IEE ECOLISH

ENERGY EXPLOITATION AND PERFORMANCE CONTRACTING FOR LOW INCOME AND SOCIAL HOUSING

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CONTENTS

Executive summary

The Ecolish project aims to promote energy efficiency in existing low income residential buildings through the organisation, elaboration and evaluation of Energy Exploitation and Performance Contracting on European-wide pilot locations.

The current report is part of WP5 – deliverable 5.2 ‘A full report on the financial and economic analysis regarding the proposed implementation scheme and a report on the full comparison against the traditional financing methods’.

Objective of WP5 is to evaluate the energy benefits from the implementation of the selected retrofitting measures from WP2, as well as to examine the financial and other characteristics of the proposed investments in order to find the best possible approach for implementation.

This report presents the suggested implementation financing scheme for the energy retrofitting of the pilot locations, and compares it with traditional financing schemes that currently exist in the different countries.

The proposed financing scheme is the Energy Performance Contracting, this is the collaboration between an Energy Services Company (ESCO) and a building owner (a landlord). The ESCO usually offers a range of services with respect to design, installation, and maintenance.

Many differences exist among the proposed funding schemes in the different pilot locations and this depends on the social, economic and legal characteristics of the countries. The analysis shows that the use of an ESCO offers many financial advantages to the inhabitants over the traditional funding schemes. However, it seems that among the ECOLISH participating countries the scheme is more used and accepted in the Netherlands ESCOs are also operating, in the market of Hungary, however these are not independent companies as they have to sell their products. In Greece and Latvia this funding scheme is rarely used mainly because of the lack of legislation, lack of experience in real case studies and the ownership structure of the building stock in these countries.

Introduction

Strong barriers exist for energy conservation in housing renovation projects. These barriers concern in particular the financing of the energy conservation measures and tenant-related factors. So far, the available financial facilitations by the Government, i.e. loans or subsidies for energy rehabilitation are limited. Additionally the investment of money from the occupants themselves is not feasible especially when the target group is characterized by low income and a large percentage of aged people, as the case of the Greek pilot location. Moreover, due to the lack of information on energy issues, there are prejudices concerning energy conservation on the part of the inhabitants.

As far as the financing of the energy rehabilitation, solutions would consider loans with a long payback period and using part of the saved energy costs to pay back the loans. A more cost effective solution would be the employment of an Energy Service Company (ESCO); that typically offers feasibility analysis, engineering, construction and financing services that are required for implementing an externally financed energy efficiency project.

This report presents the cost of the planned interventions and compares the proposed financing method against traditional financing schemes for the four pilot locations in Greece (Pieria), Hungary (Pecsvarad), Latvia (Ogre), and the Nethrelands (Heerlen). For the purposes of the analyses, a common format template was completed by all partners with questions regarding the characteristics of the proposed financing scheme and the existing financing schemes for energy retrofitting.

1. Pilot location Pieria in Greece

Proposed financing scheme for the Greek pilot location

In the case of the Greek pilot location, an Energy Performance Contracting is proposed between Techem Company (ESCO) and the occupants of the blocks. The main idea of contracting Techem, is the energy management of the dwellings by Techem and the upgrade of the buildings systems and building envelope. In order to realise the project, Techem will carry out sensitivity analysis concerning the energy profile of the case study and the needs of the occupants regarding cooling, heating and hot water.

Specifically, in the case of the Greek case study, Techem company will:

1. Upgrade the existing building installations. This will include:

- Replacement of the existing boiler (efficiency around 65%) with high efficient condensing boiler (efficiency of 90%).
- Insulation of the pipes, in order to minimise the heat losses
- Conversion of the central heating system to an autonomous system. This will be realised with installation of thermostats for heating to each unit (radiators) in every flat. In this way occupants will operate the systems as long as they wish and will be able to adjust the set points according to their needs.
- Installation of heat cost allocators in each dwelling. In this way occupants will have the feeling of their energy consumption.
- The energy management of the blocks
- The operation, maintenance and repair of the installations

2. Upgrade the building envelope. This will include:

- Installation of external insulation on the roof of the blocks in order to reduce the heating loads during the winter period and improve the thermal comfort levels.
- Use of external paints on the roof and walls with high solar reflectance in order to reduce the solar gains thus cooling loads during the summer months.

