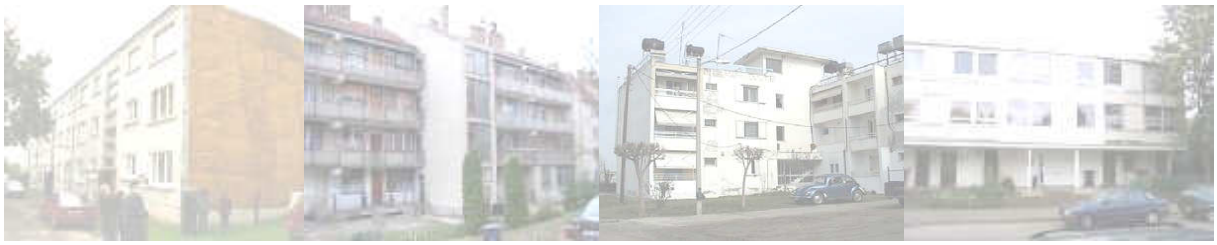
ECOLISH:

Energy Exploitation and Performance Contracting for Low Income and Social Housing

Final Publishable Report - December 2009



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EXECUTIVE SUMMARY

The objective of the ECOLISH project is to investigate the possibilities for energy efficient retrofitting for low incomes and social housing by using the possibilities of energy performance contracting (EPC) and energy exploitation by ESCO's. The project is especially focussing on individual house owners with very low incomes. Four pilot locations (Pécsvárad in Hungary, Pieria in Greece, Ogre in Latvia and Heerlen in the Netherlands) were examined on their social, legal, technical and financial possibilities for EPC by universities and specialists. External factors like the economic crises and ancient social structures are import to EPC and should be recognised.

Fuel poverty is becoming a serious problem for social housing due to current trends in energy cost and income development. In social housing, energy costs do often not relate to the poor thermal comfort and low indoor air quality. Saving potential and benefits in this building stock are high, but need to be allocated to investments. The low-income target group wants to lower costs but isn't financially able to invest themselves and lacks a long term view on its real estate property. Many residential buildings are at the end of their technical and economical lifespan and will soon need extensive renovation. On the other hand, most of the occupants want to stay in their familiar surroundings and they trust on existing social structures. Energy performance contracting is a multiple solution to these issues.

A specific problem in the building stock is individual and spread ownership. This can be solved by organising occupants and forming legal entities. Occupants welcome support as soon as it is well-intentioned and recognized, but may be reluctant to externals. Energy service companies (ESCO's) therefore have to gain the trust of the occupants. Highly mixed occupancy (young and old, different level of education) demands a personal approach to get everybody satisfied with a standard package of measures. The ECOLISH project provides occupants info guides on this topic.

A unique approach for collecting data of the neighbourhood by occupants resulted for several pilot locations in a lot of detailed data on the building stock en actual energy use. It is important to provide a balanced set of energy saving measures, which have a robust saving potential. Sensitivity studies in the ECOLISH project show that energy savings by improving the building envelope are more robust than upgrading the building services. Architectural improvements therefore prefer, but are not common business for ESCO's. An improvement of the building envelope often requires large, partly delinquent investments. The long pay-back time should match the extended lifespan of the building.

The technical measures themselves are quite common building practice, but risk allocation in energy savings and financial exploitation is still a big challenge. In practice, the savings strongly depend on the occupant's behaviour and may not meet the expectations. This sharing of this risk needs expert attention and clear instructions to the occupants.

Most financial constructions require co-financing of the occupants. Because of their low income (or even unemployment) the occupants lack these financial means and may have difficulties in getting a credit. An offer from an ESCO to a well organised group of house-owners for EPC should include a balanced set of technical measures (that fit the target group) and a clear plan how to finance this.

The role of municipalities can be important, for example for establishing revolving funds and organising occupants. ESCO's could play a new and important role. The residential sector can be a new and interesting business area, also individual house owners. Several financing constructions are possible but constructions with mortgage and revolving funds are favourable.

The ECOLISH project showed that *the proof of the pudding is in the eating*. Energy performance contracting for social housing requires close cooperation between social, legal, technical, financial and real estate experts. The organisation of the occupants and the validation of the energy saving forecasts turned out to be the most challenging parts.

Key marks with their key actors are:
- a solid organisation of the house owners (social and legal experts);
- an ESCO with a balanced set of energy saving measures and corresponding financial scheme (technical and financial experts);
- a clear long term view on the real estate and its neighbourhood (social and real estate experts).

Energy performance contracting reduces fuel poverty, improves quality of life and prevents climate change in one solution. We recommend that government and administration (from local to EU level) provide good conditions for this concept that potentially solves multiple problems. Clear legislation, harmonisation of energy saving measures and financial incentives for the application of the concept are these main preconditions. Furthermore, easy accessible data on the individual energy use on neighbourhood scale simplifies feasibility studies for EPC.

The main achievements of the ECOLISH project are that in each pilot location, despite the bad local starting situation, it was managed to establish

- a new or improved organisation of house owners;
- cost-effective packages of energy-saving measures;
- model contracts within the valid legal and financial constraints;
- interest from commercial ESCO's for further implementation.

The pilot locations are typical for the national building stock and thus can lead to large replication.

PROJECT DATA

Project Acronym:	ECOLISH
Full title:	Energy Exploitation and Performance Contracting for Low Income and Social Housing
Objective:	Achieving energy efficiency and solving fuel poverty for low income and social housing, focused on individual owners with very low incomes
Contract number:	EIE/06/049/SI2.447840
Financing:	Intelligent Energy Europe
Budget:	€ 1.289.973 (EU contribution: 50%)
Duration:	1 December 2006 – 30 November 2009
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Project website:	www.ecolish.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY 2

PROJECT DATA 4

1. INTRODUCTION 6

2. OBJECTIVES, SCOPE AND METHODS OF THE ECOLISH PROJECT 7
   Objectives and scope 7
   Methods used 7

3. BENEFITS 8
   General benefits for energy efficient refurbishment of social housing 8
   Benefits for the target groups 8

4. THE PILOTS 10
   The Netherlands, Heerlen 11
   Latvia, Ogre 15
   Greece, Pieria 21
   Hungary, Pécsvárad 25

5. GENERAL OVERVIEUW AND COMPARISON OF THE PILOTS 28
   Main characteristics 28
   Comparison of energy use and heating systems of the pilot locations 28
   General SWOT analyses 29

6. ROLE OF ESCO'S ON ENERGY PERFORMANCE CONTRACTING IN ENERGY EFFICIENT RETROFITTING FOR SOCIAL HOUSING 33
   Terms and definitions 33
   Recent developments in ESCO business and services 35
   General overview of the situation on EPC and ESCOs in the EU 39
   The major barriers in Europe for ESCOs 40

7. DESCRIPTION OF THE PROCESS OF ORGANISING OCCUPANTS 41

8. DESCRIPTION OF THE PROCESS AND QUALITY CONTROL ASPECTS 46
   Process 46
   Quality control 48

8. SUCCES STORIES 52

9. CONCLUSIONS 53

10. RECOMMENDATIONS FOR FURTHER ACTIONS 55

11. ABBREVIATIONS AND TERMS 56
   Abbreviations 56
   Terms 57

ANNEX I Description of the process on the pilot locations and templates for energy performance and ESCO contracts 59

ANNEX II: Template survey form basic technical investigation 117

ANNEX III: General example template for ESCO contract 121

1. INTRODUCTION

Energy use in buildings is about 40% of the total energy use in Europe. The energy use of residential buildings is at ca. 9500 PJ the largest proportion (23% of total energy use in Europe). Energy saving and CO_2 reduction in the existing residential buildings stock will make a major contribution to the European 20/20/20 targets. Although the potential is high and a wide variety of technologies is available, promotion of energy efficiency in the existing residential building stock faces a number of barriers, especially for social housing and housing stock owned by people with low incomes. This group has to deal with financial limitations and barriers. At the same time this part of the European residential building stock is characterised by high (often extremely high) energy use, due to inefficient heating installations and little or no thermal insulation. Also the application of renewables in the sector is very rare.

The poor thermal performance and physical quality of these buildings has consequences for the quality of life. Indoor air quality and thermal comfort is often very poor with negative influence on human health. In many locations in EU fuel poverty is a problem and can lead to intolerable situations regarding the quality of life and health.
At the same time, in general, better indoor thermal and moisture conditions imply higher levels of comfort as well as lower rates of degradation and longer cycles of refurbishment and repair. Reduced exposure to the fluctuation of outdoor conditions due to thermal insulation prevents dampness, rusting and mould formation. In winter, internal walls remain warm and the cold-radiation effect is eliminated; in summer, thermal insulation prevents walls from becoming heated and thus has a cooling effect. Distributive electricity networks also experience less load intensity due to improved energy efficiency in housing and their life is extended.
Positive side-effects from energy retrofitting projects can also improve the aesthetic qualities of buildings, give better noise isolation and, if combined with more comprehensive measures, add other technical improvements to buildings. On district level, comprehensive retrofitting and upgrading the architectural quality of the building envelope van also improve the social structure and safety in neighbourhoods.
Such factors, taken together, can also have beneficial impacts on property values. With the introduction of energy certifications as imposed by the EPBD and raised awareness, the influence of energy efficiency and green standards on the appraisal process has increased, even though it is still far from being daily practice in most EU countries until now.

Although energy saving and CO_2 reduction in residential buildings in EU has the highest potential of all sectors and a wide variety of technologies is available, promotion of energy efficiency faces a number of barriers. A major barrier in the housing sector for low incomes and social housing is the lack of financial means as well as with owners as housing corporations. Especially for social housing and housing stock owned by people with low incomes have to deal with financial limitations and barriers.
But also housing corporations are often not willing to invest in energy efficiency measures, as these organisations don't have the revenues to repay these investments.

At the same time, this part of the European residential building stock is characterised by high energy use, due to poor energy efficiency of heating installations, poor thermal insulation and poor building physical quality with negative consequences for quality of life. On many locations in EU fuel poverty enlarge this problem. From the other hand, the possible energy saving potential can also offer the key to a solution for these problems. Improving energy efficiency means saving on costs for energy. These savings can be allocated to investments for energy efficiency measures.
Energy Performance Contracting and Energy Exploitation by Energy Service Companies are promising instruments for this.
Within the IEE ECOLISH project the possibilities of these instruments have been investigated in four different pilots in Europe, carried out in the Netherlands, Latvia, Greece and Hungary.

2. OBJECTIVES, SCOPE AND METHODS OF THE ECOLISH PROJECT

Objectives and scope

The objective of the ECOLISH project is to investigate the possibilities for energy efficient retrofitting for low incomes and social housing. The scope of the ECOLISH project is targeted to individual owners with very low incomes in general, for all housing types. The project contains pilots with multi-residential buildings as well as single family dwellings. Especially owners of single family dwellings are extremely difficult to organize, as well as housing complexes with spread ownership.
One of the main features of the project is that it focuses on four cases, where, until now, it was not possible at all to do take any measures to decrease energy use and, above all, energy costs to prevent fuel poverty.

Energy performance contracting and energy exploitation is a potential solution for this problem, especially now the energy market in Europe is liberalised. Within the IEE ECOLISH project a pilot for Energy Exploitation and Performance Contracting is organised, elaborated and evaluated. The pilot is organised on four locations in Europe, each location representing a specific situation in terms of building type, ownership, social and cultural background and climate. For each location Energy Service Companies will be involved for energy exploitation. One of the aims is to investigate if there are possibilities to involve parties including occupants, for example as shareholder. For the necessary investments tailor-made energy performance contracts and finance schemes are elaborated, signed and evaluated including energy and building technical boundary conditions, juridical, financial and social aspects. As overall result general guidelines and conditions will be given how to come to energy performance contracting including a template for a contract. Special attention is paid to the communication with occupants and their role in the contracting.

Methods used

The pilot is organised on four locations in Europe: Heerlen, the Netherlands, Ogre Latvia, Pieria, Greece and Pécsvárad, Hungary, each representing a specific situation. To support the locations a number of general research activities were carried out:

- Technical and social analyses of the pilot locations and determination of measures for building envelope and building services improvement: Objective is to get a detailed overview of the characteristics in terms of building technical issues, energy profiles, and social profiles of the occupants and the potential of energy efficiency measures. A special questionnaire was developed (annex 2);
- Energy Exploitation and Performance Contracting: Objective is to elaborate the actual energy performance contracts for the pilot locations. This includes an inventory of financial and legal aspects, the elaboration of financing structures and the final elaboration of a draft of a specific tailor-made Energy Performance Contracts for the pilot locations;
- Occupant's organisation: Objective is to raise order to raise awareness, create interest and get an optimal involvement of the occupants. This achieved by giving guidance, information and education for the occupants on the implementation of the contracts;
- Evaluation of benefits: Objective of this task is to evaluate the energy benefits from the implementation of the selected retrofitting measures from the inventories on locations, as well as to examine the financial and other characteristics of the proposed investments in order to find the best possible approach for implementation;
- Monitoring, feedback and evaluation: It is important that the technical and financial characteristics of the proposed interventions are presented to the building owners and occupants and get their feedback. Finally the implementation plans are adapted to fit the best possible performance.

