Key Results

January 2006 to June 2008
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Editorial

There is not such a thing as a common social housing definition, quality or practice in Europe and from this perspective alone ROSH did much to shed light on existing differences and similarities in the involved regions. Our company has a broad variety of projects which deal with the energy efficient retrofitting of buildings, but this was the first one looking into “less privileged” sectors. What became quite clear within the course of the project was that we cannot afford using simple one-fits-all solutions in this complex field. Every building, every owner and tenant structure, every set of frame conditions is different. But then, the tools and steps taken within ROSH show also a very simple way to achieve a lot. The setting up and enforcing of specific communication and information measures by addressing tenants, owners, architects and planners, housing industries and networks that is customized to the specific and individual demands and conditions have been very successful. The project consortium would like to share these results – either in form of the various detailed deliverables available online – or as a kind of introduction in form of this report. All of us will continue to work in the field of refurbishing social housing and are open to your remarks, questions or cooperation to further develop ROSH approaches.

Gabi Schlichtmann, target GmbH
Project Co-ordinator
Project Basics

Acronym: RO SH
Full title: Development and marketing of integrated concepts for energy efficient and sustainable retrofitting of social housing

Topic: Expanding the market for advanced energy-efficient retrofitting solutions as well as comfort levels and the quality of life for tenants

Financing: Intelligent Energy – Europe
Contract number: EIE/05/140/SI2.4/9590
Budget: € 1,330,623 (EU contribution: 49.86%)
Duration: January 2006 – June 2008
Co-ordinator: target GmbH, Hannover
Countries: Austria, Bulgaria, Germany, Ireland, Italy, Poland
Number of partners: 12
Project website: www.rosh-project.eu
## Results Overview

### Key Result No. 1  Shining Examples

- Ten demonstration projects in five regions were selected, supervised and supported
- The total savings from ROSH projects amount to 1,145 CO₂ tonnes annually and an average energy reduction of 58%
- Publication of all details in the print brochure “10 Shining Examples” in English, German, Italian, Polish and Bulgarian (EN, DE, IT, PL, BG)

### Key Result No. 2  Guidebooks & Quality Assurance

- ROSH Guidebook Part I on technical solutions available in EN, DE, IT, PL, BG
- ROSH Guidebook Part II on financial solutions in EN, DE, IT, PL, BG
- 200 copies of the guidebooks distributed in each region
- Energy checklists in EN, DE, IT, PL, BG
- Advisory kit on software tools in EN, DE, IT, PL, BG
- Presentation posters on blower door and building in EN, DE, IT, PL, BG

### Key Result No. 3  Analysis, Campaigning, Consultations

- Survey and cross-country analysis based on 150 expert interviews
- Five marketing campaigns with more than 70 information events reaching some 3,000 stakeholders in roundtables, seminar and motivation activities
- 167 consultations in the regions
- 50% of the consulted parties willing to continue working towards energy efficient retrofitting

### Key Result No. 4  Tenant Training

- Tenant information and training were carried out in all demonstration projects
- 264 tenants trained with materials adapted to their needs
- 60% of trained tenants willing to adjust and change behaviour
- Tenant training concepts and materials are available in EN, DE, IT, PL, BG

### Key Result No. 5  Good Practice

- Portraits of 30 technical good practices examples online and as PDF
- Portraits of 11 good financial practices schemes online and as PDF
Introduction to ROSH

ROSH stands for retrofitting of social housing and was an European project for developing and marketing integrated concepts for energy efficient and sustainable retrofitting of social housing funded by Intelligent Energy Europe. The project was implemented from January 2006 to June 2008 by twelve partner organisations from Austria, Bulgaria, Germany, Ireland, Italy and Poland.

There is no single formal definition of what social housing is within Europe and this holds also true for the regions involved in the ROSH project. For the purpose of the project “social housing” was defined as multi-family houses or apartment buildings for low-income households.

Millions and millions of these types of buildings in Europe have been built in the sixties. Buildings which come into focus more often regarding economical and social problems, less than for reasons touching energy or sustainability. But to meet the demands of today and tomorrow these neglected building resorts have to address the application of energy efficiency and sustainability. The building sector in the EU accounts for 40% of the final energy consumption. An estimate of one fifths of this energy could be saved profitably. In the next 15 years more than one million new buildings are going to be erected in the EU, approximately 1 to 2% of the building stock undergo retrofitting every year. One thing is very clear: the energy efficiency of buildings can be improved considerably – either in retrofitting or in new buildings. Against the background of sustainable, indigenous and secure energy for Europe the saving of energy in the building sector is essential.
Partners Say

Sonja Geier, Department Sustainable Buildings, AEE Institute for Sustainable Technologies, Austria

We could say that the ROSH campaigning activities were a success story in Styria that continues even after the official end of the EU project. In Styria the ROSH campaigning activities already started in 2006 and were supported by favourable regional developments and due to strong supporters such as the national support through "klima:aktiv" and the Federal Ministry of Agriculture, Forestry, Environment and Water Management. From our perspective ROSH came at the right time and proved to be a real milestone for the development and promotion of integrated concepts in the retrofitting of larger building in the social housing. Lighthouse projects with high awareness impact could be initiated. Due to the success of the ROSH campaign further consultations were carried out in the years 2007 - 2008, the campaign for the period of 2009 is already fixed.

Tim Wameling, Department Structural Engineering, Standards and Energy Efficiency, Chamber of Architecture Lower Saxony, Germany

For the first time since its foundation the Chamber of Architecture of Lower Saxony has been involved in an EU project. Why did we as an institution which is primarily representing professional interests at regional level cooperate in a Europe wide project for the retrofitting of social housing? Because we see that these building stock, which has much too often been neglected in the past, has to be addressed from an architectural and energetic perspective in the way of an increasing environmental and energy crisis. ROSH has offered the ideal forum for the matchmaking of all relevant stakeholders including all from public authorities to tenants and to architects at local and regional level. The Chamber of Architecture has been able to communicate the Europe wide cooperation, the experiences as well as the know-how made via trainings and publications to their 10,000 active members.

Chiara Wolter, Senior Consultant and Architect, Ambiente Italia, Italy

The complex work developed within the ROSH project gave us the possibility to get involved with a particular sector of the built environment: the social housing. The aim of a sustainable retrofitting of those building is not so far to be achieved, in despite of the enormous existing difficulties, but has to be stressed with information campaigns, consultations and with the wide diffusion of best practice examples. The inputs from the multinational cooperation invite us to increase the quality of the existing retrofitting measures and show us that there is a way to do it. The approach of ROSH strengthened our conviction that cooperation between operators, tenants, owners, technicians is the better way to achieve results, enriching the awareness of each part involved.
Katarzyna Grecka, Vice President, Baltic Energy Conservation Agency, Poland

Retrofitting actions are not a new occurrence on Polish market. However, only 25% of citizens realise that 70% of energy used in households is consumed for heating purposes. ROSH project addressed mainly energy end users- tenants and buildings administrators, underlining the significance of increasing thermomodernisation consciousness among this group of market actors. In the course of project actions several tools have been elaborated, e.g. technical and financial guidebooks, check lists for building administrators, good practice samples, posters on thermography and blower door tests, presentation and brochure for tenants, which will fill in the information gap in this sector and are extraordinarily helpful, when making a decision about thermomodernisation investments in social housing.