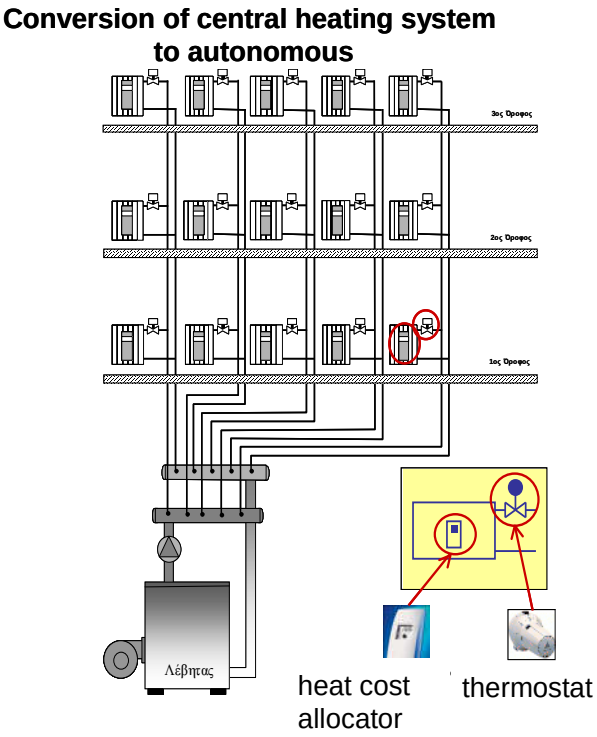

Figure 1: Scheme that shows the basic concept of converting the central heating system of the blocks to an autonomous system (scheme provided by Techem)

Other energy measures under consideration that would improve significantly the energy consumption of the dwellings and would improve the thermal comfort levels are:

-Replacement of the existing single windows with double or double low e windows.

- External insulation on the walls of the blocks

-Installation of ceiling fans in the occupied areas in order to improve the thermal comfort levels during the summer months and reduce the use of the air conditioning.

-Replacement of common luminaires with low energy lamps

It should be noted that, in the case of the Greek pilot case, the above actions (replacement of windows, installation of ceiling fans, replacement of common luminaires) cannot be realised by Techem company (ESCO) due to the Greek legislation that does not allow the access, the construction/management and repair of devices in the private areas of the houses. Therefore, it is upon the owners whether they wish to proceed with these measures and fund these actions themselves.

Additionally, insulating externally the walls cannot be realised due to the Greek legislation-Building Code that defines coverage percentage for every site and out of this area, construction works are not legal. In the case of the pilot location in Pieria, the coverage percentage is used and therefore the installation of external insulation that would increase the area of the blocks is not feasible.

Sale of energy for the Greek pilot location

After the renovation works, the occupants will purchase the energy by Techem (ESCO) and will pay the bills also to Techem.

The new cost of energy that the occupants will pay is defined by a equation that will be agreed between the owners of the blocks and Techem and depends on three economic factors:

1. The fixed assests: a fixed price that depends on investment, maintenance, labor costs.
2. The variable costs: a variable price that depends on the fuel type/ price (i.e. natural gas/ oil, or electricity) and the energy consumption of each dwelling. The energy consumption will be monitored with heat cost allocators installed at the radiators of every flat.
3. Monitoring cost for heating and cooling. The energy consumption of the blocks will be monitored several times per year and an invoice will be issued per household according to the monitoring results. For the energy consumption attributed to the communal areas of the blocks (i.e. circulation areas, lifts, etc) each household will contribute according to its area and property over the total block.

Finally, because of the energy interventions and the energy savings occupants will pay less for their energy consumption.

ESCO in Greece

The Energy Performance Contracting in Greece is not so common and rarely used although it seems a very promising and interesting solution.

Currently there is no official legislation that would promote the energy performance contracting. A legislative draft has been submitted for approval that deals with the following issues:

- The sale of a building that is already contracted with an ESCO. It is proposed the transfer of the ESCO to the next owner
- The sale of products that belong to ESCO is prohibited
- The reproduction of facilities and products of ESCO apart from these that are already discussed and agreed within the contract is prohibited.

Additionally, the ownership structure of the building stock in Greece where the majority of the houses are private owned and there is no one landlord is inhibitory parameter for the energy performance contracting. Moreover, the technical and financial companies in Greece are not very positive to this financing scheme because they do not have the knowledge and experience.
Currently, very few applied examples number in Greece, realized by Techem. These study cases are located mainly in Northern Greece and concern multi-blocks, similar case studies with the pilot location in Pieria.

Cost of the planned interventions and economic benefits

Table 1 shows the cost of the different energy savings and in each case the financing scheme for the Greek pilot location.

Energy measure	Total number	Cost (euros)	Total cost /block(euros)	Funding scheme
Thermostats/heat cost allocators: **100euros/radiator**	5/dwelling	500/dwelling	9,800	ESCO
Boiler replacement		8,500/block	8,500	ESCO
Insulation of pipes		500/block	500	ESCO
Insulation on the roof, 38 euros/m^2	250 m^2 (roof area)	9,500/block	9,500	ESCO
External painting, walls, and roof	Depends on the colours to be used, on the external walls and roof (roof area / block =300m2, and 60 m2 area of external wall/dwelling	2,000 (roof) /block For external walls: aprox 3euros/m^2= 180 euros/dwelling	2,000 (roof) 1,700 (external walls)	ESCO
Double glazing: **65 euros /m2**	Approx 12 m2 / dwelling	780 /dwelling	7,020	Owners of dwellings
Ceiling fans: Varies on the type/design of ceiling. Taking into account the most cost effective solution: **50euros/fans**	3 fans / dwelling (in bedrooms and living rooms or halls of dwellings)	150/dwelling		Owners of dwellings
Low energy luminaires: Depends on the types of luminaires, taking into account the most cost effective solution : **8 euros/lamp**	On average 18 lamps/dwelling	144/dwelling		Owners of dwellings

