont

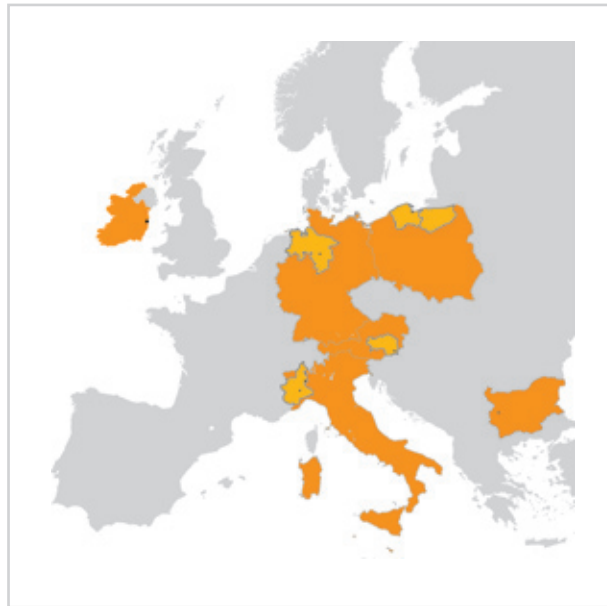
- • • **Ambiente Italia srl**
www.ambienteitalia.it
- • • **Agenzia Territoriale per la Casa di Asti**
www.atc.asti.it
- • • **Agenzia Territoriale per la Casa di Novara**
www.atc.novara.it
- • • **Federcasa – Federazione Italiana per la Casa**
www.federcasa.it

Poland with the Regions Pomerania and Warmia-Mazuria

- • • **Baltycka Agencja Poszanowania Energii SA**
www.bape.com.pl

ROSH

is a European cooperation project within the *Intelligent Energy – Europe Programme*. It consists of 9 regions in 6 countries of the European Union.



Styria

Austria

City of Dublin

Ireland

Pomerania and
Warmia-Mazuria

Poland

Asti, Novara and
Verbano-Cusio-Ossola

Italy

Lower Saxony

Germany

Bulgaria