Noemy Moumdjian, Project Manager, Black Sea Regional Energy Centre (BSREC), Bulgaria

Energy efficiency turned out to be indispensable in our daily life within the last years. The demand for saving energy in new and existing buildings creates a necessity for developing new procedures and regulatory measures. For BSREC special focus was foreseen to enable dissemination of project results to Southern and Eastern Europe. The dissemination activities in Romania, Hungary and Slovakia proved to have success beyond the regions of the participating partners. By presenting outcomes of the project in front of wide expert audiences, the ROSH project succeeded in attracting the attention and raising the awareness in Southern and Eastern European countries. We believe that our common efforts will be further rewarded by making possible the dissemination also in future that will surely contribute to achieving our main goal.

Dr. Gerry Wardell, Director of the City of Dublin Energy Management Agency (CODEMA), Ireland

The ROSH project has proved valuable in supporting the refurbishment of social housing in Dublin, in many ways. First, ROSH allowed the evaluation of a range of technical refurbishment measures that are appropriate to two specific Dublin social housing schemes and examined the financial instruments which are available to fund the refurbishment. Second, it provided a multiplier effect to an additional thirty schemes which are at the early planning stage for refurbishment. By extension, it has also helped to inform the wider social and private existing housing sectors, where there is a very significant scope for energy saving potential. Third, it facilitated the exchange of know-how between Dublin and the other European partner cities. Finally, the ROSH project has helped to combat Fuel Poverty among a more vulnerable sector of society through providing more energy efficient homes which cost less to heat; this is especially important in an era of rapidly rising energy costs.
Gerhard Lang, Department Property and Public Authorities, Energy Agency of Graz, Austria

On one hand the ROSH project has indicated that framework conditions are different in the participating regions. This concerns the legal and financial status quo in the context of refurbishment activities at residential buildings in the sector of social homes.

On the other hand ROSH has provided a lot of tools and support activities for housing managers and building owners in the ROSH regions to master various barriers in the context of retrofitting of social houses. The guidebooks, the cost data base, the involvement of tenants or the demonstration projects are exemplarily mentioned.

The most visible and effective activity of ROSH has been the campaign. 45 concrete consultations have been initiated in the first period (2006), in total until now 140 consultations have been done in Styria. The participation at about 20 events in Styria will influence refurbishment strategies also after the project duration.

Heike Böhmer, Managing Director of Institut für Bauforschung e. V., Germany

As a stakeholder association in field of research for construction and building, it is our day-to-day business to communicate the state-of-the-art in the area of retrofitting including the message that there is no alternative to reducing the energy consumption in existing buildings. We know that is especially challenging to address the sectors such as social housing where the economical frame conditions might seem to be more constraining. Within ROSH we managed to make progresses in the area involving and convincing stakeholders to start valuable demonstration projects. Some of these projects are still ongoing, but I am convinced that the outcomes will be both satisfactory in the area of energy savings as well as the promotional impact.

Ubaldo Sabbioni, Technical Director, Agenzia territoriale per la casa della provincia di Asti, Italy

Participating in the EU project ROSH was important for our agency, because it was able to give new impulses. Getting to know all the existing differences in all the involved regions and sharing experiences will help all of us tackle the huge task of transforming multi-family building stock into energy efficient housing. In Asti, we had a good cooperation with all the local parties, which showed good results.
Umberto Maria Luoni, Technical Director, Agenzia Territoriale Casa Novara, Italy

Managing and maintaining affordable apartments, houses and flats for low income families is the key task of our agency and has always been a priority in our region. Due to social developments, the need for this kind of buildings increased over the years. The aspect of energy efficiency and raising awareness for the need to save energy in the social building sector however is a comparable new development, but cannot be separated from the social questions. Within the ROSH project we were able to develop and test approaches and methods to improve the involvement of tenants and the results of energy efficiency measures.

Anna Maria Pozzo, Technical Director, Federcasa – Federazione Italiana per la Casa, Italy

Federcasa has participated in the project ROSH because we believed that an initiative to increase the awareness of experts of social housing concerning the topics of energy efficiency was extremely helpful. The heritage of the former Istituto Autonomo per le Case Popolari (IACP) needed the intervention of retrofitting and adjusting of some 450,000 dwellings. The public resources for doing large scale renovations were missing and it was necessary to involve private funding for financing as well as to involve and prepare all stakeholders of social housing for the financing schemes envisioned by the European Directive. Above all, there was a lack of knowledge about the building stock to allow the right investment schemes and the development of the correct retrofitting solutions. The instruments developed within the project responded to this objective, especially the guidebooks, which addressed in its two volumes the technical as well as financial questions. Through its work Federcasa will continue to disseminate the project beyond the end of the contract, will insert links and references in related web sites and will present the results of the project within their training activities.
Ten lighthouse demonstration projects were selected from the five partner regions to showcase advanced sustainable retrofitting concepts. These projects were supervised and supported in different planning, implementation, monitoring phases. On the whole, the results were encouraging. The total savings from ROSH projects amount to 1,145 CO₂ tonnes annually and an average energy reduction of 58% was achieved (related to the energy consumption for space heating and DHW). All “shining” projects were planned in close co-operation with regional market players such as housing companies, local authorities and tenant associations. Support was provided through information services about detailed retrofitting concepts, the development of financial models and active support in the implementation process. All tools and concepts developed within the ROSH project were used to achieve the success of the shining examples.

A ROSH brochure called “10 shining examples: sustainable retrofitting of social housing in Europe” is available in English, German, Italian, Polish and Bulgarian. The print copy of the brochure can be ordered from villa@targetgmbh.de or digital PDFs downloaded from http://www.rosh-project.eu.
Austria, Styria, Gasen

< Multifamily house GASEN >

Summary of Demonstration Project

The multi-family house was erected in 1966 according to state-of-the-art construction in those days. The building was structurally sound and suitable for energetic improvements. Before its reconstruction thermo technical lacks were causing mould and condensation.

The outer walls of the building consist of vertical coring bricks (30-40 cm), its ceilings of reinforced concrete plates. It had box-type windows with single glazing. The heating of the building was supplied by a district heating (radiators with thermostat) with a central hot water conditioning and a conventional two-pipe-system.

With the high-quality retrofit the energy consumption for heating was reduced by 77%. This reduction was achieved by a high-quality insulation of the building envelope, the installation of windows with passive house standard (U-value [total] = 0.80 W/m²K) and a non-central ventilation unit with heat recovery (64% efficiency). As all the inhabitants of the building were involved into the decision process right from the beginning, the retrofit was always very much appreciated.

Notable features:

Heating system: Central heating system with biomass district heat

Ventilation system: Installation of single room ventilation units with heat recovery (64% efficiency)

Windows: New passive house windows triple glazed reduced the U-values from 2.60 W/m²K to 0.80 W/m²K.

Fabric elements: Additional wall insulation reduced wall U-values from 0.85-1.23 W/m²K to 0.20 W/m²K. Significant roof insulation reduce roof U-values from 1.50 W/m²K to 0.24 W/m²K and cellar-ceiling from 1.15 W/m²K to 0.21 W/m²K.