Table 1: Greek pilot location, energy measures, cost and financing scheme

	Wireless heat cost allocator / radiator	Cost / radiator € 100

	Thermostats/radiator for the control of setpoints Possibility to adjust indoor temperature between 7…28°C.	
	Replacement of the existing thermostat of each radiator with the new one	

	Measures	**Financing scheme**	**Total Cost (euros)**
Upgrade of building services	Replacement boiler, insulation of pipes, thermostats, energy meters, external painting, insulation of roof	**ESCO**	18,800/block (9 dwellings/ block)
Upgrade of building envelope	Insulation on the roof, external paints with high solar reflectance	**ESCO**	3,700/block
Upgrade of building envelope	Double glazing	**Onwers**	780/dwelling
Other	Ceiling fans, low energy lamps	**Onwers**	294/dwelling

Table 2: Total costs and financing scheme for the Greek pilot location

As it is shown in table 1, the whole project concerning the upgrade of the building installations is carried out and funded 100% by Techem.

Additionally, because of legal reasons, the upgrade of the building envelope can be partially funded by Techem, as far as this concerns the external insulation of the roof and the external painting of the blocks with paintings of high reflectance. This arises to 34% of the total works concerning the upgrade of the building envelope.

If the occupants wish to proceed with extra renovation works of the building envelope (i.e. installation of double windows) this will cost them around 780/ household. Additionally, with extra 294 euros/dwelling, they can achieve extra energy savings, by replacing the common luminaires with low energy lamps (144 euros/dwelling), and installing ceiling fans in the areas of their dwellings (150euros/dwelling).

Other costs

	Monitoring and issue of energy bills for every household.	Cost/household € 5,00
	Issue of energy bills for communal areas of the blocks	Cost/household € 0,70

Table 3: Other costs concerning the issue of energy bills in the case of the energy performance contracting (table provided by Techem)

In the case of the energy performance contracting, the occupants should pay a small amount of money concerning the monitoring of the energy consumption and the energy bills issued by Techem company; this will cost 5,70 euros/household.

Traditional financing schemes

Funding 100% by the occupants

Usually, in the case of multi blocks in Greece, where there is no one landlord but the flats have different ownership, in order to proceed with actions that concern the whole block, (i.e. refurbishment, construction works) all occupants should agree with this as they will contribute financially according to their % ownership of the total block. These issues are discussed and agreed during the general assembly that takes place once or several times every month and usually a manager is appointed

by the total of the occupants who leads the discussion and takes care of the communal issues.

Housing management concerns the framework and the content of the decision-making of landlords regarding their housing stock. Considerations that play a role in this housing management could for example be the need to avoid vacancies, to keep the housing stock in line with the present and future tenants' demands, to keep the housing stock in a proper physical state and the improvement of the energy performance of the stock.

In the case of the refurbishment, the manager of the block should make the contacts for the realization of the project always with the consent of the other owners.

With this funding and organizational scheme the following difficulties can be encountered:

- Disagreement among the occupants on the housing management
- Disagreement on the occupants on solutions regarding the energy savings and which measures to be prioritised
- Delays concerning the realization of the project
- Incompatibility regarding the financial potential of each household
- Provision of capital cost

Loans

Not all owners of dwellings are permitted to contract a loan, but even if allowed, usually restrictions and requirements have to be taken into account.

These restrictions are dependent on their income, existence of a permanent job, and their age.

Subsidies- financial motivation

In the case of Greece and concerning the refurbishment of existing residential buildings with energy measures, the available financial facilitations are very limited:

Law 2364 of 1995: It refers to tax incentives for domestic RES installations. Primarily the law is dealing with the importation, transmission, distribution and sales of natural gas in Greece; it also contains an important provision regarding the purchase and installation of domestic RES appliances. According to Article 7 of the law, up to 75% of the total cost for the purchase and installation of domestic RES appliances and systems (as well as gas appliances) can be deducted from the taxable

income of natural persons. Such appliances and systems are deemed to include installations for the common use of the occupants of apartment buildings, in which case the deduction is calculated on the basis of the co-ownership percentage of each owner. It is estimated that the tax deduction of Law 2364/95 can today reduce the cost of domestic RES systems (e.g. solar heaters) by up to 30%.

Additionally, the Hellenic Ministry for the Environment Physical Planning and Public Works provide the owners with loans, tax deductions, extensions and repayments facilities via banks and special arrangements. Specifically, the expenses to purchase natural gas for heating and renewable energy systems (i.e. solar collectors), is deduced from the tax by 75%. Additionally, reductions are realised in the rate of interests regarding the loans that concern the implementation of low energy measures in dwellings.