During the project it became clear that it was necessary to come to a comparison of results and, in addition, a harmonisation of the results in relation to the implementation of the EPBD in the 4 ECOLISH countries. The initial situation and the improved situation were expressed in the national energy labels in the framework of certification of buildings for the national implementation of the EPBD. The significant difference in labels between the four countries made a necessary to make a comparison and a harmonisation of results.

3. BENEFITS

General benefits for energy efficient refurbishment of social housing

Improving energy efficiency in social and low income housing is a great opportunity to promote economic development, environmental stewardship, social and gender equality and, in general quality of life.

Environmental benefits: Better energy efficiency reduces the pressure of energy use on climate change. Furthermore, improving the energy efficiency of housing constitutes a climate change adaptation measure by better shielding homes from adverse weather conditions. There are also opportunities related to carbon trade possibilities due to reduced carbon dioxide (CO2) emissions.

Energy availability and energy security: Improving energy efficiency in housing permits more energy for alternative uses or for growing "structural" energy demands in the housing sector itself. It also alleviates the risks of political instability which may arise due to energy shortages or energy price inflation for households.

Economic benefits: Better efficiency offers savings with respect to operational costs for tenants, and service providers benefit from the more efficient transportation of energy services. The development of the sector also has positive influences for research and innovation, business development, employment and investment. It therefore offers an effective tool to stimulate economic growth.

Regeneration of the built environment: Retrofitting homes and using proper technologies for housing construction considerably improve indoor thermal, moisture and noise isolation, and imply higher levels of comfort of living and longer cycles of property repair.

Social and health effects: Energy efficiency interventions in housing improve living conditions and the state of public health, address the problems of energy affordability and "energy poverty" and, as a consequence, mitigate social exclusion and inequality.

It is clear that the benefits from energy efficiency in housing represent a situation with mutual benefits. They simultaneously embrace local, regional, national, and global dimensions. However, government policies must drive complex technological and institutional change towards improved efficiency of energy use in order to avoid contradictory microeconomic interests at the national and international levels. Although some progress has been seen in the field recently, the situation existing in virtually all EU member states still leaves much room for improvement. Even those countries that are considered to be advanced in terms of building standards are very far from realizing the sector's full potential. But it is the transition countries that especially lag behind. A specific challenge for these countries relates to overcoming what can be called the energy inefficiency trap, or a situation in which countries having lower energy efficiency are unable to change their respective status due to the lack of funds, experience, technology, motivation and initiative. In the meantime, the state of existing technology demonstrates a very high potential for drastically reduced energy consumption in the housing sector. The technology includes passive houses, zero-energy homes or even plus-energy buildings which produce renewable energy and deliver excesses to the common energy grid. Many technological solutions are also cost-effective: it is estimated that 25-40 percent of only direct energy savings, depending on the particular country, may be achieved nationally in housing by applying cost-effective technologies. However, investment in energy efficiency is done on a limited scale, far below what might be considered as rational. This paradox is known as the energy efficiency gap. It appears that the most serious challenges to energy-efficient housing are not simply technological: they are connected with the need to establish proper and functioning institutional structures that can set large-scale efficiency measures in motion.

Benefits for the target groups

Occupants: Although the proposed action has obvious benefits for several target groups, the benefits for the occupants are socially (and economically) the most important ones. On condition that the total retrofitting and upgrading is an integrated process considering the quality of the building envelope, energy supply, ventilation provisions, building physical details and sustainable selection of building materials, as boundary condition in this proposed action, occupants have the benefit of improved

indoor environment and improved health in combination with low energy costs. The proposed action combines improvement of quality of life with the European policies on energy and CO_2 reduction.

Municipalities: Municipalities in many EU countries have local policies on energy and CO_2 reduction. Although a wide range of technical solutions and technologies, varying from simple and robust to advanced, are available, financial and organizational constraints raise barriers for implementing and realising these policies.
Especially for the residential building stock in economically poor regions it is often impossible for municipalities to achieve local CO_2 reduction policies.
Alternative tailored financing schemes as addressed in this action offer new opportunities for realising local energy and CO_2 reduction policies. All selected pilot locations in this action are typical examples of houses where normally no energy measures would be taken. The participating municipalities have direct benefits of this action in realizing their energy policies. By the participation of the Climate Alliance in this project more than 1000 European municipalities will directly be involved through the dissemination of the project results.

Housing companies and corporations: In many European countries there is growing awareness amongst Housing Corporations of energy and environmental issues, and many are integrating energy and sustainability into their company policies. Next to it housing corporations consider the health and quality of life of their customers as their mission. In some countries the social housing sector is privatised which means that there is a certain competitiveness amongst the corporations in the market. Offering good housing quality (i.e. healthy, comfortable houses with low energy bills) strengthens their position. This often means that the existing housing stock needs upgrading to the current level of new houses. In many cases advanced (and often expensive) technologies are necessary. Financing construction gives a possibility to use the financial revenues after retrofitting for the investment in energy measures.

Utilities and ESCO's: After the liberalization of the European energy market utilities, are often not interested to invest in energy efficiency measures and energy performance contracts and/or the exploitation of sustainable energy installations. Still the "traditional" utilities can play an important role in this, especially in countries with existing building stock with high energy consumption. In exchange for investments in energy saving measures a utility can get a contract for a fixed period to supply the energy for determined prices. This construction can give a certain warranty for utilities to acquire and preserve customers in the liberalised energy market.
In many countries however, the role of the utilities in energy exploitation and performance contracts has been taken over by Energy Service Companies. These companies are better able to operate in a liberalized energy market and can be more flexible in handling different internal interest rates.

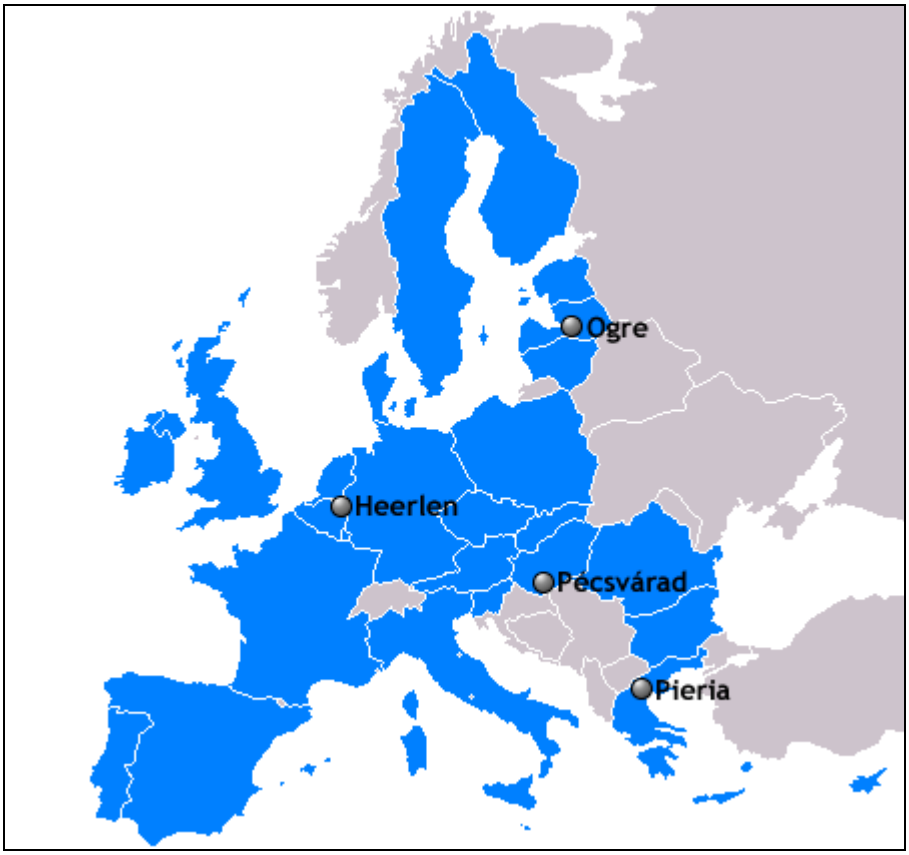
Real Estate Developers: In many EU countries real estate developers see a growing market in retrofitting of houses often in combination with total rehabilitation and upgrading of a district. Social housing and low income housing are a large but difficult and commercially unattractive market to operate for real estate developers. However, retrofitting including the upgrading of the thermal quality of the building and the energy supply in combination with energy performance contracts could be an interesting opening for this market. At the same time, in some countries project developers have experience with energy exploitation of advanced energy concepts (for new buildings) in order to make advanced technical solutions economically feasible. This experience can be used for retrofitting social housing.

4. THE PILOTS

In the ECOLISH project four pilots have been organised in four different locations in Europe:
- Heerlen, district Vrieheide, the Netherlands;
- Ogre, Latvia;
- Pieria, Greece;
- Pécsvárad, Hungary.

Each location represents a specific situation in terms of building type, building practice, local culture and social habits, ownership and climate.

climate → buildings ↓	Pilot Heerlen moderate	Pilot Ogre cold	Pilot Pieria mild	Pilot Pécsvárad continental
Apartments owners		x	x	x
Apartments tenants		x		x
Single family owners	x			
Single family tenants	x			



For each location tailor-made energy performance contracts and finance schemes have been developed and evaluated including energy and building technical boundary conditions, social analyses, as well as legal and financial aspects.
For a detailed description of the pilot locations and the process of organising occupants and coming to contracts, see Annex I.

The Netherlands, Heerlen

Single family house (Vasco house), HEERLEN

Summary of Demonstration Project

District Vrieheide is situated in the north-east part of the municipality Heerlen in the Netherlands and contains 1045 houses. Most families who live in this district have low incomes or are unemployed. A cluster of 837 single family dwellings, built in 1960, characterizes the district. These dwellings have the biggest problems with energy consumption and the indoor environment. The dwellings are, despite there rather unusual floor plan, a good example of post-war large scale real estate development.

The outer walls of the building are renovated in the 80's. The walls of the building consist of 200 mm concrete, 50 mm insulation and are finished with a layer of plaster. Thermal bridges are still present. The windows are made of uninsulated aluminium with single glass and 20 mm insulated plastic panels.

The floors and roofs are made of concrete. The roofs are built according to the reversed roof principle (insulation is installed upon the waterproof layer).

Each house is equipped with radiators and a boiler. In two houses, gas fired combined boilers for heating and hot water are used. In the other houses, they used geysers for hot water. All houses are naturally ventilated.