Thermal bridges: Insulation of the balcony-plates and bearing-outs.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</td>
<td>157.0</td>
<td>36.0</td>
<td>77%</td>
</tr>
<tr>
<td>CO₂ emission kg/m²/yr</td>
<td>7.45</td>
<td>1.70</td>
<td>77%</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>Central heating system</td>
<td>Central heating system with biomass</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Central hot water system</td>
<td>Central hot water system</td>
<td></td>
</tr>
<tr>
<td>Monitoring system</td>
<td>AEE arranged a Blower-Door Test and made Thermographic pictures. We measure the energy consumption currently.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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www.rosh-project.eu
Austria, Styria, Kerpelystraße

Summary of Demonstration Project

The multi-family building was constructed in 1979. It consists of two buildings with a total number of 40 flats, every flat is owned by a private person. Refurbishment activities have to be approved by a majority of the owners, only in case of improvement measures an unanimous decision of the owners is necessary. The association of flat owners is composed of elderly and in general poor people.

The building has been in poor condition since only maintenance repairs have been carried out. Thus, the thermal-energetic standard of the buildings has not corresponded to the current standards. Although some parts of the outer walls have been insulated, in some flats mildew has appeared and windows have become loose. In total the thermal comfort in flats has been not adequate in terms of current standards. Due to decentralized heating systems with electric power for heating and domestic hot water energy costs have been relatively high.

At the beginning of the decision process a common discussion by the flat owners did not appear to be forthcoming. Some of the flat owners opposed any refurbishment, some argued for a smaller renovation, some supported a comprehensive refurbishment.

At first the flat owners have been convinced of the needs of a refurbishment by thermographies of the buildings. In the second steps different scenarios have been calculated to explain the economic and ecologic effects of refurbishment activities. This easy to understand comparison has lead to a decision of the flat owner to a refurbishment of the weakest parts of the building at first. Further renovation activities may follow later on.

Notable Features:
- Insulation of outer walls: 12 cm mineral wool
- Insulation of top floor ceiling: 20 cm mineral wool
- Insulation of cellar ceiling: 8 cm mineral wool
- Windows: replacement of all windows
- Entrance door: replacement of entrance door

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</td>
<td>111</td>
<td>42</td>
<td>62 %</td>
</tr>
<tr>
<td>CO₂ emission Kg/m²/yr</td>
<td>30</td>
<td>11</td>
<td>62 %</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>Electric power</td>
<td>Electric power</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Electric power</td>
<td>Electric power</td>
<td></td>
</tr>
<tr>
<td>Monitoring system</td>
<td>Individual monitoring by flat owners</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Germany, Lower Saxony, Beuthener Straße

<Beuthenerstraße>

Summary of Demonstration Project

The building, located in Hanover in the district Mittefeld, was built in 1951 and consists of 30 flats (46 m² living space, 4 separate entrances, three floors). The district rose after the Second World War to provide housing space for refugees and displaced persons. Nowadays Mittefeld rather represents a social weak point and has been supported since 1999 by the programme SoziStadt (social city) aiming at a positive district social development.

The owner of the building is GSB, a housing association founded in 1927 and owner of 17,000 apartments, houses and industrial areas in the city of Hanover. Before the present retrofitting measures, just few energetic interventions had been done (some windows were replaced, minimal insulation of the attic and of the gable side). Thus the building needed maintenance actions; moreover, carried out energetic measures proved their economically feasibility. The retrofitting actions have been planned, tendered and implemented within the ROSH duration.

Notable features:

Outer walls have been insulated with a thermal insulation composite system (140 mm EPS, 0.035 W/K and 6 mm silicone plaster); U-value was reduced from 1.66 W/m²K to 0.22 W/m²K. Moreover, balconies were demolished and replaced with new, thermally-broken ones.

New windows are double glazed, low-e, PVC frame, reducing U-value from 1.8 W/m²K to 1.3 W/m²K.

Insulation of the attic floor was provided with 240 mm PS board (0.035 W/K) and 19 mm chipboard (additional insulation to the existent one).

The gas central heating and the decentralized domestic hot water production were not modified; however, a hydraulic balance of the heating system is foreseen.

The energetic relevant costs of the retrofitting amount to €355,682 which corresponds to €256.56/m² living space.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered energy consumption for space heating &amp; DWH kWh/m²yr</td>
<td>202.5</td>
<td>74.8</td>
<td>63%</td>
</tr>
<tr>
<td>CO₂ emission kg/m²yr</td>
<td>88.1</td>
<td>44.4</td>
<td>50%</td>
</tr>
<tr>
<td>Type of heating system</td>
<td>Gas central heating</td>
<td>Gas central heating</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Gas central per dwelling</td>
<td>Gas central per dwelling</td>
<td></td>
</tr>
<tr>
<td>Monitoring system</td>
<td>No monitoring yet, it is proposed to meter the total heat consumption in the building</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

target

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www.rosh-project.eu
Germany, Lower Saxony, Eulerstraße

Summary of Demonstration Project

The building complex Eulerstraße 11, 13 and 15 in Hanover is constituted by three multi-family houses built in 1959. They have respectively 8, 8 and 7 apartments each, divided into 4 floors. Each multifamily house has a usable floor space of approx. 380 m² while the flats’ living space is on average 60 m².

The owner (private person, 81 years old) decided to retrofit the three buildings after having participated in one of engineers’ office hours organised by ROSH partner IFB.

There are several reasons for the refurbishment of the three buildings on the part of the owner. Among others the better letability of the single apartments as well as the valorisation and value added of the buildings. Furthermore the environmental aspect is also important for the building owner.

The below described retrofitting measures were planned between end of 2007 and middle of 2008. However, these activities have been postponed for approximately 1 year due to the comprehensive planning requested by the possible loft conversion. The IFB supported the building owner during the planning phase and will follow the realisation of the retrofitting till its completion.

Notable Features:

The outer walls will be insulated with a thermal insulation composite system (160 mm, 0.032 W/K) including a better insulation of the gable wall (U-value will improve from 1.2 to 0.2 W/m²K).

The insulation of the steep roof surface foresees 180 mm while insulation of cellar ceiling 60 mm (0.035 W/K). The U-values will reduce respectively from 1.0 to 0.24 W/m²K and from 1.4 to 0.4 W/m²K.

All windows will be replaced by double panes lowe glazing.

The owner still considers whether to convert also the loft.

The low temperature gas boiler feeding the central heating system will be replaced by a gas condensing boiler with solar thermal plant for hot domestic water and heating support.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered energy consumption for space heating &amp; DHW (kWh/m²/yr)</td>
<td>268</td>
<td>66 *</td>
<td>75 %</td>
</tr>
<tr>
<td>CO₂ emission (kg/m²/yr)</td>
<td>67</td>
<td>14.2 *</td>
<td>79 %</td>
</tr>
</tbody>
</table>

Type of heating and DHW system

- low temperature gas boiler
- gas condensing boiler with solar thermal plant (for DHW and heating support)

Monitoring system

The monitoring concept will be finally set up with the start of construction.