The Hellenic Ministry for the Environment Physical Planning and Public Works is preparing a new legislation for low incomes households that will be in force in the next couple of months of spring 2009. The aim of this legislation is to fund 50% the owners of dwellings that are built before 1980 in order to:

- Upgrade the building envelope. This will cover actions related to the installation of thermal insulation, installation of double windows, and use of external paintings with high solar reflectivity.
- Upgrade the building systems. This will cover actions related to replacement of old boilers and insulation of pipes.

Compensate out of energy savings

Sometimes it is possible to balance investments with the savings on the energy costs. This could in particular be a practical solution when the investor is the beneficiary from the achieved energy savings. However, in the case of Greece, this is not very often met, as precondition of this method is the existence of a capital.

•	Financing schemes	Greek pilot case - restrictions
A.	100% funding from owners	• Disagreement among the occupants on the housing management • Disagreement on the occupants on solutions regarding the energy savings and which measure to be prioritised • Delays concerning the realization of the project • Incompatibility regarding the financial potential of each household
B.	Loan	• Reduced interest rates • Depends on the income, age, permanent job of occupants
C.	Subsidies	• Limited tax reductions • A general scheme is not available at the moment, but a new subsidy for low incomes will be in force in the next couple of months
D.	Compensate out of energy savings	• Precondition the existence of a capital
E.	Energy performance contracting	• Interesting and optimising option , but rarely met in Greece due to the ownership structure of buildings in Greece

Table 3: Possible financing schemes to cover energy retrofitting in Greece

Advantages of the financial scheme - ESCO for the owners and users of the dwellings

In the case of the Energy Performance Contracting, the occupants will take advantage of the following:

- Upgrade of the building services of their dwellings
- Autonomous operation of the heating systems, thus improvement of their life quality. This has several advantages:

1. Savings to the fuel used (oil or natural gas for heating) as the occupants will operate the system only when they need it , for example when they are in their dwellings
2. Additional heating for the households that desire it without charging this to their neighbours. Usually flats that are exposed more to the outer environment (i.e. flats of last level) need more heating than flats of lower levels (i.e. flats of first floor)
3. Comfort and cost savings due to the possibility to adjust the set points for every room. Energy savings can account 6% by lowering the setpoints by 1 degree.
4. Issue of energy bills for every household based on the monitored energy consumption. In this way, each household will be charged accordingly to their use and there will be no longer disagreement among occupants because of different lifestyles.

- Maintenance and repair of the building installations (boilers, thermostats) by ESCO (Techem) with no cost for the occupants
- Reduction of the communal costs, transfer of repair costs to the ESCO (Techem company)
- Reduction of energy consumption, thus reduction of cost.
- Compliance with the new legislation EPBD : On May 15, 2008, the National Law 3661 (FEK 89A'/19.5.2008) for the Energy Performance of Buildings was finally voted in the Greek Parliament. Therefore, every activity for sale or rent should be accompanied with a certificate regarding the energy performance of flats.
- Funding 100% of the refurbishment project by ESCO.
- Management of the energy consumption by ESCO (Techem) with no cost for the occupants. Currently, there is no central energy management system for the apartments and residents are responsible for covering their energy demands. Regarding the energy consumption, very limited data is available; however the occupants are aware that the central heating system leads to high demands and is cost ineffective.
- In the case of refurbishment concerning the whole block and not the separate households, an unanimous decision by participating owners is difficult and

can be an obstacle increasing the complexity and duration of the renovation process. Furthermore, the inhabitants tend to focus on short-term aspects. This resembles general experience in (social) rented housing, where a significant part of the extra investments for energy conservation and sustainability usually is covered through a rent increase, with which the tenants usually have to agree first.

ESCO against traditional financing schemes

In the case of the Greek pilot location, the Energy Performance Contracting has a number of advantages against the traditional financing schemes.

The main advantages concern:

- Financial issues
- Management issues
- Communication issues

Financial: As it is mentioned, the upgrade of the building services and the insulation of the roof will be funded 100% by Techem. Each household will be charged a small amount of money (5.7 euros) that is attributed to the monitoring of the energy consumption and the issue of the energy bills. Because of legal reasons, Techem cannot undertake actions within the properties, like the replacement of common luminaires with low energy lamps, or the replacement of single glazing with double glazing. These actions will result to significant energy savings and will improve the thermal comfort levels but should be undertaken and funded by the occupants themselves. These will cost them around 780 euros/household for the replacement of the single glazing with double glazing, 150euros/household for the installation up to 3 ceiling fans and 144 euros/household for the installation of low energy luminaires .

In the case of not contracting an ESCO and using another financing scheme (i.e. self-funding, loan etc), in order to proceed with the same facilities that the ESCO would provide, the energy implementation would cost minimum 2,500 euros/household. Even in the case of a subsidy of 50% over the total cost, the owners will be enforced to provide the rest amount of money.

Management issues: Apart from the financial advantages, the energy management and maintenance of the building systems is a very important issue that occupants should consider. Through the energy management, major energy savings can be achieved and possible malfunctions can be detected and repaired. Very often after

the realisation and energy retrofitting of a project, there is no any control and monitoring of the data, resulting even in loss of money.