The local pilot website: www.vrieheide.info

The Netherlands, Heerlen

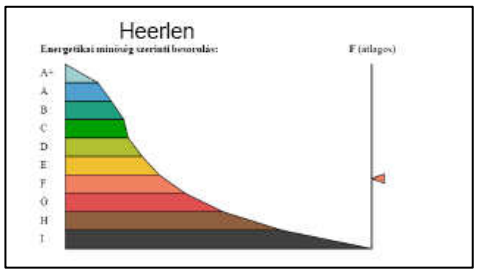
Single family house (Vasco house), HEERLEN

Notable features

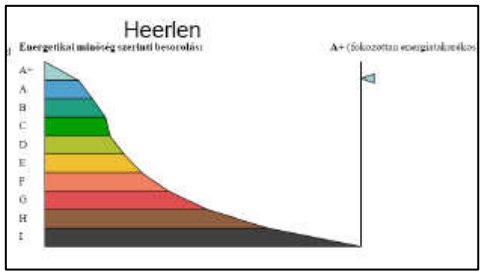
characteristics	Initial situation	proposed refurbishment
Heating system	Individual heating system Radiators and cv-boiler (ranging from VR to HR 107)	Individual heating system Radiators and cv-boiler (ranging from VR to HR 107)
Ventilation system	Ventilation through cracks and seams	self adjusting ventilation
windows	single glazing U-value: 5,1 W/m^{2}K	high efficiency glazing U-value: 1,1 W/m^{2}K
Fabric elements	Wall: 1,82/0,62 W/m^{2}K Basement ceiling: 1,73 W/m^{2}K Roof: 0,71 W/m^{2}K	Wall: 0.60 W/m^{2}K Basement ceiling: 0,32 W/m^{2}K Roof: 0,61W/m^{2}K
Thermal bridges	Insulation of the balcony plates and bearing outs	Insulation of the balcony plates and bearing outs

Energy related Indicators

	Initial situation	After refurbisment
Delivered Energy consumption for space heating & DHW [kWh]	99	46
Type of heating system	Individual heating system	Individual heating system
Type of DHW system	Individual heating system	Individual heating system



Initial situation



After refurbisment

Social analysis

Number of investigated apartments	837 single family dwellings
Ownership	80% private 20% rented by private landlord
Occupancy person/app	2,8
Age ≤ 18	24%
Age 18 – 65	66%
Age 65+	10%
Occupant behaviour no heat during the nights	80%
Occupant behaviour lowering temperature during the night	20%

Overview of costs (1 block, 6 dwellings)

	Netherlands			Funding
	Measures	**Costs**		
Amount dwellings		*6 (1 block)*		
Installation				
Building envelope	Insulation roof	€	35.300	Owner / bank / ESCO
	Insulation bottom floor	€	16.800	Owner / bank / ESCO
	Insulation end wall	€	31.000	Owner / bank / ESCO
	High Efficiency glazing	€	30.000	Owner / bank / ESCO
	Self-adjusting ventilation	€	900	Owner / bank / ESCO
		€	**114.000**	
Electrical Equipment				

SWOT analyses for pilot Heerlen:

Social: Organisation and Involvement	
Strengths	***Weaknesses***
- Strong involvement - Good social control - High-Level Organization - High potency of location	- Unilateral structure - Behaviour - Low education level of occupants - High unemployment Social family structure is threatening
Opportunities	***Threats***
- With right approach - strengthening social cohesion motivation participants	- Large sidedness - Shrink scenario - Family structure - Structural youth problems - pure self-righteousness - Disappearance neighbourhood

Economics: Income and investments	
Strengths	***Weaknesses***
- Consistent energy supply	- High unemployment - Low incomes - Unilateral structure - Low education - No shops - Speed of the process
Opportunities	***Threats***
- strenghtening economy - Stabil situation	- Unemployment Crisis - Critical attitude - Shrinking and age population > 55 years - Depreciation

Technical: Maintenance	
Strengths	***Weaknesses***
- Lots of public space	- Buildings structures - No knowledge - Outdated - Poor infrastructure
Opportunities	***Threats***
- Strengthening architectural level - Beautiful environment after development plans	- Poor maintenance of the area - Moderate public space maintenance - Many building-annexes

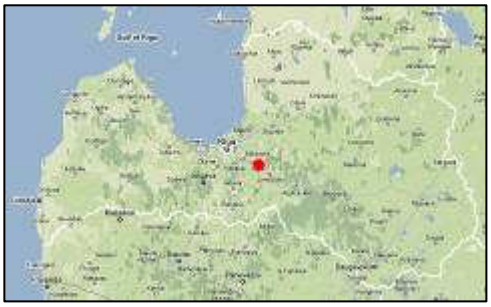
Legal: Creation of EPC, Influence of utilities	
Strengths	***Weaknesses***
- legislation	- Poor limitation
Opportunities	***Threats***
- Strengthening coherence	- Many government regulations - no "rules" - poor enforcement

Context: Surroundings	
Strengths	***Weaknesses***
- Use and access their strength	- Too many house sales - unilateral ideas - individualism - Speed of process, regulatory
Opportunities	***Threats***
- Honest and open communication by professionals - Trust - Collaboration	- Economical Crisis - Shrinking population - Aging of population - Demolition of neighbourhood nearby

Latvia, Ogre

Apartments, OGRE

Summary of Demonstration Project



The municipality of Ogre is situated in central Latvia, 36 kilometres east of the capital, Riga. In 1861, when the Riga-Daugavpils railway was opened, Ogre began to develop into a health resort. Following annexation by the Soviet Union and the Second World War, Ogre was transformed into an industrial centre with a rapidly-growing population and the need for multi-occupant housing.

The pilot scheme area in the municipality of Ogre includes 10 residential buildings with a total of 238 flats. The blocks were erected in two different styles. Some of the buildings were built between the early 1970‘s and early 1990‘s with bricks and panelling. The other buildings were built in the early 1960’s and consist of white bricks.

The outer walls of the buildings consist partly of bricks and partly of concrete. The windows of the building are made from wood with double glass.

The Heating systems of the buildings were made of steel pipes. Self-ventilation was used as indoor air ventilation. Outside air intake occurred mainly through windows. Air chambers were used to take out air from kitchens and lavatories. Since 1997 the generation of hot water was gradually transferred from central heating points to individual boiler houses installed in each building.

The local pilot website: www.malkalne.lv

Latvia, Ogre

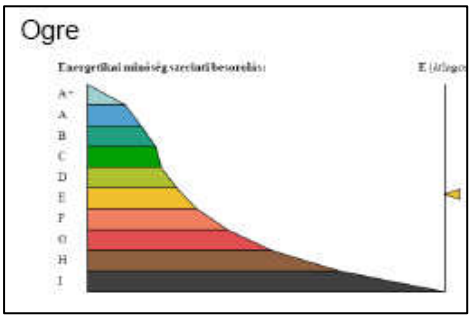
Apartments, OGRE

Notable features

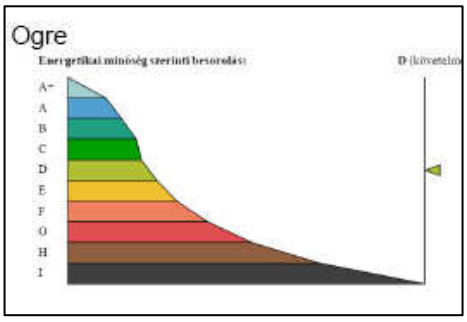
characteristics	Initial situation	proposed refurbishment
Heating system	Central heating through radiators	Central heating through radiators
Ventilation system	Outside ventilation through windows	Outside ventilation through windows
windows	Double glazing 2,5 W/m^2	Double glazing 1.6 W/m^2
Fabric elements	Wall: 1,27/0,89 W/m^{2}K Basement ceiling: 1,03 W/m^{2}K Roof: 0,75 W/m^{2}K	Wall: 0.29 W/m^{2}K Basement ceiling: 0.29 W/m^{2}K Roof: 0.29 W/m^{2}K
Thermal bridges	Insulation of the balcony plates and bearing outs	Insulation of the balcony plates and bearing outs

Energy related Indicators

	Initial situation	After refurbisment
Delivered Energy consumption for space heating & DHW [kWh/m^2/yr]	126	99
Type of heating system	Central heating	Central heating
Type of DHW system	Central heating	Central heating



Initial situation



After refurbisment

Social analysis

Number of investigated apartments	238
Ownership	100%
Occupancy person/app	2,2
Age ≤ 18	16%
Age 18 – 65	63%
Age 65+	21%
Occupant behaviour no heat during the nights	0%
Occupant behaviour lowering temperature during the night	100%

Overview of costs (1 block, 20 dwellings)

	Latvia		
	Measures	**Costs**	**Funding**
Amount dwellings		*20 (1 block)*	
Installation			
	Insulation pipes		ESCO
		€ 1.500	ESCO
	Heat reduction staircase		
	Repair wooden frame		
		€ 1.500	
Building envelope	Insulation roof	€ 7.000	Owner / bank / ESCO
	Insulation cellar wall		Owner / bank / ESCO
	Insulation end wall		Owner / bank / ESCO
	Balcony glazing	€ 30.500	Owner / bank / ESCO
	Radiator thermostats		Owner / bank / ESCO
	Renvation whole buidlding	€ 45.000	Owner / bank / ESCO
		€ 37.500	
Electrical Equipment			

SWOT analyses pilot Ogre:

Social: organisation, involvement	
Strengths	***Weaknesses***
- every house has it s own “house oldie”, acting as a representative of inhabitants interests - some houses already have some experience in implementing energy efficiency improvements (supported by municipality or in frames of project competitions)	- lack of education of population in the corresponding fields (housing, energy, etc.) - lack of interest and responsibility towards common municipal items and common ownership and property - although 46% of respondents have expressed interest to participate in measures, only part of them would be ready to play an active role in changing the situation - even if positive towards energy-efficiency improvements, flat owners rely on the initiative and active action of the house oldies instead of taking responsibility by themselves - great part of inhabitants are retired persons with no money and no interest to invest in energy efficiency improvements - due to the overall economic crisis in Latvia people are focusing on solving their own problems even more as before
Opportunities	***Threats***
- low awareness of inhabitants provide wide opportunities to increase their understanding concerning energy efficiency measures - experience in smaller scale energy efficiency activities can encourage inhabitants to initiate bigger projects for energy efficiency improvements	- economic crisis in Latvia can cause increase in the number of people going to work abroad, thus seeing no reason to invest in their housing - increase of the overall instability and uncertainty concerning the future can lead to total depression

Economics: income, investments	
Strengths	***Weaknesses***
- there are several types of financial support available for energy efficiency improvements (state support, EU programmes, municipal credits or co-financing, local project competitions, bank credits) - municipality provides support in solving social/economic problems of inhabitants	- the applying procedure for receiving state and EU support is very complicated - most types of financial support require co-financing from inhabitants - the incomes of inhabitants in the pilot area are dramatically low (in most cases 140-280 EUR per one person of the household) - paying of costs for heating is a problem for approx. 40% of inhabitants - 39% spend more than 40% of their income on energy costs
Opportunities	***Threats***
- 80% of inhabitants are not satisfied with the costs for the heating, which gives possibilities to convince them to agree on energy efficiency improvements in their house - the energy price (gas) is rising	- due to economic crisis in Latvia the income level of inhabitants can decrease even more - people can come to situation, when they can’t pay even the bills for heating, water, etc.

Technical: maintenance	
Strengths	***Weaknesses***
- good technical base (municipal boiler houses, renovated municipal heating network and sub-stations) - qualified and educated staff and rich experience (more than 15 years) in maintenance field of the supporting organisation - municipal agency “Malkalne” - 2/3 of inhabitants have indicated that they certainly wouldn’t like to move to another place	- the overall state of buildings in pilot location is regarded as moderate (72%) or poor (25%) - the situation concerning the existing insulation of dwelling houses can be regarded as very poor - there is no other maintenance company in Ogre (thus – no competition) - the staff of municipal agency “Malkalne” is rather old
Opportunities	***Threats***
- weak situation concerning the existing insulation give big possibilities for energy savings ad reduced energy bills in the future - possible rising up of the number of clients (new private houses, new dwelling houses, etc.), provides an opportunity to maintain larger areas, to get new clients and to get more earnings for the company	- inability of inhabitants to pay the energy bills can cause disconnecting of the heating and hot water to several clients - houses can be destroyed due to exceeding of their life time

- the quality of existing municipal services can be improved and new services proposed for inhabitants - the buildings in the pilot location represent typical housing built in the 60-80ties throughout Latvia and other Soviet Republics, thus allowing to apply project results in other areas and increasing the added value	

Legal: creation of EPC (Energy Performance Contracting), influence of utilities	
Strengths	***Weaknesses***
- there are several examples in Ogre, where inhabitants have created their own maintenance cooperatives - municipality provides legal advice, if necessary	- in most types of financial support the financing is available only for multi-apartment houses, which are in the possession of the flat owners - inhabitants feel protected from the municipal administration side and are not ready to take over all responsibilities of their housing by themselves - only 7% of inhabitants are sure about their wish to create their own maintenance cooperative - the experience of other houses concerning own maintenance cooperatives or societies is not very good - there is no experience and thus no example of Energy Performance Contracting in Latvia - there is no legislation established on EPC - the conditions for establishing new businesses in Latvia is not very favourable in general
Opportunities	***Threats***
- dissatisfaction of inhabitants concerning the energy bills and their wish to decrease their expenses can stimulate them to consider other types of maintaining their housing and to search for new ways of financing energy efficiency improvements	- due to economic instability in Latvia inhabitants will strive more and more to be in the protection of municipality and will not be ready to separate from MA “Malkalne” or to chose new forms of organising and financing energy efficiency measures

Context: surroundings	
Strengths	***Weaknesses***
- good geographical situation of Ogre (location near to Riga) and good connections - 92% of inhabitants find it pleasant to live in their neighbourhood - almost 80% of inhabitants consider Ogre as a pleasant place to live	- the infrastructure is rather poor (especially – the condition of streets and roads) - 62% of inhabitants are dissatisfied or even very dissatisfied with parking facilities - dwelling houses are not very appropriate for people with special needs (handicapped people) - many people work and study in Riga and stay in their housing only overnight, thus having no big interest to invest in energy efficiency measures or improvements of their surrounding
Opportunities	***Threats***
- the overall infrastructure of the pilot-area and its surroundings can be improved by using municipal, state and EU financing under different funds and programmes	- the condition of the infrastructure can become even worse due to considerably reduced municipal budget, cut by the government with intention to lead the state out of the economic crisis

Greece, Pieria

Apartments, Pieria

Summary of Demonstration Project

Pieria Prefecture is located in North Greece combining mountainous areas (Mt. Olympus, Mt. Pieria) and areas by the sea (Thermaikos Gulf). Katerini is the capital of the prefecture, with a total population of 56.434 inhabitants located in the centre of the Prefecture with a total area of 93.459 acres, mainly flat. Katerini has 4 organised settlements of low income social housing.