* Calculated values according to ROSH project status 30.6.2008

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04
Ireland, City of Dublin, Bridgefoot Street

Summary of Demonstration Project

The scheme of Bridgefoot Street was constructed in 1964 and comprised of 143 Dublin City Council flats at Bridgefoot Street, Bonham St. and Island Street set out in five inter-connecting blocks. The complex suffered from a number of defects including roof leaks, dampness, condensation and difficulty with heating. It was recognised that major work was needed to bring them up to modern standard of comfort, security and energy efficiency. The flats were in very poor condition, with little or no insulation in the building fabric, single glazed windows and no heating system except for an open fire place. The original layout for the regeneration plan was developed by Dublin City Architects Division by Kiernan Kavanagh and Killian Skay and resulted in a major refurbishment of the south facing block of flats which houses 32 units.

Notable features:

Orientation: South-facing aspect retained to optimise passive solar gain.

Heating system: High efficient conventional natural gas boilers replaced solid fuel open fires.

Balconies: South facing balconies are enclosed and incorporated into living space. This overcomes the problem of heat loss from overhanging floors and ceilings due to walkways.

Windows: New high performance windows are double glazed, argon filled, low-e, timber frame, reducing the U-value from 5.0 W/m²K to 1.5 W/m²K.

Fabric elements: Additional wall insulation reduced wall U-values from 1.90 W/m²K to 0.2 W/m²K. Significant roof insulation was also added to reduce roof U-values from 1.94 W/m²K to 0.16 W/m²K. The upgrade of the wall, roof and ground floors where possible resulted in fabric elements with U-values reduced by a factor of 3.

Smart Card: User-friendly smart cards allow residents to pre-pay for their gas consumption, allowing them to budget on a weekly basis. This also helps create an energy awareness among the residents of their fuel consumption.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kW/m²/yr</td>
<td>385.28</td>
<td>94</td>
<td>90%</td>
</tr>
<tr>
<td>CO₂ emission Kg/m²/yr</td>
<td>310.8</td>
<td>18.7</td>
<td>94%</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>Open fire</td>
<td>Central gas fired heating</td>
<td>-</td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>electric</td>
<td>Gas &amp; electric</td>
<td>-</td>
</tr>
<tr>
<td>Monitoring system</td>
<td>Codema installed temperature &amp; humidity loggers in 5 of the flats, fuel metering data also collected by codema</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figures above are asset based, and are the theoretical figures for the heating requirements of the flat. Initial monitoring results indicate actual use of 115 kW/m²/yr.

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Ireland, City of Dublin, Bunratty Road

Summary of Demonstration Project

The Bunratty Road Complex was constructed in 1967 and comprised of 24 buildings 2 storey each, with 144 units in total. The redevelopment of Bunratty Road involves the renewal of the site and the provision of 174 units, including the refurbishment of 72 units to 48 larger units each with own door access, private open space. The flats have been unoccupied for some time and are in poor condition with little or no insulation in the building fabric, single glazed windows and a heating system (gas boiler) which is due for replacement. The refurbishment of these flats brings significant improvement to the building fabric by greatly increasing the insulation levels and improving the U-value of the building fabric.

Notable Features:

Wall: The walls will be dry-lined with 75mm polystyrene insulation board and will improve the U-value from 1.84 W/m²K to 0.26 W/m²K.

Floor: The U-value of the floors will be improved from 0.60 W/m²K to 0.24 W/m²K by installing 65mm polystyrene insulation board.

Windows: Soft low-e windows with a minimum 12mm argon filled gap will replace the single glazed windows reducing the U-value to 1.92 W/m²K from 4.60 W/m²K.

Roof: Fibreglass insulation with a thickness of 220mm will be installed at ceiling level improving the U-value from 0.60 W/m²K to 0.16 W/m²K.

Renewable Energy: Solar panels will provide for heating domestic hot water and single glazed windows replaced with low-e argon filled double glazed windows.

Heating system: A suitable efficient heating system will be installed - gas fired central heating system with a condensing boiler to replace the open fire place.

The energy efficient and renewable refurbishment of Bunratty Street was awarded funding under the House of Tomorrow Programme which is administered by Sustainable Energy Ireland.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</td>
<td>353</td>
<td>85</td>
<td>76%</td>
</tr>
<tr>
<td>CO₂ emission Kg/m²/yr</td>
<td>70</td>
<td>17</td>
<td>76%</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>Gas central heating/open fire</td>
<td>Gas central heating (new condensing boiler)</td>
<td>-</td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Gas &amp; electric</td>
<td>Gas &amp; electric</td>
<td>-</td>
</tr>
<tr>
<td>Monitoring system</td>
<td>No monitoring of existing buildings; it is proposed that monitoring of fuel consumption will be carried out after refurbishment</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Figures above are asset based, and are theoretical figures for the heating requirements of the flat.
Summary of Demonstration Project

ATC Asti is a public body, managing and owning approx. 1,700 social housing units in the province of Asti, Italy. Currently, little public structural funds for ordinary refurbishment are available at national level. Thus, maintenance measures of social housing buildings hardly ever consider energy efficiency. Nevertheless, ATC Asti has decided to replace conventional boilers with condensing ones, as well as to carry out the thermal insulation of the roof. The roof area of the entire building complex is around 3,650 m². Refurbishment measures will consist installing a 10cm thick insulating layer and a waterproofing sheet. No thermal insulation exists either. Thus possible future retrofitting measures may include: substitution of windows, installation of energy saving light bulbs after improving electricity wiring, new condensing boilers, thermal insulation of walls, introduction of a centralised hot water (solar) system in "Quartiere Strada Volta. The financial plan still needs to be drafted.

Notable features:

First step of retrofitting

Roof: wooden fibre insulation panels, 8cm thick layered on the top of the roof, completed with a waterproofing layer and a 4cm thick concrete layer reduce U-value to 0.38 W/m²K

Heating system: individual boilers will be gradually replaced by natural gas condensing boilers. The action includes the installation of thermostatic valves, and thermostats.

Second step of retrofitting

Walls: insulating material shall be blown into the wall gap in order to reduce the U-value.

Windows: old windows will be replaced by double pane lowe glazing

DHW system: solar thermal systems

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</em></td>
<td>No initial monitoring due to individual system</td>
<td>The project is in engineering phase</td>
<td>First step: 15%  Second step: 20%</td>
</tr>
<tr>
<td>CO₂ emission Kg/m²/yr</td>
<td></td>
<td></td>
<td>First step: 15%  Second step: 30%</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>Individual natural gas boilers</td>
<td>Individual natural gas, condensing boilers</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Individual natural gas and electric boilers</td>
<td>Individual natural gas and electric boilers</td>
<td></td>
</tr>
</tbody>
</table>

Monitoring system: After retrofitting works will be implemented a monitoring system

*Theoretical hypotheses due to the lack of information related to initial energy consumption.

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Italy, Novara, Via Adamello

Summary of Demonstration Project

The plaster on the exterior walls of the 3 buildings sited in Via Adamello, Novara, is peeling off and refurbishment measures can no longer be put off.

At the same time, renovation of this plaster represents an excellent opportunity for improving insulation of the buildings. As such, A.T.C. Novara has decided to take on this project and indeed, maintenance measures of the buildings are currently in progress.

Another refurbishment opportunity arises from the local “district program”, which has been launched by local authorities. This financing scheme supports ecological and energy saving actions in the construction sector.

The overall technical project comprises maintenance of the plaster and of the roof as detailed below.