Communication: In the case of the Greek pilot location, where there is no one landlord but every household is a property; a unanimous decision on the energy measures among the occupants would be very difficult and time consuming. Also conflictions among the occupants derive from different needs, social and economic status. With the presence of the ESCO many issues regarding the communication between the occupants and owners of the flats (i.e. concerning the maintenance and repair costs) will be lessened.

Conclusions for the Greek pilot location

The proposed financing scheme is the Energy Performance Contracting that, although is not very common in Greece, it seems to provide many financial and procedural advantages against the traditional financing schemes.

The main characteristics of the financing scheme for the Greek pilot location are:

- Techem company (ESCO) does not have access in the private areas of the ownerships because of the Greek legislation. Thus, construction/management and repair of devices in the private areas of the houses cannot be realised by Techem.
- The renovation works carried out by Techem will be funded 100% by this financing scheme.
- After the renovation works the energy management of the residential buildings will be performed by Techem
- The energy bills will be paid to Techem
- The proposed financing scheme offers financial and management advantages to the occupants compared to the existing traditional schemes.

2. Pilot location Pecsvarad in Hungary

Proposed financing scheme for the Hungarian pilot location

The proposed financing scheme is an ESCO combined with governmental support. During the progress of the ECOLISH project it was discussed that ESSENT Company, the ESCO from the Netherlands would take over the implementation of the energy measures of the pilot location in Pecsvarad and would make an offer. However, this did not occur. In the final couple of months, the German company RWE that also operates in Hungary took over and will give a final answer/offer after 26th December 2009 (after the end of the ECOLISH project) when there will be a final internal meeting.

The energy measures that are discussed to be implemented are the following:

-Insulation of the roof

-Insulation of external walls

-Replacement of the existing windows

-Replacement of the existing doors

-Insulation of the cellar roof

-Installation of thermostatic valves

-Replacement of the existing boiler

-Upgrade of domestic hat water system

After the renovation the energy supplier will remain the local gas company (E-on) with which the occupants have contracts without any time limit.

ESCO in Hungary

In Hungary, the ESCO scheme is known and used quite often. The ESCO is mainly connected with producer companies, like Honeywell, Techem, and Siemens. They always use their own products or services (i.e. heat cost allocators, radiator valves)

Other known ESCO operating in Hungary is Dalkia that is an independent company, but is not operating in the residential market, and EPC that is mainly for hospitals, schools and other commercial buildings.

Traditional financing schemes

The traditional financing schemes for energy rehabilitation of the housing stock are the following:

- Funding by the occupants
- For panel buildings, governmental support exists
- For other buildings, governmental support is in the plan

Additionally, there are business based subsidies for energy conscious renovation in the residential sector.

Cost of the planned interventions and economic benefits

The cost of the planned energy measures are shown in the following tables:

Insulation of Roof	A	22 Euro/m^2
Insolution fo external Wall	B	48 Euro/m^2
Change Window	C	180 Euro/m^2
Change Door	D	240 Euro/m^2
Insulation of Cellar Roof	E	34 Euro/m^2
Termostatic Valve	F	240 Euro/Flat
Condensation Boiler	G	1520 Euro/Flat
DHW indirect	H	400 Euro/Flat

Table 4 Proposed energy measures and cost/m^2

Building Renovation	Total Cost (€)	Reduce of Running Cost (€)	Payback Time
A	9148	2140	4.3
A+F	14908	3033	4.9
F	5760	893	6.4
A+B+F	49804	6334	7.9
A+B+F+G	84364	7972	10.6
B	34896	3268	10.7
F+G	40320	3745	10.8
A+B+G+H	93964	7972	11.8
A+B+D+G	111904	8868	12.6

A+B+C+F+G	142456	9384	15.2

Table 5 Proposed energy measures, total cost, payback time

Advantages of the financial scheme - ESCO for the owners and users of the dwellings

The proposed financial scheme is the combination of the ESCO participation and governmental support. The scheme is suggested without any occupant payment for the energy investments. The traditional financing scheme cannot be implemented in low income housing.

Without the financing scheme (ESCO + governmental support) the project cannot be implemented.

Conclusions for the pilot location in Pecsvarad

In the case of the Hungarian pilot location there was no ESCO involved from the beginning of the ECOLISH project, thus no decisions could be made on the financing of the proposed energy measures. However, the funding scheme that is discussed is a combined participation of an ESCO and governmental support. This guarantees that the occupants will take no any financial risk for the energy investments.

3. Pilot location Ogre in Latvia

Proposed financing scheme

Currently the ESCO scheme is not very viable in Latvia and negotiations are taking place between the occupants of the pilot location, the municipality and the Riga Technical University. The possible ESCO company to be involved in this funding scheme – is called “Sun Energy Baltic” Ltd., and is the subsidiary company of the foreign energy service company called “Zon Energy”.

The ESCO will invest a range of energy efficiency improvements like insulation of end walls, insulation of facade walls, etc. according to energy-audits of the involved buildings and evaluation by the ESCO.