The blocks under examination were constructed in an area of approximately 20acres. Within this area are 150 apartments located. The settlements are organized in 18 blocks, which were built in two different periods, namely in 1977 and 1981.

The outer walls of the building consist of 200 mm bricks without insulation. Thermal bridges are still present. The roof is made of concrete. The windows are made wood or aluminium, but with single glass.

The energy use of the examined buildings mainly consists of electricity used for lighting, cooling, cooking and electric appliances and red diesel used for heating. In general, primary electricity in Greece is mainly generated from lignite.

The apartments have common central heating system per block or groups of blocks. The occupants have no influence on the set point temperature and daily schedule of the heating. Hot water was provided through electricity and solar collectors. The apartments are naturally ventilated through the windows and through the existing cracks and openings.

The local pilot website: www.pieriki-anaptixiaki.gr

Greece, Pieria

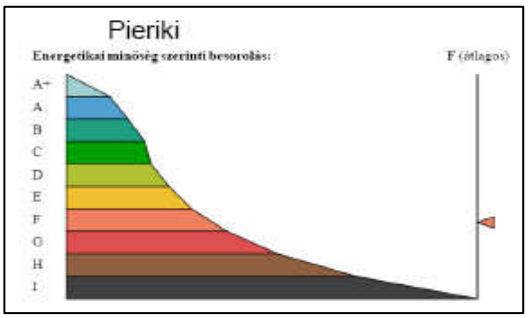
Apartments, Pieria

Notable features

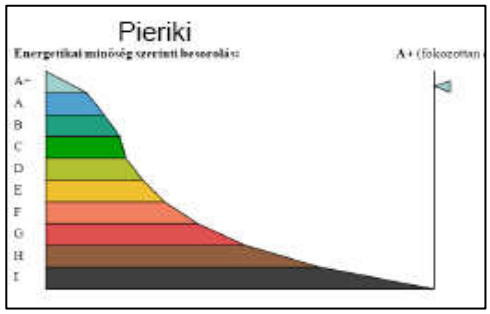
characteristics	Initial situation	proposed refurbishment
Heating system	Central heating through radiators	Central heating through radiators cv-boiler (ranging from VR to HR 107)
Ventilation system	Outside ventilation through windows	Outside ventilation through windows
windows	single glazing 5,1 W/m^{2}K	Double glazing with thermal breaks 2,5 W/m^{2}K
Fabric elements	Wall: 2,73/1,80 W/m^{2}K Basement ceiling: 3,39 W/m^{2}K Roof: 0,71 W/m^{2}K	Wall: 0.21 W/m^{2}K Basement ceiling: 0.29 W/m^{2}K Roof: 0.22 W/m^{2}K
Thermal bridges	Insulation of the balcony plates and bearing outs	

Energy related Indicators

	Initial situation	After refurbisment
Delivered Energy consumption for space heating & DHW [kWh/m^2/yr]	104	58
Type of heating system	Central heating	Central heating
Type of DHW system	Central heating	Central heating



Initial situation



After refurbisment

Social analysis

Number of investigated apartments	150
Ownership	Workers Housing Organisation and inhabitants
Occupancy person/app	2,6
Age ≤ 14	14%
Age 15 – 65	59%
Age 65+	27%
Occupant behaviour no heat during the nights	100%
Occupant behaviour lowering temperature during the night	0%

Overview of costs (1 block, 9 dwellings)

	Greece			Funding
	Measures	**Costs**		
Amount dwellings		*9 (1 block)*		
Installation	Thermostats	€	3.267	ESCO
	Boiler	€	2.833	ESCO
	Insulation pipes	€	167	ESCO
		€	**6.267**	
Building envelope				
	Insulation roof	€	9.500	ESCO
	Painting	€	3.700	ESCO
		€	**13.200**	
	Double glazing	€	7.020	Owner / bank / ESCO
		€	**7.020**	
Electrical Equipment	Fans for cooling			Owner
	Luminaires			Owner

SWOT analyses of pilot Pieria

Social: organisation, involvement	
Strengths	***Weaknesses***
- interested, especially in terms of saving money	- Greek youngsters move out while immigrant youngsters move in - occupants have final contracts-houses have been resold, whilst the social status of new occupants remains the same in general.
Opportunities	***Threats***
- partly used to future thinking.	- no trust to externals

Economics: income, investments	
Strengths	***Weaknesses***
	- no credits by third parties
Opportunities	***Threats***
	- bad experiences

Technical: maintenance	
Strengths	***Weaknesses***
- individual responsibility for maintenance.	- mismatching of architectural designs and actual situation. - actions not studied, no scientific input
Opportunities	***Threats***
- when situation really gets inevitable, actions are taken under private initiative	- focused on esthetics.

Legal: creation of EPC (Energy Performance Contracting), influence of utilities	
Strengths	***Weaknesses***
	- no legalisation on ESCO's yet
Opportunities	***Threats***
- awareness of management legislation.	- more delays on ESCO's legalisation. - dispersion of competences

Context: surroundings	
Strengths	***Weaknesses***
	- low trust, low initiative. - approaching problems. - multi sectoral actions.
Opportunities	***Threats***
- important work don on public spaces.	- no organisation of occupants (public or private) existed, so the organising actions of occupants started from zero level.

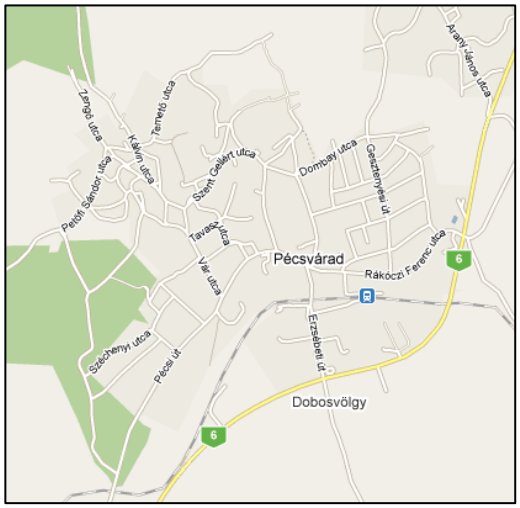
Hungary, Pécsvárad

Apartments, Pécsvárad

Summary of Demonstration Project

Pécsvárad is situated in the south part of Hungary, about 180 km from Budapest. The small town is the centre of the East- Mecsek, wich contains 19 villages (Figure 1). The population of Pécsvárad is 4041, the total number of houses and dwelling is 1414. Last 20 years was build 36% of the total number of houses and buildings. In the town the average density 2,92 people/flat.

The investigated houses were built in 1960 – 1970.The 121 dwellings located in 10 buildings. Quarter of the investigated houses (27%) are in good shape. The state of maintenance of the houses are mainly reasonable (69%) and only 4 % is in bad shape.



The outer walls of the building consist of 380 mm bricks without insulation. Thermal bridges are still present. The roof is uninsulated with ceramic inset. Most of the investigated houses have wooden window frames with double glass. Some dwellings the windows were changed for good insulated window mainly with plastic frame. The windows are double glassed.

For space heating the houses are mostly equipped with radiators and gas-boilers. Approximately 89 % of the house uses electrical heater for DHW. Natural ventilation is the process of supplying and removing air by operable windows.

The local pilot website: www.pecsvarad.hu
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Hungary, Pécsvárad

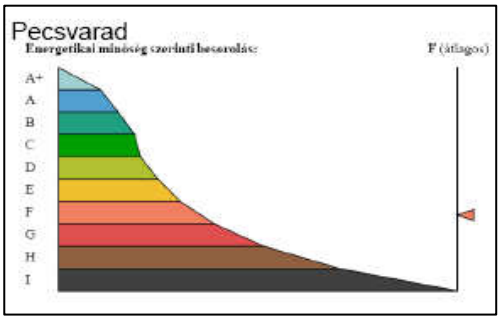
Apartments, Pieria

Notable features

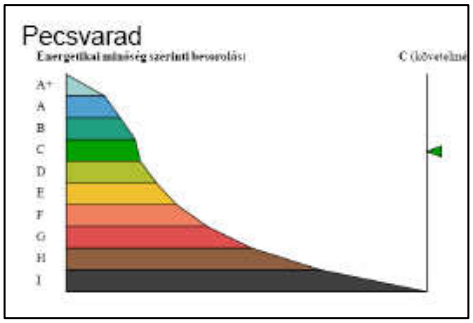
characteristics	Initial situation	proposed refurbishment
Heating system	Central heating through radiators and gas-boilers.	Central heating through radiators and gas-boilers.
Ventilation system	Outside ventilation through windows	Outside ventilation through windows applying (small) fans
windows	Wooden frame with double glazing 2,5 W/m^2	Wooden or plastic frame with double glazing 1,6 W/m^2
Fabric elements	Wall: 1,34 W/m^{2}K Basement ceiling: 0,98 W/m^{2}K Roof: 1,31 W/m^{2}K	Wall: 0,45W/m^{2}K Basement ceiling: 0,49W/m^{2}K Roof: 0,29 W/m^{2}K
Thermal bridges	Insulation of the balcony plates and bearing outs	Insulation of the balcony plates and bearing outs

Energy related Indicators

	Initial situation	After refurbisment
Delivered Energy consumption for space heating & DHW [kWh/m^2/yr]	104	58
Type of heating system	Central heating	Central heating
Type of DHW system	Central heating	Central heating



Initial situation



After refurbisment

Social analysis

Number of investigated apartments	107
Ownership	99% owns the flat
Occupancy person/app	2,2
Age ≤ 18	16%
Age 18 – 65	75%
Age 65+	9%
Occupant behaviour no heat during the nights	31%
Occupant behaviour lowering temperature during the night	69%

Overview of costs (1 block, 24 dwellings)

	Hungary			Funding
	Measures	**Costs**		
Amount dwellings		**24 (1 block)**		
Installation	thermostats	€	5.760	ESCO
	boiler (24)	€	36.480	ESCO
	DHW boiler	€	9.600	ESCO
		€	**51.840**	
Building envelope	insulation wall	€	3.490	Owner / bank / ESCO
	insulation roof (dachboden)	€	748	Owner / bank / ESCO
	windows incl frames	€	48.000	Owner / bank / ESCO
		€	**52.238**	
Electrical Equipment				

SWOT analyses of pilot Pecsvarad

Social: organisation, involvement	
Strengths	***Weaknesses***
- people are interested, occupants would like to reduce the energy bills, the people don't want to move - would like to live in a better environment.	- mix occupancy (old and young)
Opportunities	***Threats***
- put the money to the future (energy efficient measures) not to the bank.	- some apartments rent (20%)

Economics: income, investments	
Strengths	***Weaknesses***
- a lot of company offer energy efficient solutions, promise the savings.	- Not now governmental support, municipality cannot help, energy costs rate high
Opportunities	***Threats***
- save energy, save money	- economical crisis, situation in Hungary

Technical: maintenance	
Strengths	***Weaknesses***
- good technical support.	- the suggested measures could be different from apartment to apartment.
Opportunities	***Threats***
- value of the buildings increases	- difficult to find a really good solution - not to meet with the request of the occupants.