Notable features:

- **Walls**: improving the insulation of the walls ("cappotto") Polystyrene panels, 8cm thick, reduce the Uvalue from 1.08 W/m²K to 0.33 W/m²K

- **Roof**: insulation of the roof, substitution of asbestos roofing. A double layer of wood fibres (5 + 5cm), added to the attic floor, reduces the roof Uvalue from 1.36 W/m²K to 0.31 W/m²K.

- **Heating system**: A.T.C. Novara is planning additional maintenance measures, particularly with regards to the heating system.

### ENERGY RELATED INDICATORS

<table>
<thead>
<tr>
<th>Energy Indicator</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</td>
<td>172.00</td>
<td>100.00</td>
<td>41.86</td>
</tr>
<tr>
<td>CO₂ emission Kg/m²/yr</td>
<td>29.70</td>
<td>17.38</td>
<td>41.48</td>
</tr>
<tr>
<td>Type of Heating system</td>
<td>3 Central gas heating system</td>
<td>1 Central gas heating system</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Individual, not central</td>
<td>Individual, not central</td>
<td></td>
</tr>
<tr>
<td>Monitoring system</td>
<td>-</td>
<td>- thermograph</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- consumption data</td>
<td></td>
</tr>
</tbody>
</table>

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Summary of Demonstration Project

The social building Chodkiewicza Str. 11 in Gdańsk was built in about 1960 as a hostel for workers, now it belongs to Gdańsk municipality which was the decision maker of this refurbishment. The main reason of the refurbishment was to carry out the general repair because of a bad condition of the building and conversion of hostel rooms to the independent separate flats for temporary living. The minimum floor area of a single flat and the flat fittings were planned according to the Polish regulation in minimum standards. There were 3 flats, 70 hostel rooms and 20 common rooms (kitchens, bathrooms, club rooms) before refurbishment, now there are 73 separate flats.

The other purpose of the refurbishment was to meet requirements concerning the thermal protection which are currently in force in Poland.

23% of investment costs was covered by ministry of infrastructure as a subsidy.

Notable features:

Heat source: Highly efficient, fully automatic heat substation replaced the low efficient old one.

Heating system: Heating installation (pipes, radiators and valves) was replaced. Thermostatic valves were installed on radiators.

DHW system: DHW installation (pipes, fittings) was replaced.

Fabric elements: Additional outer wall insulation with 12 cm of foamed polystyrene reduced gable wall U-value from 1.02 W/m²K to 0.25 W/m²K and longitudinal wall U-value from 1.11 W/m²K to 0.26 W/m²K. 23 cm of granulated mineral wool was also added to reduce roof U-value from 2.5 W/m²K to 0.19 W/m²K. Additional floor insulation with 10 cm of foamed polystyrene and replacement of other floor layers reduced floor U-value from about 1.7 W/m²K to 0.3 W/m²K.

Windows: New high performance windows are double glazed with PVC frame, reducing window U-value from 2.6 W/m²K to about 1.9 W/m²K.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW kWh/m²/yr</td>
<td>320.32</td>
<td>162.99</td>
<td>49.1</td>
</tr>
<tr>
<td>CO₂ emission kg/m²/yr</td>
<td>78.42</td>
<td>39.90</td>
<td>49.1</td>
</tr>
<tr>
<td>Type of heating system</td>
<td>Central heating supplied by DH substation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Centralised DHW preparation in DH substation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring system</td>
<td>The heat meter in the substation measures total heat consumption in the building. Readings are taken every month.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figures above are based on heat consumption in period of 2003-2005 (initial situation) and in 2007 (after refurbishment) recalculated using standard climatic data, energy and CO₂ are calculated using unit area in m².
Poland, Pomerania, Sambora Ulica

Summary of Demonstration Project

The multifamily building Sambora Str. 6A-C in Gdansk was built in 1977 as a municipal building, but now belongs to condominium (19 flats are private, 8 are municipal). There are 27 flats with 1025 m² of floor area. The building did not meet the requirements of the regulation concerning thermal protection which are currently in force.

The main reason of the refurbishment was to reduce heat costs with the possibility to obtain a loan (covering 80% of total investment costs) and subsidy (25% of the loan amount) for thermostabilization works according to the thermostabilization law. The additional reason was to make necessary repairs. The refurbishment measures had been selected on the basis of the energy audit. The most important selection criterion was to obtain more than 25% energy savings for heating and hot water production according to the thermostabilization law.

Notable features:

Heating system: Installation was rinsed. Section control valves were installed on risers. Thermostatic valves were installed on radiators. Thermal insulation of heating pipes was repaired. Heating installation was balanced after the thermostabilization of the building envelope.

Fabric elements: Additional outer wall insulation with 12 cm of foamed polystyrene reduced wall U-value from 1.18 W/m²K to 0.26 W/m²K. 16 cm of granulated glass wool was also added to reduce roof U-value from about 0.7 W/m²K to 0.22 W/m²K. New roofing was made also.

Windows: Luxfer tiles in staircases with U-value = 4.55 W/m²K were partly covered with insulation and partly replaced by new windows. New high performance windows in staircases and basement are double glazed with PVC frames, reducing window U-value from 5.1 W/m²K to about 1.5 W/m²K.

Doors: New high performance doors made of aluminium and double glazing replaced the old ones.

<table>
<thead>
<tr>
<th>ENERGY RELATED INDICATORS</th>
<th>Initial situation</th>
<th>After refurbishment</th>
<th>Reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Energy consumption for space heating &amp; DHW (kWh/m²/yr)</td>
<td>379.01</td>
<td>309.45</td>
<td>18.1</td>
</tr>
<tr>
<td>CO₂ emission kg/m²/yr</td>
<td>92.54</td>
<td>75.75</td>
<td>18.1</td>
</tr>
<tr>
<td>Type of heating system</td>
<td>Central heating supplied by DH substation</td>
<td>Centralised DHW preparation in DH substation</td>
<td></td>
</tr>
<tr>
<td>Type of DHW system</td>
<td>Monitoring system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figures above are based on heat consumption in 2005 (initial situation) and in 2008 (after refurbishment) recalculated using standard climatic data, energy and CO₂ are calculated using that area in m².

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Key Result No. 2: Guidebooks & Quality Assurance

ROSH has developed two guidebooks (part 1 and part 2) on the topic of "Sustainable retrofitting of social housing" which are intended to summarise the ROSH approaches and results obtained in the project. In addition other helpful tools for quality assurance were developed and are available as PDF files in five languages.

Guidebook 1: Technical Solutions

Languages: EN (2 versions: master and IE), DE (2 versions: AT and DE), IT, PL, BG
Pages: 40-60
Available as: PDF, print

The guidebook 1 relates to advanced integrated retrofitting solutions and includes good practice examples and tools developed within ROSH. It has been tested in trainings organised for architects, engineering consultants and planners as well as for decision makers in housing associations in the partner regions.

The following topics are addressed:

- Country and regions survey
- Checklists for building managers
- Thermal retrofitting of buildings
- HVAC systems
- Exemplary options
- Tools, handbooks and guidelines
- Quality assurance
- Best practice examples
The guidebook 2 contains information, planning tools and good practice examples for successful financing concepts on the regulatory frameworks, economic conditions, subsidy schemes and advanced financing schemes. The guidebook is addressed to decision makers in housing companies and local authorities as well as energy agencies, consultants and planners.