In terms of financing ESCO plans to apply for EU financing under the activity “Improvement of Heat Insulation of Multi-Apartment Residential Buildings” of the ERDF operational programme "Infrastructure and Services" (50%) and to take a credit for the remaining amount (50%).

Concerning the management of the project after the renovation, the details are under discussion (suggestion by the ESCO – payments from inhabitants collected by the municipal agency “Malkalne”).

ESCO in Latvia

The proposed financing scheme is not widely used in Latvia. There is only one ESCO (the above-mentioned “Sun Energy Baltic” Ltd.), which is dealing with energy efficiency improvements in dwelling houses. Up to now they are implementing one project for a multi-apartment house in Cesis town and have started the preparatory process also concerning several houses in Valmiera. So there is only one actually working example of EPC for a multi-apartment house in Latvia.

The possible reasons for such low activity could be the lack of ESCOs, no legislation concerning this issue, low awareness and motivation of inhabitants concerning energy-efficiency improvements, lack of their responsibility towards common property, necessity to take the house in the possession of the flat owners, overall lack of experience in using EPC in Latvia (no examples to see). Currently the situation is additionally complicated by the economic crisis in Latvia (causing rising of unemployment and cutting of wages), due to which people are focusing on solving their own problems even more as before.

Cost of the planned interventions and economic benefits

The cost of the planned interventions will depend on the energy-audits of the involved buildings and their evaluation by the ESCO. Still it is not clear what sets of measures can be offered to the occupants. Simple measures like optimising controls and individual metering are not considered (by RTU) as an option. One of the reasons for this statement is the fact that indoor temperature is relative low (18^0C) instead of the normal comfort temperature of 20 - 22^0 C. However, there are serious doubts by the other technical participants about this.

One of the problems is also the organisation of the occupants per block (60 households). Nevertheless it is expected to come to a conclusion and completion by the end of the year.

The energy measures will be funded by the activity “Improvement of Heat Insulation of Multi-Apartment Residential Buildings” of the ERDF operational programme "Infrastructure and Services" and credit.

Additional financial sources (for example, municipality) will be searched for covering the costs, which are not eligible under ERDF, for example, inner utilities.

Traditional financing schemes

The current main types of funding are state support, EU programmes, municipal credits or co-financing, local project competitions and bank credits (provided, for example, by Mortgage and Land Bank, ESEB Bank, DnB Nord Bank) for repairing, reconstruction, renewal and energo-efficiency increasing of the common usage parts of multi-apartment houses.

Currently, the Cabinet Regulations state two types of cost regarding the calculation of the management and maintenance of dwelling houses: for new houses 0.40 Ls/m^2, for old houses 0.69 Ls/m^2. The procedure for maintaining and renovating residential blocks is as follows: every year, till 15th October, the house manager must calculate the maintenance cost and present the repair plans for each separate house, taking into account income and expenses (repair expenses, maintenance etc.) of every house. That means that houses may have different costs for maintenance (depending on the amount of the planned works for the coming year). Till the 1st of January, the inhabitants of every house can decide on the cost: they accept it, or not; if not – they establish their own house managing company (society). Every year till 1st of April the

house manager provides inhabitants with the report of the previous period (year). In 27.01. the new regulation of Ogre municipal agency "Malkalne" is adopted:

- the reports for each house must be prepared till the 1st of April,
- the statements of each house (with the necessary amount of repair works) must be prepared till the 1st September,
- to work out the data base of each house the reports and statements should be published in the municipal agency website www.malkalne.lv

Inhabitants can decide whether or not to make the energy savings, for example by installing house insulation. They can decide together with the house managing company on higher cost for the coming year, in order to make some energy saving repair works (wall insulation, facade repairs etc.). If the inhabitants want different cost for their house maintenance they can establish their own house maintenance society. This encourages the responsibility of every inhabitant of Ogre.

Other possibilities are state support, EU financing, municipal credits or co-financing and local project competitions.

In the case of Ogre municipality the following alternatives exist:

- **State Co-financing for Energy-Efficiency Activities in Dwelling Houses:**
  - energo-audits – 80% from the costs (max 569 EUR),
  - adopting of energo-audits to the current normative requirements – max 142 EUR,
  - elaboration of the technical project – 80% from the costs (max 3557 EUR),
  - renovation – 20% from the total eligible costs of the renovation project;
- **ERDF operational programme "Infrastructure and Services" - activity "Improvement of Heat Insulation of Multi-Apartment Residential Buildings"** (up to 50% of the total eligible costs, max 142287 EUR per project):
  - preparation of energo-audit, technical inspection, technical project (detail design) – max 10% of direct eligible project costs,
  - building supervision and author supervision – max 5%,
  - construction costs;
- **Co-financing provided by Ogre County Council:**
  - insulation of end-walls and in some cases facades
  - Merging of 3 sources of financing: yearly co-financing provided by Ogre County Council for insulation of dwelling houses (50%), accumulated resources of the concrete house (30%), participation payments of inhabitants (20%)