Legal: creation of EPC (Energy Performance Contracting), influence of utilities	
Strengths	***Weaknesses***
- energy certification helps.	- no penalty if somebody does not prepare the energy certification.
Opportunities	***Threats***
- prepare to law for ESCO, projects, EU support for ESCO	- no law for ESCO, EPC

Context: surroundings	**Context: surroundings**
Strengths	***Weaknesses***
- new building, better indoor climate with less energy	- people afraid from all new and to take responsibility for long time, municipality no responsibility for the housing cooperative
Opportunities	***Threats***
- good practice for other buildings	- bad experiences for ESCO (earlier was no guarantee for savings)

5. GENERAL OVERVIEW AND COMPARISON OF THE PILOTS

Main characteristics

For every location social analyses were executed. In following table an overview is given of the main characteristics:

	Heerlen	Ogre	Pieria	Pécsvárad
Number of investigated apartments	837 single family dwellings	238	150	107
Ownership	80% private, 20 % rented by private landlord	100%	Inhabitants (apartments) Workers Housing Organisation (communal areas)	99 % owns the flat
Occupancy person/app.	2,8	2,2	2,6	2,2
Age ≤ 18	24%	16%	14% under 14	16%
Age 18 – 65	66%	63%	59% between 15-65	75%
Age 65+	10%	21%	27%	9%

Table.5.1: Overview of the main characteristics

Comparison of energy use and heating systems of the pilot locations (Integrated Energy Performance, IEP)

With the given energy parameters we compared the integrated energy performance of the pilot locations. The heating system is differs from each other, while in Pécsvárad and Heerlen each dwelling has individual heating system, until Pieriki and Ogre have central heating system.
The following table is a contraction of the average measured energy consumption for all the pilot locations.

	Space heating (gas)	Space heating	Specific gas consumption for heating	DWH	DWH	Total gas con.	Total IEP
	m^3/a	kWh/m^2a	m^3/m^2a	m^3/a	kWh/m^2a	m^3/a	kWh/m^2a
Ogre	**--**	**125**	**--**	**--**	**67**	**--**	**192**
Heerlen	**1876**	**147,7**	**14,5**	**424**	**33,4**	**2300**	**181**
Pécsvárad	**1120**	**153**	**16**	**--**	**60**	**1120**	**225**
Pieriki	**--**	**144**	**--**	**--**	**54,5**	**--**	**198,5**

Table 5.2: average measured energy consumption for the pilot locations

Ogre' heating and DHW system:
One-pipe heating systems with the connection to the centralized heating system were used to heat buildings. The elevators have been gradually replaced by plate-type heat exchangers, thus moving away the internal engineering networks of the buildings from the external heat supply networks. Heating systems of the buildings were made of steel pipes.
The average heat consumption for hot water of analyzed buildings for year 2005/2006 was 67 kWh/m^2a, while the average energy consumption for heating was 125 kWh/m^2a. The integrated energy performance of a typical dwelling is 192 kWh/m^2a, which is 14% lower than the Hungarian integrated energy performance. Despite of the weather condition, in the Hungarian dwellings the indoor temperature is higher at least with two degrees Celsius and also the Latvian building stocks have better heat transfer coefficients than the Hungarian buildings.

Heerlen's heating and DHW system:
The houses are mostly equipped with radiators and a cv-boiler (ranging from VR to HR 107). Approximately 33 % of the house uses a gas-fired combi appliance for DHW (domestic hot water). The other houses use a kitchen geyser.

The Dutch calculation resulted a large difference between the actual gas consumption and the calculated one under standard conditions (3.150 m^3 year). This can be explained by, among others, the heating scheme of the ground floor - will mainly not be heated. Therefore, the average room temperature is adjusted to 15℃ (including the most ly unheated ground floor). This is calculated as a weighted average of:

Ground floor (entrance, storage):	29,6 m^2	Ti = 10℃
First floor (living room, kitchen):	49,0 m^2	Ti = 18℃
Second floor (bed rooms, bathroom):	49,0 m^2	Ti = 15℃

The very low indoor temperature explains why the Heerlen's apartments have lowest energy performance than the rest of the pilot location.

Pécsvárad's heating and DHW system:
The typical heating of the apartments, namely 77%, functions with gas boiler or gas convectors. The DHW is mainly produced with electrical boilers/geysers, 89% of the investigated apartments are using electricity to produce hot water. Three fourth of the inhabitants keep their dwelling in the heating season between 20-22^{o}C, 12% on 23 ^{o}C and the rest of apartments are heated below 17 ^{o}C or above 24 ^{o}C.
Inhabitants' behavior and the week thermal structure of the flats, indicates very high integrated energy performance of the investigated apartments. We compared the gas consumption for heating, for Heerlen and Pécsvárad. At Pécsvárad we only considered those apartments, with its DHW produced with electric geysers, and the heating system operated with gas. The Dutch apartments are 129 m^2 while the Hungarians are 70 m^2 in average, to compare the gas consumption/apartment would not be a relevant option; therefore we used a specific gas consumption, m^3/m^2, on the unit surface. As a result we calculated a 16m^3/m^2 annual gas consumption for Pécsvárad's apartments, and 14,5 m^3/m^2 annual gas usage for Heerlen, in both cases, the gas was used just for heating.
For the Greek and Latvian pilot location there was no gas dates available, either there was no gas used for combustion (red diesel in Pieriki), or distance heating in case of Ogre.

Pieria's heating and DHW system:
Apartment blocks have a common central heating system. During the winter
period (October - April) the heating system is set to 22 ℃ and constantly burning from 7.15 till 21.0 0 h daily, independently of occupancy of each apartment. The occupants have no influence on the set point temperature and daily schedule of the heating.
The current heating installation has a nominal value of 400.000kcal/h, the fuel used for heating is red diesel.
Annually the total fuel consumption for heating for all apartments of blocks together is approximately 27.000 liters. There are no individual separate heating meters; therefore the average heating consumption for the apartments were estimated to 15ltr/m^2.
The integrated energy performance of the apartments from Pieriki is high, especially with all the positive circumstances around the pilot location, Mediterranean climate, no heating during the nights. On the other hand, Pieriki's building envelope heat transfer coefficients values deduct the high values of IEP (Integrated Energy performance), 198,5 kWh/m^2a. We neglected the cooling energy use of these apartments, (42,5kWh/m^2a for an average apartment), to be able to compare the pilot location's IEP with each others.
Adding together the energy consumption for heating, cooling and DHW making, the real energy performance of the pilot location was 240,5 kWh/m^2a.

General SWOT analyses

During several project meetings the concept of ESCO's and EPC for social housing was discussed among the project partners. These discussions are summarised in a SWOT analysis for each pilot location. The aspects are: social, economics, technical and legal issues. Furthermore, the concept of ESCO's and EPC is analysed regarding other external factors (context and surroundings).
SWOT Analyses is a strategic planning method used to evaluate the strengths, weaknesses, opportunities, and threats involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favourable and unfavourable to achieving that objective.

- **S**trengths: attributes that are helpful to achieving the objective;
- **W**eaknesses: attributes that are harmful to achieving the objective;
- **O**pportunities: *external* conditions that are helpful to achieving the objective;
- **T**hreats: *external* conditions which could do damage to the objective.

Identification of SWOT's is essential because subsequent steps in the process of planning for achievement of the selected objective may be derived from the SWOTs. The results for the SWOT analysis of EPC and ESCO's related to several criteria is described for each pilot location.
A general SWOT analysis is derived from the pilot locations and summarized in the next table.
Important note: not all of the mentioned general items apply to each location.
In next table a general summarising SWOT of EPC for social housing is given.

Aspect	Strengths	Weaknesses	Opportunities	Threats
Social	• occupants want to reduce their energy bill • occupants like to stay in their known surroundings, with EPC no need to move • strengthening social cohesion in neighbourhood	• target group is not used to long term planning • lack of education of population in the corresponding fields (housing, energy, etc.) • low improvement of social status • target group is reluctant / suspicious on new energy business-	• energy measures put the money to the future, not to the bank • low awareness of inhabitants provide wide opportunities to increase their understanding concerning energy efficiency measures • experience in smaller scale energy efficiency activities can encourage inhabitants to initiate bigger projects • gain trust by honest, open communication	• mixed occupancy, age differences with different horizon and interests • lack of organization • no thrust to externals • (natural) shrinking of population, youngsters move out • indivualism • low initiatives • multi sectoral actions • lack of interest and responsibility towards common municipal items and common ownership (common property)
Economics	• save energy, save money • stabilized energy costs • value of property rises • enlargement of building lifespan	• savings depend on user behaviour • low income • most types of financial support require co-financing from inhabitants • criteria of loaning money to low-income	• rise of energy price • EU support on ESCO's • financial support programs • majority of occupants is not satisfied with high energy costs • people can come to situation, when they can't pay even the bills for heating, water, etc.	• economical crises, increases the number of people going to work abroad, thus seeing no reason to invest in their housing • mistrust to credits by third parties • the applying procedure for receiving state and EU support is very complicated • fluctuating governmental support (grants) • high unemployment
Technical	• good technical support by specialists • simple measures already result in high savings • improved building with better IAQ	• state of similar dwellings may vary in practice (different annexes): tailor made solutions necessary • standard package may not satisfy everybody	• pilot location is typical for national building stock, large replication • improvement of architectural level • lots of public spaces	• outdated, small floor plans • floor plans may not appropriate for handicapped and elderly people • home improvement normally focused on aesthetics

Aspect	Strengths	Weaknesses	Opportunities	Threats
		• poor state of maintenance of buildings • buildings at the end of technical life span		
Legal	• solid contract partners	• legal organization of owners necessary • rights of owners/clients are not covered by law • lack of legislation on EPC and ESCO's • dispersion of competences	• EU energy certification and EPBD • new legislation on ESCO's	• no penalty if energy certification misses • poor enforcement of legislation • building permits absent • experiences with other formal organizations of owners • delays on legislation
Context, surroundings	• better appearance of the buildings after renovation	• low formal responsibility of municipality for social housing	• high satisfaction of living area • good practice, demonstration for other buildings in neighbourhood	• bad experiences from past (ESCO without guarantees) • poor quality and maintenance of public space (poor infrastructure, poor parking facilities)

6. ROLE OF ESCO'S ON ENERGY PERFORMANCE CONTRACTING IN ENERGY EFFICIENT RETROFITTING FOR SOCIAL HOUSING

Terms and definitions

Concerning the use and understanding of the terms 'ESCO', 'EPC', 'TPF' and others there is a problem with unambiguous definitions which have been highlighted at many forums and by numerous experts and business actors. The Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on Energy End-use Efficiency and Energy Services (Energy Services Directive) gives clarity on this discussion. The European Commission has been promoting EPC, ESCOs and TPF, through a number of direct and indirect Recommendations and Directives. Nevertheless, the Energy Services Directive is a crucial step. Besides the basic role and vital function, it may customize the ESCO related terminology.
The official definition of an Energy Service Company (ESCO) is: a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria.

ESCOs are companies whose services can be used to deliver varying levels of input to community heat and power (and sometimes cooling) schemes and other types of energy service contracts. Typically, these services include project design, capital finance, construction, management, fuel purchasing, billing, plant operation, maintenance, long-term replacement and risk management. ESCOs typically provide capital finance to projects on the basis of bankable long-term energy supply contracts with their customers.
The host organisation will not normally want to own or operate a community energy scheme itself. To do so would mean bearing all of the risk on the capital cost and operating such a scheme and this may well be seen as too removed from its core activities. That being the case, the host organisation may look to a specialist service provider to provide finance, expertise and risk management services to deliver the scheme. The majority of schemes have been developed in this way.

In the case of larger schemes, it is common for a separate legal company to be formed to deliver the scheme. This company is known as a Special Purpose Vehicle (SPV) and would usually be project specific and wholly owned by the ESCO, although the host organisation will sometimes take a small stake. Sometimes the SPV itself is referred to as an ESCO, in addition to the parent company.

That said, it is worth noting that there is no *single* ESCO model - they vary according to the characteristics of the communities, or project developed in which they are set. However, to a large extent, they all work within the same legislative, regulatory and commercial environment. Summarised it can be described as a construction to facilitate all financial benefits of private organised energy exploitation (which is possible the framework of a liberalised EU energy market). It can also be an entity for all involved parties, for example to take over their specific concerns. This can be one or more organisations, within (preferably) in a transparent and accessible structure, taking care of:

- Financing of the installations;
- Energy supply (Heat, Cold, DHW), nowadays often addressed as supplying comfort;
- Maintenance;
- Billing and customer care;
- Metering;
- Purchasing energy (fuel, electricity) for the installations.