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

Languages: EN (2 versions: master and IE), DE (2 versions: AT and DE), IT, PL, BG

Pages: 25-35

Available as: PDF, print
Energy checklists

Retrofitting measures need a careful and individual planning. Aware of this, the ROSH team developed recommendations for modernisation measures providing suggestions and advices for multi-family dwellings. These do not mean to substitute a professional energy consultancy. The checklist for building managers and owners – energy recovering refurbishment check-up for multi-family dwellings – aims at answering the question: "Do I have to modernise my multi-family dwelling in terms of energy efficiency?". The ROSH energy checklists are available in English, German, Italian, Polish and Bulgarian from the project website.

Audit and advice kit for tools

ROSH developed a kit to enable an overview of the different software programs which adapt existing methodologies, measures and materials to carry out energy audits for multi-family residential social housing buildings. 56 software tools are listed in the kit. Most of the software tools are used as planning and support devices for architects, planers, energy consultants, engineers, energy auditors, but there are also procedural and financial tools as well as quality, monitoring and controlling tools included. This kit should help to find the best software for special task and can be downloaded in English, German, Italian, Polish and Bulgarian from the project website.
Quality Assurance: Concept and Training Materials

Quality assurance is one crucial element necessary for enabling successful implementation of energy efficient housing. In its entirety, quality assurance is less about recording installation and utilisation procedures but about tracking down impediments to efficiency. This applies for the whole life cycle of buildings, from planning to utilisation period right to modernisation measurements respectively demolition. As quality assurance is an all-embracing term used in numerous different specialist disciplines, the stress within ROSH was put on energy efficiency aspects of quality assurance.

Quality assurance in the field of energy recovery needs to be regarded as a complete system for the life cycle of buildings. Quality assurance is required for planning, utilization and modernisation periods. Applied to conditions and requirements of social housing, and within ROSH also for multi-storied buildings targeting at citizens with low income, quality assurance in the field of energy efficiency may be a monitoring system for existing living conditions as well as an early warning system for constructional matters. Furthermore, quality assurance also monitors refurbishment planning and implementation.

Training material has been developed considering the above mentioned aspects and addressing planners and technicians. Digital PDFs with presentations in English, German, Italian and Polish can be downloaded from http://www.rosh-project.eu.
Quality Assurance: Blower door poster

A presentation poster on the Blower Door tool in English, German, Italian, Polish and Bulgarian was developed and used by the project partners on various occasions within the information and motivation work of the project.

To know how the wind blows

Blower Door ensuring airtightness

Increasing energy prices are pushing the need for energy efficient construction and refurbishment. For this purpose an airtight construction is important to ensure that measures such as the installation of modern heating systems or efficient windows are effective.

To assess the airtightness of the building, a blower door test can be performed. The test measures and visualises the air leakages of the building. The test can be performed at various stages: during the construction process to allow for early corrections, after the completion of the construction work to assess the final airtightness status, or after completing the project to measure the real-world performance.

At first a Blower Door ventilator is built into the front door or into one window of the building. All other interior doors and windows are closed and all interior doors remain open. Then the ventilator is generating an impermeable vacuum, of 50 Pascal. Existing leakages are traced by hand and with a wind speed measuring apparatus. The Blower Door is best supplemented by a thermography camera and a smoke generator which makes leakages visible.

Dr. Monica Stocker and Christian Bresch are project partners of the ROSSH project. The ROSSH project is an integrated approach for the refurbishment of social housing buildings in five European countries. The project partners are from Austria, Germany, Italy, Poland and Bulgaria. The project is funded by the European Union under the heading “Energy Efficiency.”

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Quality Assurance: Thermography poster

A presentation poster on the thermography in English, German, Italian, Polish and Bulgarian was developed and used by the project partners on various occasions within the information and motivation work of the project.

Buildings show their colours
Building check with thermography

Buildings space heating demand and space heating costs are mainly set by the heat insulation, the windows' quality and the thermal weak points of the building envelope.

The thermography camera is an analytical instrument, which makes it possible to detect thermal weak points in the building envelope. In particular, the thermography can detect thermal bridges that are otherwise often hidden.

Thermography before and after retrofitting: the hotter the area in the thermography picture, the lower the heat insulation in this area.

Example property: Apartment buildings Makartstraße in Linz/Austria
Co-ordination: AIE INTEC

Year of construction: 1967/1988
Inception of renovation: August 2006 - March 2008
Costs of renovation: 2,440,000 EUR

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total heat energy demand</td>
<td>173,000 kWh/a</td>
</tr>
<tr>
<td>Heat demand</td>
<td>110,000 kWh/a</td>
</tr>
<tr>
<td>Energy costs for space heating (without domestic hot water)</td>
<td>14,100 €/a</td>
</tr>
<tr>
<td>Energy savings</td>
<td>1,200 €/a</td>
</tr>
<tr>
<td>Energy costs savings</td>
<td>12,800 €/a</td>
</tr>
</tbody>
</table>

Before | After
Key Result No. 3: Analysis, Campaigning, Consultations

**Market Analysis**

The analysis of the market situation in the social housing sector throughout the ROSH partner countries was carried out at the beginning of the project and completed end of 2006. It revealed interesting aspects underlining the many differences and the few similarities in the ROSH regions.

Social housing in **Lower Saxony (Germany)** is characterised by a structure historically grown after the World War II. This fact leads to an accordingly high demand for modernisation and retrofitting measures. Moreover special problems from a social and energetic point of view exist in great housing structures built between 1965 and 1975 at the outskirts of towns. Thus, modernisation measures have to be seen not only as sustainable energy policy but also as an opportunity to avoid the further social and economical drift.

The provision of social housing in **Ireland** has traditionally been within the remit of the local authorities which manage more than 80% of the social rented housing sector. Complementary to this however, a voluntary housing sector has emerged which provides housing for low-income families and for vulnerable people with special needs. Refurbishment measures are needed for those buildings designed and build prior to the 1973 oil crisis (about 85%) not paying attention to the energy issues and consumption.

The main obstacle to the realisation of energetic refurbishment measures in **Italy** is set in the difficulty to have a pay back of the investment: the social housing agencies are not allowed to increase the rent when they accomplish a refurbishment, even if it causes a substantial reduction of energy consumption/demand. The peculiarity of the Italian situation is the lack of an overall financial programme for modernisation and refurbishment, so that only the strictly necessary maintenance measures are carried out.

The situation in **Poland** presents a large backlog in the retrofitting of social housing. It is estimated that 7.5 million of total 12 million apartments have to be modernized due to a low technical and energy standards. Nevertheless there is no long term state programme of modernisation and financing for the social buildings and most of these duties are devolved to the local authorities. There is a real need for developing new tailored financial schemes due to a lack in practicing other tools than thermomodernisation credit for retrofitting of building.

About 20% of the total housing stock in **Austria** is represented by social homes with an average heat demand of some 250 kWh/m² annually. Therefore these buildings have a great retrofitting potential and larger retrofitting work is in most instances still necessary. Reduction of the share of fossil fuels on the one hand and an increase in comfort for the occupants of social homes on the other hand must be one of the main targets of the retrofitting process.