- **Project competition for inhabitants groups and public organisations "Creating the Environment Around Us", organised by Ogre County Council and State JSC "Mortgage and Land Bank of Latvia"**:

- small scale investments in infrastructure (for example, changing of windows in staircases),
- maximum amount available per project – 996 EUR (700 LVL)

•	Financing schemes	Latvia pilot case - restrictions
A.	State Co-financing for Energy-Efficiency Activities in Dwelling Houses	• Costs for energy audits, elaboration of technical reports etc • Renovation cost- max 20% of the cost
B.	ERDF operational programme-EU funding	• Up to 50% of the total eligible costs
C.	Co-financing provided by Ogre County Council	• Participation payments of inhabitants 20%
D.	Project competition organised by Ogre County Council and State JSC "Mortgage and Land Bank of Latvia":	• Small scale investments • Maximum amount available per project
E	Energy performance contracting	• Interesting and optimising option , but rarely met in Latvia due to lack of legislation

Table 6: Possible financing schemes to cover energy retrofitting in Latvia

Advantages of the financial scheme - ESCO for the owners and users of the dwellings

Residents are guaranteed that they will not pay more as in a not-renovated house – thus getting all benefits of the implemented energy efficiency measures for a cost, similar as before.

After the end of EPC the payments will be considerably lower thanks to achieved energy-savings.

The energy supplier after the renovation will continue to be the municipal agency "Malkalne" – municipal institution of Ogre County Council, aiming at providing heating, water supply, sewerage and house maintenance services for the inhabitants of the Ogre County. Currently there are maintenance agreements signed between MA "Malkalne" and flat owners, which include also energy supplying – there is no duration indicated in these agreements. In the case of ESCO and taking into account the conditions for receiving ERDF financing, every house has to separate from "Malkalne" and take the house in the possession of inhabitants (by creating their own maintenance society or giving the maintenance rights to an authorized person). In this case there will be new agreement necessary between the house owners and "Malkalne" on maintaining the house and supplying the energy.

ESCO against traditional financing schemes

Inhabitants don't have to invest additional money in energy efficiency improvements; the risk on energy savings is taken by the ESCO.

Conclusions for the pilot location in Latvia

In the case of Latvia the main characteristics of the proposed funding scheme are:

- 50% EU financing under the activity "Improvement of Heat Insulation of Multi-Apartment Residential Buildings" of the ERDF operational programme "Infrastructure and Services» and 50% credit for the remaining amount.

-The energy supplier after the renovation will continue to be the municipal agency "Malkalne", however there will be a new agreement between the house owners and "Malkalne" on maintaining the house and supplying the energy.

- Residents will continue to pay the same amount of money as in a not-renovated house while getting all benefits of the implemented energy efficiency measures for a cost.

-The financial risk on the energy costs is taken by ESCO, the residents will no invest additional money

- The proposed funding scheme (ESCO) offers advantages over the traditional financing scheme that do not provide full funding of the renovation but they offer a maximum amount of eligible costs, therefore the residents should pay the rest.

4. Pilot location Heerlen in Netherlands

Proposed financing scheme

The organization and coordination of the whole process is proposed to be realised by Essent Energy Services. Essent Energy Services is an ESCO and a separate Ltd, part of an energy distribution firm Essent. For the implementation of the measures Essent Energy Services will collaborate with players such as Fons van der Heyden Ltd (insulation glass and High Efficiency glazing) and Volta Limburg (High Efficiency boilers and solar water heaters).

In general, Essent Energy Services has now started a new ESCO service, especially for households called 'Savings Plan Home'. Households do not have to select suppliers, appointments to make bids to questions and coordinate planning. Essent points on grant opportunities and regulates - in interest - the complete financing. The packages that Essent can offer includes building measures (thermal insulation, HE glazing), HE boilers (heating DHW) as options for renewables such as solar boilers and photovoltaics.

There will be pilots on 3 locations, in Heerlen (within the EU project ECOLISH), Kerkrade and Enschede.

Essent Energy Services has elaborated 3 packages of measures including financing schemes for the pilot location in Heerlen. The packages include the following:

a) Basic package

- Insulation improvement of the roof of 20 mm;
- Insulation improvement of the facade of 50 mm (side).

b) Additional package

- Basic package;
- Insulation improvement facade of 50 mm (behind);
- High efficiency glazing and insulated panels in the rear.

c) Complete package

- Additional package
- High efficiency glazing and insulated panels in the front.

For the pilot location in Heerlen it is suggested to realise the complete package. The funding of the renovation will be provided by the Government. The interest rate for

investments regarding energy saving measures is 5% with considerable advantages regarding the taxes.

After the renovation, the energy management of the blocks will be realised by Essent Energy Services. This will also ensure the reduction of the monthly payment amount of the energy bill.

ESCO in Netherlands

In the course of 2009 there will be a loan for energy-saving investments. The homeowners can borrow money to make investments so that their energy bills will be reduced. The government guarantees these loans.