Experience has shown that the existence of a highly proactive host organisation is essential to the development of a successful scheme. In the case of schemes serving existing buildings, the host organisation is usually a Local Authority (although sometimes a developer) with a range of their own buildings included within the scheme. The relationship between the SPV and the host organisation is an important aspect of schemes with examples ranging from wholly privately owned to publicly owned – this is explored further in the London Energy Partnership guide to making ESCOs work. Examples of SPVs set up to serve existing buildings include:

ESCOs serving new developments
Following the recent introduction of planning policies requiring community energy networks, there are many proposals for ESCOs to serve new developments and some of these are starting to be built out. Indeed, the new build area is currently the main focus of the attention being paid to ESCOs.

ESCOs as facilitators of Renewables and Other Low CO_2 Technology
As well as facilitating the finance for schemes, ESCOs bring with them expertise in the use of renewable energy and other low carbon technologies. They will usually have experience of implementing renewable energy schemes at a range of sites. For example, they will often have experience in:
- gaining access to supply chains for biomass fuels;
- maintaining community scale wind turbines; large PV plants;
- operating CHP units and selling the electricity generated.

Extending the services offered to cover other utilities
At the new build stage, the provision of infrastructure for the supply of heat and power to buildings also provides opportunities to integrate other services at the same time. For example, economies may be achieved by considering the design of the communications and other utility networks in parallel with the energy networks. Where the ESCO supplies other Utility services it is sometimes referred to as a Multi-Utility Service Company (MUSCO).

The Limitations of ESCOs
ESCOs undoubtedly have a critical role to play in delivering low carbon communities, especially in high density areas. However, they do have some limitations and potential weaknesses of which developers need to be aware.

The owners of the buildings and dwellings on these new developments will, due to the method of heating provision, be captive heat customers. This is the case with any communal heating scheme, regardless of whether an ESCO is involved or not. In order to protect their reputation, developers need to ensure that ESCOs, as the monopoly supplier, offer competitive and cost reflective heat prices, in the long term as well as in the initial years, together with comparable service levels. This is usually achieved through clauses in the project agreement between the host organisation and the ESCO and the Customer Heat Sale agreements. As heat is a largely unregulated market, little protection is offered through the regulatory system.

In terms of electricity, there can also be constraints arising for customers. It is likely that ESCOs implementing new build schemes will look to sign customers up for long periods of time in order to underpin the significant capital investment in infrastructure required. The occupants of new dwellings provided with heat by an ESCO may also find themselves in the situation where they are asked to sign up as a long term electricity customer. In these circumstances, similarly to heat supply, developers will need to ensure that ESCOs offer electricity prices similar to or below those available to the average consumer. If the ESCO is sufficiently large that it is required to be licensed, consumers will also have the added protection offered by supply license regulations, although this can also result in additional administrative costs for the scheme operator.

Community Involvement in ESCOs
Communities can become involved in ESCOs in a number of ways. At one level, the residents association will be a consultee of the ESCO e.g. in terms of ensuring customers are receiving a satisfactory service. At another level, representatives of the resident's association may sit on the board of the SPV set up to run the scheme. Finally, the community might have an actual stake in the SPV, either via a Community Trust Co-operative (where every customer is a member) or a shareholding. This scenario is being investigated for Barking Riverside whereby the Community Trust might take a stake in the SPV set up to deliver the scheme. Whichever type of involvement is adopted, actively engaging the community in the operation of the ESCO brings with it a range of benefits. For example, the community is likely to feel more engaged with the issue of energy, which can encourage them to think more about how they conserve energy in their day to day lives. It can also increase their level of control, thereby meaning that being served through a monopoly heat supply is less of an issue.

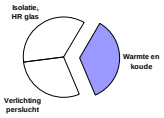
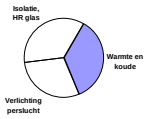
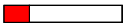
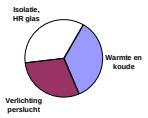
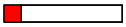
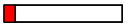
Energy Performance Contracting
Energy Performance Contracting (EPC) is a contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement.

EPC is an innovative financing technique that uses in cost savings from reduced energy consumption to repay the cost of installing energy conservation measures. In the more traditional way this service is offered by Energy Service Companies (ESCOs), and often limited to energy efficient installations and building services. In ECOLISH however the building as a total system is concerned (i.e. building, installation and its occupants). EPC can be established by traditional ESCO's but also by other 3rd parties, willing to invest (builders/real estate developers, housing corporations). For residential buildings the basic principle is that the billing is conform the "Not More then Business as Usual" principle or lower. Next to it, all profits and benefits (including avoided costs/investments) has to be allocated to investments or future investments.
EPC allows building owners and users to achieve energy savings without up front capital expenses. The costs of the energy improvements are borne by the performance contractor and paid back out of the energy savings. Other advantages include the ability to use a single contractor to do necessary energy audits and retrofit and to guarantee the energy savings from a selected series of conservation measures.

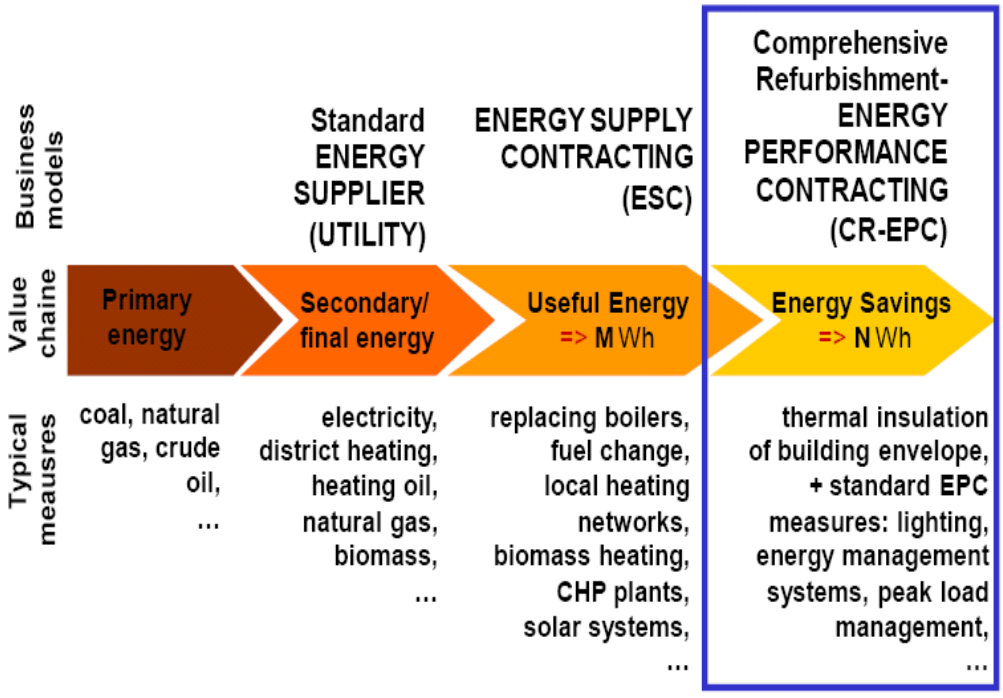
Third party financing
Third-party financing (TPF) is a contractual arrangement involving a third party — in addition to the energy supplier and the beneficiary of the energy efficiency improvement measure — that provides the capital for that measure and charges the beneficiary a fee equivalent to a part of the energy savings achieved as a result of the energy efficiency improvement measure. That third party may or may not be an ESCO.

Recent developments in ESCO business and services

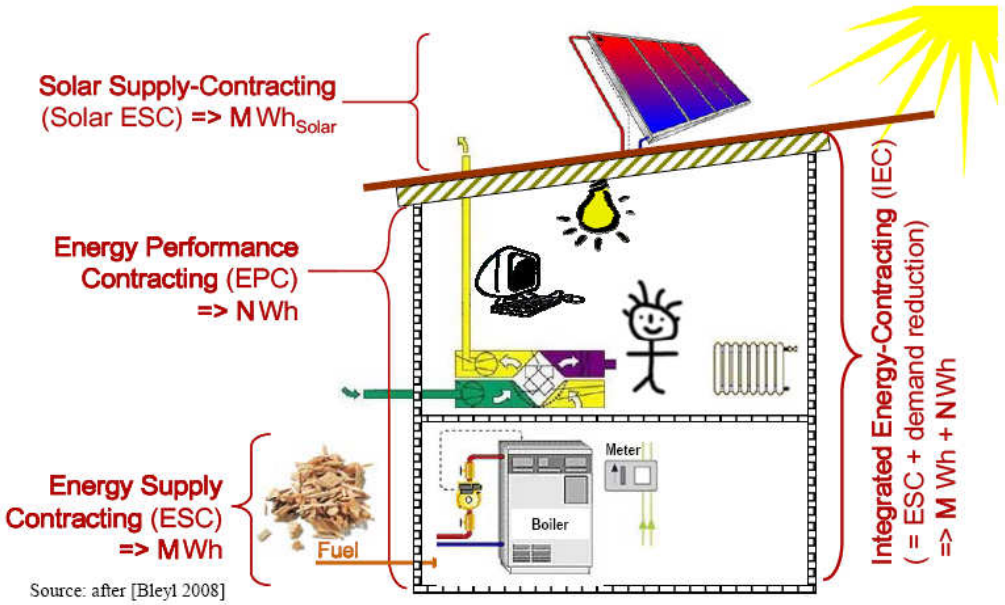
Since the start of the ECOLISH project (1 December 2006) some remarkable developments in the business approach of energy service companies took place.
Traditionally utilities offered only supply contracting of electricity, natural gas, district heating and cooling as a separate activity, without any integration with the built environment. The first steps in energy performance contracting only concerned the performance of building services for heating (and in non residential buildings for cooling), EPC basic. Especially for non residential buildings (mainly offices) this model is expanded by also including other building services such as lighting and pressurised air (EPC plus).
During the ECOLISH project participant Essent Energy Services expanded their ESCO businesses to integrated concepts, including building services and building envelope. The application of this model is much more versatile; however, the penetration rate in the market is still relatively small.

Concepts		penetration rate	business scale	
			Energy volume	Applications
1. Supply Contracting			+	+
2. EPC basic			+++	+
3. EPC plus			+++	++
4. Integrated EPC			++	+++

In next figure an overview is given of the energy services models, the energy added valued in the total energy chain and the typical efficiency measures, as developed during the ECOLISH project.

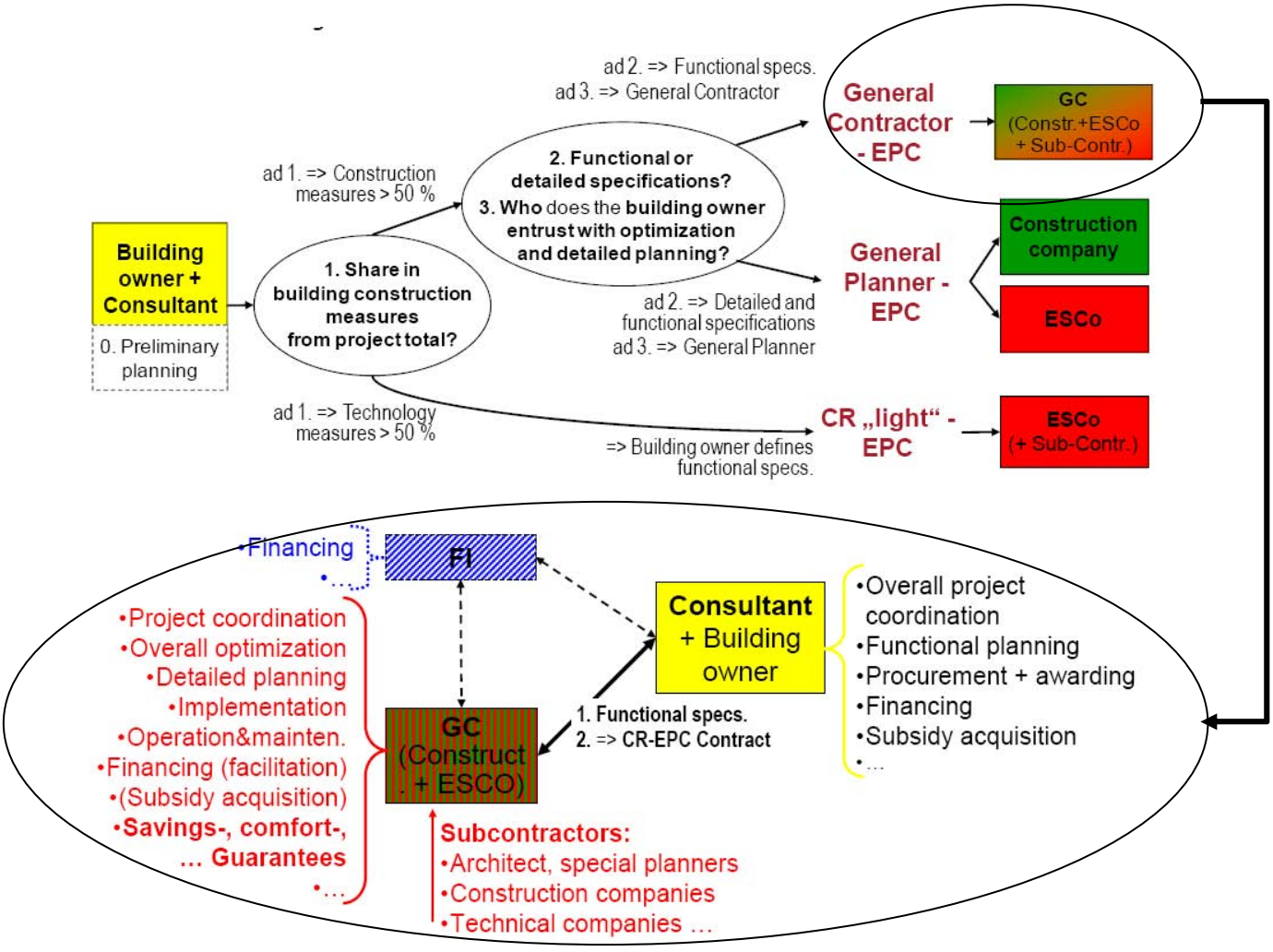


As this figure shows there are different energy contracting models possible. The scope of measures of Energy Contracting models can be different as following figure shows:

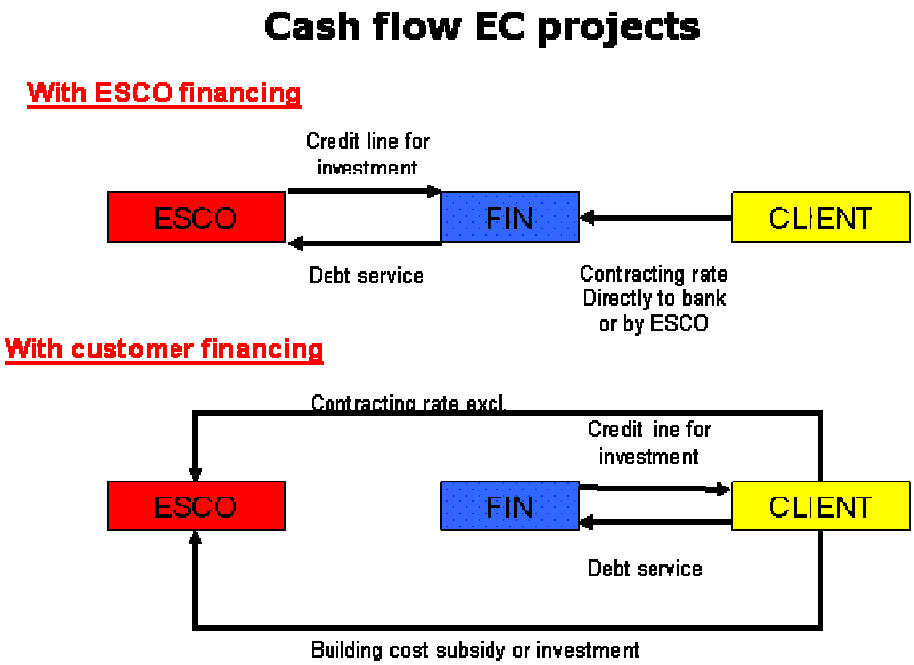


This figure shows that it is possible that separate contracts can be settled for the exploitation of solar panels PV on roofs; this model was for example investigated in Heerlen.

Within ECOLISH, most of the contracts are focusing on the total refurbishment. In following flow chart this process is shown:

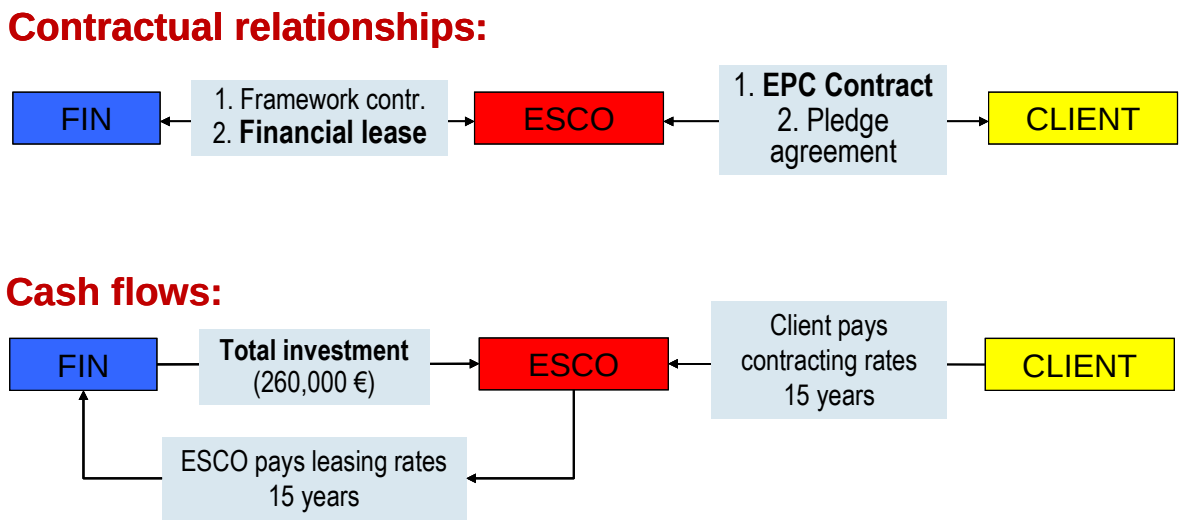


In following figure the cash flow in energy contracting projects is explained:



There are two possibilities, with or without financial contribution of the client. In the case of financing by an ESCO the contracted rates can be settled by a bank as intermediary or by directly between the ESCO and the client.

A model that is often used is a construction with financial lease:

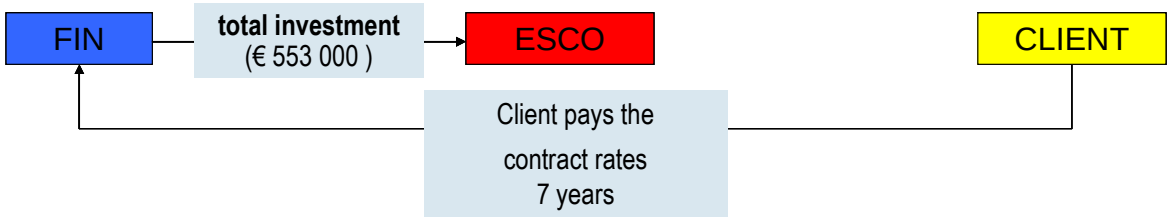


In this case the finance company is the legal owner of the asset during duration of the lease.
However the lessee has control over the asset providing them the benefits and risks of (economic) ownership. In general this model is not really suitable for investment in the building envelope. A second barrier is the relatively high interest rate of 11%, without deduction possibilities of tax.

As alternative, a construction with operational lease can be used:

Contractual relationships:

Cash flows:



The difference with financial lease is that in an operating lease the lessor has the benefits and risks of owning the asset.

Concerning the legal aspects there are also differences between the two options:

	ESCO is owner	**Financial lease**
Financing term	Fixed period according to customer demand, minimum 6 months to 60 months or longer Usually below useful life time	Flexible according to customers demand Usually below useful life time of the investment
What can be financed?	Complete energy service investments incl. soft costs	Complete energy service hardware
Cancellation of the contract	Generally no cancellation during contract term possible	Depends on contract type, usually fixed terms Short rate penalties apply for premature cancellation
Legal and economic property aspects	ESCO realizes the investments at his own name and risk and remains the owner during contract time	Debtor is legal and economic owner (bank may put retention of title or lien)
Transfer of ownership at the end of term	E(P)C should not include transfer of ownership	Deptor remains owner EPC contract may include transfer of ownership
Responsibility for operation and maintenance	O&M will usually be included in the energy service contract and done by the ESCO It will be financed by the contracting rate	Deptor is responsible for O&M at his own risk

Table 6.1: options legal aspects.

An example for a template of a contract is given in Annex III.

General overview of the situation on EPC and ESCOs in the EU

EPC, energy services and companies offering integrated energy efficiency solutions started to spread throughout Europe in the 1980s. A few successes emerged:
Germany is referred to as the largest and most advanced market, with France and the UK, Spain and Italy following close behind (Vine 2005, Bertoldi et al. 2006). At the same time, ESCO markets kicked-off in Central and Eastern Europe, too (Urge-Vorsatz et al. 2004). In addition, there were countries

where the ESCO industry emerged in a very short period at the onset of the 21st century. Austria and the Czech Republic became successful by 2005. On the other hand, there were also some negative examples, where EPC failed and thrust back further ESCO development due to a lack of trust: this happened in Sweden, Slovakia, and Estonia. Finally, a group of countries could be characterized by low level ESCO activity due to the internal and external factors that had prevented development until then. This group should be further sub-divided into two. In Denmark, the Netherlands, and Lithuania energy efficiency has been a priority, but tools other than ESCOs have delivered it, indicating that ESCOs are only one of the possible set of tools to bring energy efficiency improvements. On the other hand Greece, Poland, Portugal, Ireland, Malta and Cyprus, and Romania and Bulgaria have been examples where large potential for energy savings exist, but still lift le or no energy efficiency activity has been undertaken by 2005.

The European market potential has been estimated to be at least 5-10 billion EUR per annum and 25 billion EUR. in the long term in 2000 (Bertoldi et al. 2006, Geissler 2005). Investing in energy efficiency with the help of ESCOs is in principle a particularly profitable business in any European country; however, actual profitability depends on many factors and can be curbed by a wide array of barriers. ESCOs are profit oriented businesses and should not be expected to intervene in areas that are too risky or do not offer profit.

The majority of projects developed by Energy Service Companies in Europe have been undertaken in the public sector, where the model of Public-Private-Partnership (PPP) is one of the most effective tools to boost energy efficiency. A Public-Private-Partnership (PPP) is a partnership between the public and private sector for the purpose of delivering a project or service, which was traditionally provided by the public sector. The PPP concept recognises that both the public sector and the private sector have certain advantages, relative to the other, in the performance of specific tasks. The most common technologies so far have been co-generation, public lighting, heating and cooling, ventilation and energy management systems

The major barriers in Europe for ESCOs

The major barriers in Europe for ESCOs are (ref. *European ESCO Status Report*):

- Low awareness, lack of information and/or trust and scepticism on the clients' side;
- Limited understanding of energy efficiency opportunities, EPC and TPF;
- Small project size and high transaction costs, which discourage ESCO business;
- High perceived technical and business risk;
- Legal and regulatory frameworks not compatible with energy efficiency investments, for instance non-supportive procurement rules;
- Limited understanding of measurement and verification protocols for assuring performance guarantees;
- Administrative hurdles, such as complicated procedures, high transaction costs, split incentives, and aversion to opt-out energy management tasks;
- Lack of motivation because energy costs are only a small fraction of total costs;
- Limited governmental support for EPC.
-

In order to overcome some or all of the above barriers some suggestions are given (ref. *ESCO Status Report):*

- Increasing dissemination of information about ESCO services and projects;
- Launching an accreditation system for ESCOs (proving the quality and reliability of services);
- Developing financing sources;
- Standardized saving measurement and verification;
- Ensuring that governments take the lead with measures in public buildings;
- Developing a Europe-wide TPF network.

7. DESCRIPTION OF THE PROCESS OF ORGANISING OCCUPANTS

Inititiation of the the neighborhood aimed approach: Organising interest and participation.
In general the process starts if someone gets an idea, a creator, the neighbourhood and its surroundings, the occupants, the municipality, the government. etc.

Step 1: Primary process component.

First thought, what is the purpose:
Means: Embedding of occupant's quality profiles, taking interviews. etc.….
- What do you wish to accomplish?
  - Common points of view.
  - Leading motive.
  - Termination principle.
  - Limits.
- Motivation;
- What is the reason.

Participants:
- Neighbourhood aimed approach;
- Head of departments;
- Research worker;
- Urban developers;
- Policy Employee;
- District institutions;
- Neighbourhood building workers;
- Gender profession groups.