**The full market analysis is available from the project website.**
Campaigning

ROSH campaign in Styria (Austria): 20 events and 140 consultations

The ROSH campaign in Styria already started in winter 2005/06 and was the basic model for all other ROSH campaigns. The early start of the Styrian campaign has been decided due to beneficial conditions at political level. The campaign was implemented in cooperation with the regional government of Styria and the federal programme for climate protection “klima:aktiv”. In Styria, the campaign contained three communication objectives with related communication tools:

- Attention and awareness raising via information events, mailings, posters;
- Information and know-how transfer via press articles, expert events;
- Consultation package to initiate energy efficient retrofitting investments.

Highlights of the campaign were information events and the successful implementation of consultation packages. More than 20 various events have been organised to transfer the idea and results of ROSH. Up to 800 people have attended these information events.

The consultation package supported property managers and housing co-operatives to convince owners of buildings and flats of comprehensive refurbishment. The package included on-site visits, a comprehensive analysis of the building including thermography, a report including energy check, recommendations, technical and financial advice, consultation for property managers and housing co-operatives and a support of property managers and housing co-operatives in owners’ meetings. This package has been well established: up to 140 consultations were implemented. And: the campaign is to continue after the end of the ROSH.
ROSH campaign in Dublin (Ireland):
30 flat complexes checked

The objective of the ROSH market campaign in Ireland was to stimulate the market by implementing good practice examples and to demonstrate the achievements of the ROSH project. As Dublin City Council is landlord to over 84% of Dublin’s social housing, 30 flat complexes were selected with the aim to provide a quick check energy audit, infra-red survey and a simple financial analysis of refurbishment activities.

A provisional energy rating was provided for each of the schemes (using Bernard Curtis Flats as a baseline). The methodology used was the Dwelling Energy Procedure (DEAP) which is the national methodology used for assessing energy performance of dwellings. The most common rating received for these flats was an “F”. Contributing factors to this include poor fabric insulation, open fire as a secondary heating source and poor heating controls.

An infra red assessment is a very useful tool in the assessment of thermal bridging or other anomalies in insulation installations. The survey identified common problem areas for a number of schemes such as thermal bridging around windows and doors, balconies posed as vulnerable areas and missing insulation in some schemes was also noted.

Low cost fabric refurbishment and renewable refurbishment options were investigated and costed. Low cost measures included aspects like replacement of all lighting with energy efficient light bulbs and installation of roof insulation in assessable pitched roof flats. Further fabric and renewable energy refurbishments followed, which included insulations of walls, attics, window upgrades, solar panels and new heating boilers.
ROSH campaign in Lower Saxony (Germany): 10 seminars, 5 events, 2 demonstration projects

Since January 2006, many steps were taken to raise the awareness of building owners for necessary and comprehensive energy-efficient building refurbishment. One of the overall aims of the ROSH market campaign was to raise the awareness of owners of buildings and flats for comprehensive refurbishment. Another important goal was to address property managers and housing co-operatives in order to offer them concrete advice and support during the decision process as well as general information on sustainable modernisation of buildings. The ROSH campaign in Lower Saxony was generally structured into the different parts awareness raising, know-how transfer and consultation elements. Within these contexts, the following steps have been taken:

- Leaflets, poster, best practice examples
- 3 press articles, 3 stands on energy-related fairs
- Mailings to building owners, information events for property managers and housing associations,
- Telephone hotline for investors and owners, website
- Ten seminars for decision makers
- Five motivation events for market actors and two expert trainings
- On-site visits, analysis and survey, report on energy situation
- 49 consultations for property managers and housing associations, checks, recommendations, technical/financial advice, energy audit,
- Informative tenant meetings

Within ROSH, two demonstration projects could be realised and accompanied in Lower Saxony and presented to the public by means of informative posters and stands on energy-related fairs, press articles and different presentations in and outside Germany. A German website and an informative telephone hotline for interested building owners and housing associations guaranteed permanent access to information on energy-efficient refurbishment measures. Initial consultations, energy certificates, tenant training, quality assurance as well as helpful tools such as checklists, templates, guidebooks and listed demonstration projects have been also made available.
Within the ROSH campaign in Poland 30 consultation were implemented. The consultations were administered by housing associations or housing cooperatives and showed that there is a huge potential for energy savings within the heat demand in those buildings (ranging from 19% up to 50%). For all consulted projects it is projected to carry out implementations and therefore all projects applied for a low interest credit. The campaign consisted of numerous further activities addressed to design engineers, house owners, managers and administrators of buildings and tenants. The main objective of the campaign was to increase the awareness of its targeted audience about the possibility to improve the energy efficiency of buildings and general standard of flats. During the campaign both the materials developed within the ROSH project as well as the advice provided by experts were used. See above the chart of the campaign organization in Poland.
The campaign activities in Italy were developed at national level, with the presentation of the project in many fairs and conferences, and at regional level, in the province of Asti and in the province of Novara.

At national level many events were organized by Federcasa and Ambiente Italia such as Solarexpo and Greenbuilding in Verona in March 2007 and in May 2008, at the yearly convention of Cecodhas “Sustainable Energy and Social Housing European Conference” held in Ancona in April 2008.

Here the project was presented through leaflets and posters and the distribution of the booklet containing the good practice examples.

In its province ATC Novara has participated at the main local fair with a well visited stand, reporting on the very different activities developed during the project and also on the status of the demonstration project, showing to the large public the thermography and the energy saving measures in progress for the building in via Adamello. A further project presentation was organized in June 2008 during the big fair in the town of Sizzano, where the municipalities showed their activities and around 40.000 people visited the event.

The campaign activities in the Province of Asti are related more to experts and to stakeholders, with many meetings and presentations in a large board of municipalities, architects and engineers associations, and managers of social housing.

At the same time the consultation activities were proposed, and more than 30 buildings were analyzed with quick energy check regarding their structures and energy consumption. For all those buildings, mainly in the provinces of Asti and Novara, thermography was used to seek the weak points of the structures.
Dissemination of ROSH in East and South Europe

The ROSH partner Black Sea Regional Centre (BSREC) was involved in most tasks to spread knowledge and results with focus on Eastern and Southern European countries. Special emphasis was given to dissemination towards the EU New Member States. Therefore, three presentations were scheduled at relevant events in Bucharest (Romania), Budapest (Hungary) and Baska Bystrica (Slovakia). The ROSH project results were presented in front of wide public of experts at national seminars and conferences that took place at the end of May and beginning of June 2008. These activities proved to have a wide success. The results from the project will be further disseminated also through elaborated websites in the respective languages where these events took place and linked to the ROSH website.
Consultations

Offering direct face-to-face consultancy to owners and investors of social housing was a key aim of ROSH. On the whole, the ROSH consortiums managed to implement 167 consultations in the regions. 50% of the consulted parties said that they were willing to continue working towards energy efficient retrofitting.

The ROSH method of consultation was adapted to the regional conditions and to the special needs of the “client”, but generally was made according to the following roadmap:

Concept of Consultation

- Step 1: On-site visit
- Step 2: Analysis of building structure
- Step 3: Analysis of heating, hot water, ventilation
- Step 4 (optional): Thermography
- Step 5: Consultation report including concrete measures
- Step 6: Face-to-face consultations & support at owners or tenants assemblies

The ROSH consortium made the experience that the first consulting steps and a status quo analysis from an experienced expert could be a powerful “door opener” for implementing energy efficiency measures.
One key topic of the ROSH project dealt with the tenants’ involvement in the modernisation process of the building. Quite often the lack of information about the refurbishment measures in planning or about to be implemented leads to a very low acceptance of the action by tenants. To avoid the problems this can produce, a good communication between all the involved parts can guarantee the success of the action.