Cost of the planned interventions and economic benefits

In the case of the pilot location in Heerlen, there are several packages of measures developed. The resident's most economical variant requires an investment of € 114,000 for a block of 6 apartments. All measures are financed by Essent.

Traditional financing schemes

Traditional financing is done via financial lease. In this case the interest rate is 10%.

There are no subsidies for energy conscious renovation in dwellings, currently there are only local regulations for subsidies by municipality or province.

Advantages of the financial scheme - ESCO for the owners and users of the dwellings

The residents have the first 15 years of equal monthly costs. The purchasing power is thus maintained. The contribution per housing unit is a one-off € 1.600. Important advantage is that overdue maintenance is included in the measures and that the value of the property rises.

The monthly costs are equal during 15 years. After 15 years they will be much lower.

The residents are free to choose their energy supplier. There is no compulsory purchase by Essent.

ESCO against traditional financing schemes

The rate of the proposed funding scheme is 5% compared to 10% for traditional financing.

Conclusions for the pilot location in Heerlen

In the case of Heerlen the main characteristics of the proposed funding scheme are:

- The funding of the renovation will be provided by the Government
- All measures are financed by Essent (ESCO).

-After the renovation, the residents are free to choose their energy supplier. There is no compulsory purchase by Essent.

- The energy management of the blocks will be realised by Essent Energy Services

Conclusions

For all pilot locations the characteristics of the funding schemes are analysed and then compared to traditional financing schemes for the implementation of energy retrofitting measures.

The proposed funding scheme for all pilot locations is an ESCO company. Many differences exist among the proposed funding schemes in the different pilot locations and this depends on the social and economic peculiarities of the countries. The main differences are:

- *The source of funding regarding the implementation of the energy measures*: In the case of the Greek pilot location, the funding will be provided 100% by Techem (ESCO). In the case of Latvia , the funding will be provided 50% by an EU programme, and the remaining 50% by credits. In the case of Heerlen, the measures will be financed by Essent (ESCO) and the funding will be provided by the Government. In the case of Hungary, the proposed funding scheme is a combination of governmental support and ESCO participation.
- *The energy supplier after the renovation*: In the case of Greece, the energy supplier will be Techem. In the case of Latvia the energy supplier will remain the municipal agency "Malkalne" but a new agreement between the house owners and the municipality is required concerning the maintenance of the houses. In the case of Heerlen, the residents are free to choose their energy supplier. There is no compulsory purchase by Essent. In the case of Hungary, the energy supplier will remain the local gas company.
- *The energy management of the blocks after the renovation*: In the case of Greece and Heerlen, the management of the blocks will be realized by the ESCO company. In the case of Latvia, the management of the flats will be carried out by the municipality.

In all pilot cases the financial risk of the energy measures is taken by the ESCO and the inhabitants will not be charged for the energy renovation. It seems that the proposed financing scheme offers more advantages than the existing traditional funding schemes in all countries. After the renovation the energy bills will be lower due to the energy savings.

Additionally it should be noted the increased value of the properties after the retrofitting and as analysed in deliverable 5.1 the compliance with the EPBD Directive of all renovated dwellings.

Although the financing advantages that an ESCO offers, it seems that among the ECOLISH participating countries the scheme is more used in the Netherlands. ESCOs are also operating, in the market of Hungary, however these are not independent companies as they have to sell their products and are involved more in the industrial sector In Greece and Latvia this funding scheme is rarely used mainly because of the following reasons:

-Lack of legislation

- The ownership structure of the building stock

- Lack of responsibility towards common property

-Lack of experience in real case studies

Appendix

Template that was prepared and completed within the frames of the ECOLISH project

1 Please describe the proposed financing scheme for the planned energy measures of your pilot location

a. The legal entity of this funding scheme (i.e. ESCO, nature of the organization, how this is organised)
b. Describe which activities will be realised by this financing scheme for your pilot location concerning :

1. The energy interventions
2. Financing
3. Management

2. Is this scheme broadly used in your country? If yes/no why?

Is there any legislation supporting this financing scheme?

3. What are the costs and the economic benefits of the planned energy implementation for the occupants when using the proposed financing scheme

a. Give the cost of the planned interventions, for each energy measure

b. Who is funding the energy measures? All the energy measures will be funded by the proposed financing scheme? If no, who else is contributing financially?

c. What is the economic benefit of the use of this financing scheme for the occupants?

Are the occupants charged for any energy intervention?

d. Will the price of the energy unit change after the renovation because of the proposed financing scheme? How this will affect the occupants? (Will they pay more or less?)

e. Who is the energy supplier after the renovation? Is there a contract between the occupants and the energy supplier, and if yes, what is the duration of the contract?

4. Describe traditional financing schemes of your country for sustainable and energy conscious renovation of the housing stock

a. Usually, how energy rehabilitation of housing is funded in your country?
b. Are there any subsidies for energy conscious renovation of dwellings?

5. Advantages of the proposed financing scheme against the traditional financing schemes

Compare the proposed financing scheme with the traditional financing scheme