At the early stage the ROSH consortium tried to take a picture of the tenants’ need, distributing a questionnaire among the tenants living in the sites chosen as demonstration projects. The survey carried out by ROSH thus interviewed tenants residing in the buildings taking part in the project, in order to understand the structural characteristics of the buildings, as well as tenants’ level of awareness on issues such as energy efficiency, energy consumption and production. Findings served as background information to develop a training and communication programme for tenants. The research done by ROSH proved, that the groups of tenants living in social housing showed only a minimum of awareness and knowledge about proper use of heating, ventilation and electricity – often because of low education levels as well as migrant backgrounds. Thus tenants did not only have the need to be informed, but actually had the need to be “trained”. In addition to tailored awareness-raising and education, the further aim was to stimulate active and informed involvement in the actual construction measure to be undertaken. This, in turn, strengthened co-operation between the various stakeholders and lead to better results.
The knowledge of tenants about their right and the possibility of being informed were not very high. Often people find it hard to commit themselves towards initiatives which address the community and not the private sphere. These points also had to be taken into account for the training courses for tenants carried out within ROSH.

Within the project a set of presentation slides concerning energy saving measures and the relation between behaviour and possible savings was developed and translated in all local languages to be used in the meetings with the tenants.

In all 10 lighthouse projects, tenants’ information and behaviour training events were planned and carried out according to the special needs and circumstances. At least 60% of all trained tenants stated their intention to adjust and change their behaviour to support the planned measures.

The training material is available in English, German, Italian, Polish and Bulgarian.

Within ROSH the following tenant trainings were implemented:

- 18.07.2006, 40 tenants, Asti, Asti, focus condominium owners and tenants
- 26.02.2007, 16 tenants, Mount Anthony, Dublin, focus senior citizens
- 10.05.2007, 30 tenants, Hannover (Beuthener Str.), Lower Saxony, focus ethnic minorities
- 14.9.2007, 4 tenants, Hannover (Eulerstraße), Lower Saxony, focus heating and ventilation
- 08.11.2007, 16 tenants, Novara, Verbano-Cusio-Ossola, focus condominium owners
- 22.11.2007, 4 tenants, Hannover (Eulerstraße), Lower Saxony, focus explaining measures
- 26.11.2007, 11 tenants, Hannover (Beuthener Str.), Lower Saxony, focus follow-up meeting
- 03.12.2007, 10 tenants, Sliven, Bulgaria, focus train the trainer
- 30.04.2008, 14 tenants, Ballymun, Dublin, focus transition scheme
- 27.05.2008, 60 tenants, Novara, Verbano-Cusio-Ossola, focus large information in town hall
- 29.05.2008, 15 tenants, Gdansk, Pomerania, focus senior citizens
- 03.06.2008, 12 tenants, Hannover (Eulerstraße), Lower Saxony, focus final meeting
- 05.06.2008, 32 tenants, Gdansk, Pomerania, focus comparable new buildings
Key Result No. 5: Good Practice

In addition to accompanying the shining examples already presented, the ROSH consortium set out to analyse good and best practice solutions in the field of successful retrofitting in social housing. The objective was to distinguish between technical and financial solutions and concepts.

In the area of technical good practice five examples were identified in every region involved in the project amounting to a good practice pool of 30 projects from Bulgaria, Lower Saxony (Germany), Dublin (Ireland), Verbano-Cusio-Ossola and Asti (Italy), Styria (Austria) as well as Pomerania and Warmia-Mazuria (Poland). Key figures and data for all the buildings were analyse and collected, thus enabling to compare the data of the analysed examples. All these technically good examples of retrofitting can be found...
in an online databank on the website as well as in a print good practice catalogue and include the following case studies:

**Good technical practice from Bulgaria**
- Block of flats, Sofia
- School dormitory, Kardjali
- School + dormitory for deaf children, Sofia
- Home for elderly people, Ognen
- Kudelin

**Good technical practice from Germany**
- Beuthener Straße, Hanover-Mittelfeld
- Carl-Hurtzig-Straße, Bremen-Huchting
- Steffensweg, Bremen-Walle
- Goldener Winkel 14–26, Hanover
- Magdeburger Straße 2–4, Hanover

**Good technical practice from Ireland**
- Marion Court, Dublin
- Ballybough House, Dublin
- Mary Aikenhead House, Dublin
- Mount Anthony, Dublin
- Oliver Bond, Dublin

**Good technical practice from Italy**
- Via Rubitelli 10, Castelnuovo Monti
- Via Toscanini 17, Novara
- Quartiere Aler – vialeria Liguria, Rozzano
- Provincia di Asti, several buildings in the town area
- Via Andoardi, Novara

**Good technical practice from Austria**
- Daungasse, Graz
- Denggenhofsiedlung, Graz
- Vinzenz-Muchitsch-Straße, Graz
- Weiz
- Makartstraße, Linz

**Good technical practice from Poland**
- Dabka, Gdynia
- Msciwoja, Gdansk
- Powstania Slaskiego, Gdynia
- Raciborskiego, Pruszcz Gdansk
- Skargi, Wejherowo

For the **good financing examples** important financial aspects and information in addition to the technical key figures are highlighted and presented. In the area of innovative financing concepts and schemes eleven convincing examples were identified. These can also be found on the project website and in the good practice catalogue.
Main Lessons Learnt

The different participating partner regions within ROSH are positive about the enormous potential of energy savings in the social housing sector. Though local conditions and requirements differ, similar problems as well as similar positive results have been experienced. Within a workshop the consortium agreed on the following main three lessons learnt:

European standards, but common ground for quality assurance
There is no common definition of the term “social housing” and no common building standard for social housing across Europe. This fact leads to problems in the development of tailored schemes in the different partner countries. Despite these diversities in definitions and standards there is still common ground: Quality assurance is a key topic in all partner regions irrespective of specific local conditions. Quality assurance helps to guarantee good energy performances and a healthy living environment and prevents construction damages.

A comprehensive professional project management is essential
A comprehensive professional project management is essential for successful refurbishment activities. In this context it includes clear concepts and communication. Moreover, without consultation and guidance, often only minimum is done to meet current regulations. From the point of view of ROSH partners, following steps are necessary to guarantee an effective implementation particular in social housing:

• audit and identify efficiency strategies that meet the specific needs of the building/s in question
• assist and accompany the decision making process of the owners with concrete support and advice
• make a detailed state-of-the-art and comprehensive concept of the measures to be taken
• close observation of the implementation and quality assurance, a very crucial element
• monitoring and continuous controlling to provide key information on the success and offer the possibility for improvements

Training and awareness secure good results
Social housing is a difficult operating field because of economic constraints and many regulations. Planers, architects, housing associations, owners and tenants have to be informed early about advantages of an approach which aims at the maximum of sustainability. Convincing people of the usefulness is difficult and takes time. It is also very important to give very practical advice on energetic retrofitting and the proper use of a modernized building. ROSH experiences show this is a help, which both owners and tenants will be glad to receive. Training and awareness campaigns are thus elements which are to be seen as crucial and integral means for achieving good results.
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