A more detailed idea, plan, development comes around. The elaboration is than from right to left as far as thought goes as regards a leading motive a direction in which you wish to go and what kind of environment as regards development is good and supported from the group of participants.
This can lead to action, followed by:

Step 2: Secondary process.

- Consultation about how and not why: This has already come up in the primary process.

- Whom or what you need as means to accomplish this.
  - Neighbourhood aimed approach;
  - Project Control;
  - Finance. (guarded by..);
  - Neighbourhood working groups;
  - Participants.

Goal:
- What categories cover the idea: Physically, socially, economically and safety

- Where are the cross links: Making clear what categories strengthen each other.

Agreements:
- Covenants with external partners. (participants from the neighbourhood.)
- Depending on the subject, with what participants
- Creating basis within the neighbourhood

Leading to:

Step 3: Tertiary process.

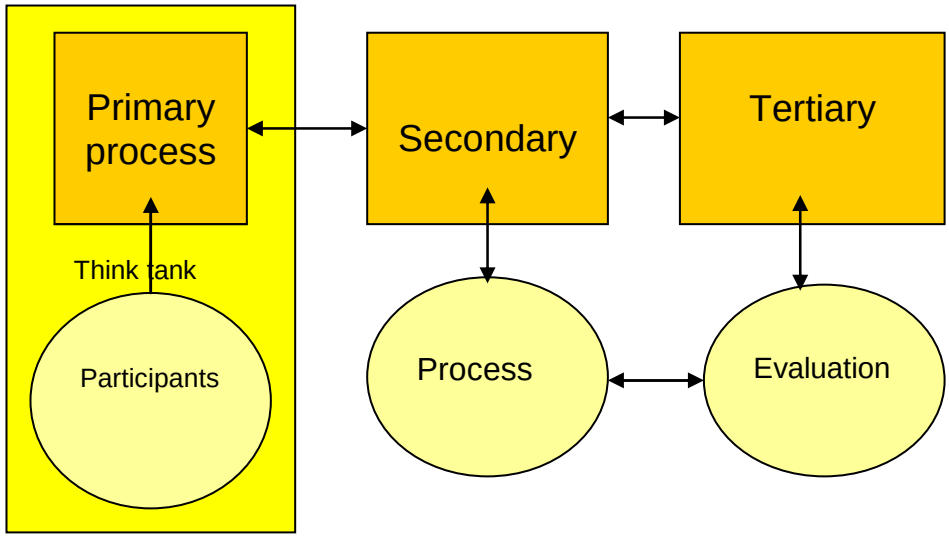
Proceed to practical development.

Leading roll:

Municipality (the responsible section or department) in association with the project leader and participants.

Means:
- Regular scheduled meetings.
- The establishment of soundboard groups
- The assembling of a 'building team'

Goal:
- Guarding the common leading motive. (are we still on the right track.)
- Streamline and keep the communication to the neighbourhood open.
- Evaluation points, adjusting plans.
- Advancing insights
- Embedding participation.
- Collecting problems and sceptical remarks.



The concrete steps are:

Step 1:
Determine the neighbourhood you want to work from.
Determine the complex you want to work with.
Set the limits for the number of houses.
Determine the main principles of the project. (leave space for thinking along and people to take part in the process.)

Step 2:
Determine who the most important persons are within the complex or neighbourhood.
Follow the informal circuit.

Step 3:
Make clear to yourself what possibilities you have, in legal way or at the local authorities of the city council or national government.

Step 4:
Organize a meeting for all the occupants of the district or neighbourhood.

Step 5:
Start at the primary process

Other keynotes

Neighbourhood Aimed Approach (NAA) is characterized by questions on one hand and integrity on the other hand. Neighbourhood aimed approach stands mainly for the transition of an organisation based on supplying to one based on questioning. Occupants and other people of interest will be involved in the plan creation in an early stage. The activities of team NAA are divers:

- Research of the needs in the district on several policy fields;
- Facilitate of social initiatives;
- Support the cooperation in order to make the cooperation free of any loose ends.
- Establish an address point for the occupants and institutions in the neighbourhood ;
- Develop an image for the neighbourhood (on physically, socially, economically and safety aspects);
- Create a neighbourhood programme in cooperation with the occupants/consumers of the neighbourhood.
- “chain directors”.

Hereby looked at the own internal organisation, it needs to be taken into account that the transition from working based on supplying to an approach based on needs deserves attention too, since the internal organisation has its share in whether or not this transition succeeds.

The environment of team NAA is dynamic and full of natural tension, which surface even more by the interaction between people individually and on group level.
Besides that Neighbourhood aimed approach has become a profession and the call for professionalisation of it is growing. The requirements for the quality of the work are getting higher.

It is correctly to ask what the contribution is of neighbourhood aimed approach to issues such as urban renewal (like redevelopment of post-war districts), segregation and mixing, mobility and economic vitalisation. At the same time it is observed that the neighbourhood isn’t the only integration framework anymore:
Not for the occupants, nor the social issues. The occupants are no longer passive followers, but take control, whether or not caused by a negative perception of their surroundings. The self-controlling development of occupants is one of the priorities which require commitment from there’s interaction between groups and organisations, it is evident that different interests lead to conflict. After all, in the neighbourhoods it is about different wishes and interests of diverse parties.

The team NAA.
When speaking about urban renewal and political choices (mostly changeable on some areas once every 4 years) the neighbourhood aimed approach is asked to not only target the physical surroundings, but the social, economical and safety aspects as well.
The diverse partners in the city district work on different levels and different tracks.
That this is in fact not good for the integrity is clear.

This means amongst others:

- Looking for other and more variation in the methods;
- A change in the rolls and the contributions from different parties
- A larger roll for chain direction with the foundation of the area-targeted process management and programme management.
- Learning to shift between different scale levels (city, district, neighbourhood etc)
- Learning to shift between different scale levels (from policy to practicality and vice versa.)
- The development of creative and innovative methods aimed at the creation of a vigorous and appealing city district.

The above requires from team NAA a new orientation on neighbourhood aimed approach and the usage of new skills. The core task here is to achieve creative cooperation. Important skills at this are being capable of managing this cooperation and being able to handle conflicts. This is a complicated task, at which politics will regularly interfere.

Note that in many neighbourhoods the cooperation is not very good or is not present at all.

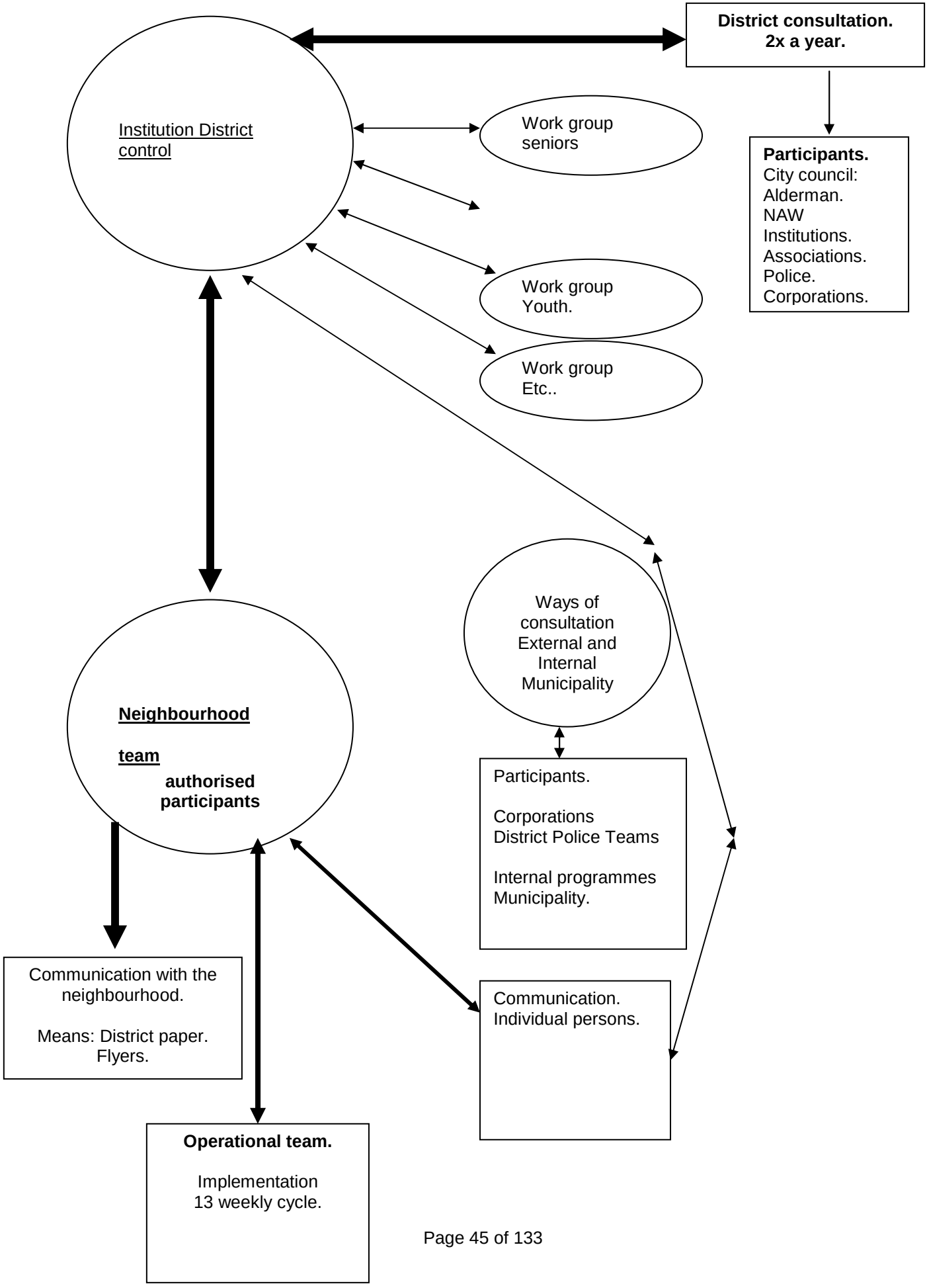
There are still too many tracks and self interests from different participants within a neighbourhood to work well together for the same cause: the development of a vigorous, safe and as a result an appealing city district.
Many participants still react too much from their own core business, all in all there is no cohesion.

Short term effects:
- Restore peace in the public areas.
- Give consumers and inhabitants the feeling back they are being taken serious.
- Restore of trust

Long term effects:
- Achieve cyclic processes, in which the issues come forward integrally on a regular basis and are allied to and on effect.
- Obtain clarity that the effect/results is not dependable on individuals but on the integral approach of all.
- Strengthening of the social cohesion on neighbourhood and city district level.

Neighbourhood aimed approach (NAA) works on two tracks:
- Externally the efforts are aimed at sharing the responsibilities with the occupants and organisations in the city. NAA coaches them on their way to autonomy.
- Internally the efforts are mainly targeting the cultural transition within the municipal organisation: from a supply-based approach to one based on needs. From the interest of services to the interests of the city. NAA makes the needs of the neighbourhood clear, passes them on to the right place within the organisation and works together with the organisation for an answer.

Measurement and evaluation:
In following scheme a montioring and measuring instrument including statistacally developments is shown.


District consultation.
2x a year.
Institution District control
Work group seniors
Participants.
City council:
Alderman.
NAW
Institutions.
Associations.
Police.
Corporations.
Work group Youth.
Work group Etc..
Ways of consultation External and Internal Municipality
Neighbourhood team
authorised participants
Participants.
Corporations
District Police Teams
Internal programmes Municipality.
Communication with the neighbourhood.
Means: District paper.
Flyers.
Communication.
Individual persons.
Operational team.
Implementation
13 weekly cycle.

8. DESCRIPTION OF THE PROCESS AND QUALITY CONTROL ASPECTS

Process

Although the approach for every location is specific and based on local circumstances, it is possible to give a general description how to organise a retrofitting process. The diagram in this section shows a flowchart of the typical process to establish energy performance contracting. From the initial start until the operation, a step-by step approach is presented. The ECOLISH research results and learning's from practice at the pilot locations are included.

Every step has to be executed positively before the next one can be started. Several decision points divide the process into five main phases, which are explained next.

1. Initiative and global analysis
To start up EPC, some global research has to be done to identify areas in a town with good opportunities. Based on social and building analysis, an expert view can identify the main success and fail rates and set up a provisional EPC. Next, all the parties involved have to be clearly informed about EPC & ESCO's and the significance of it for their own situation. This creates support of the house owners to the concept and may result in a letter of intent for the further development.

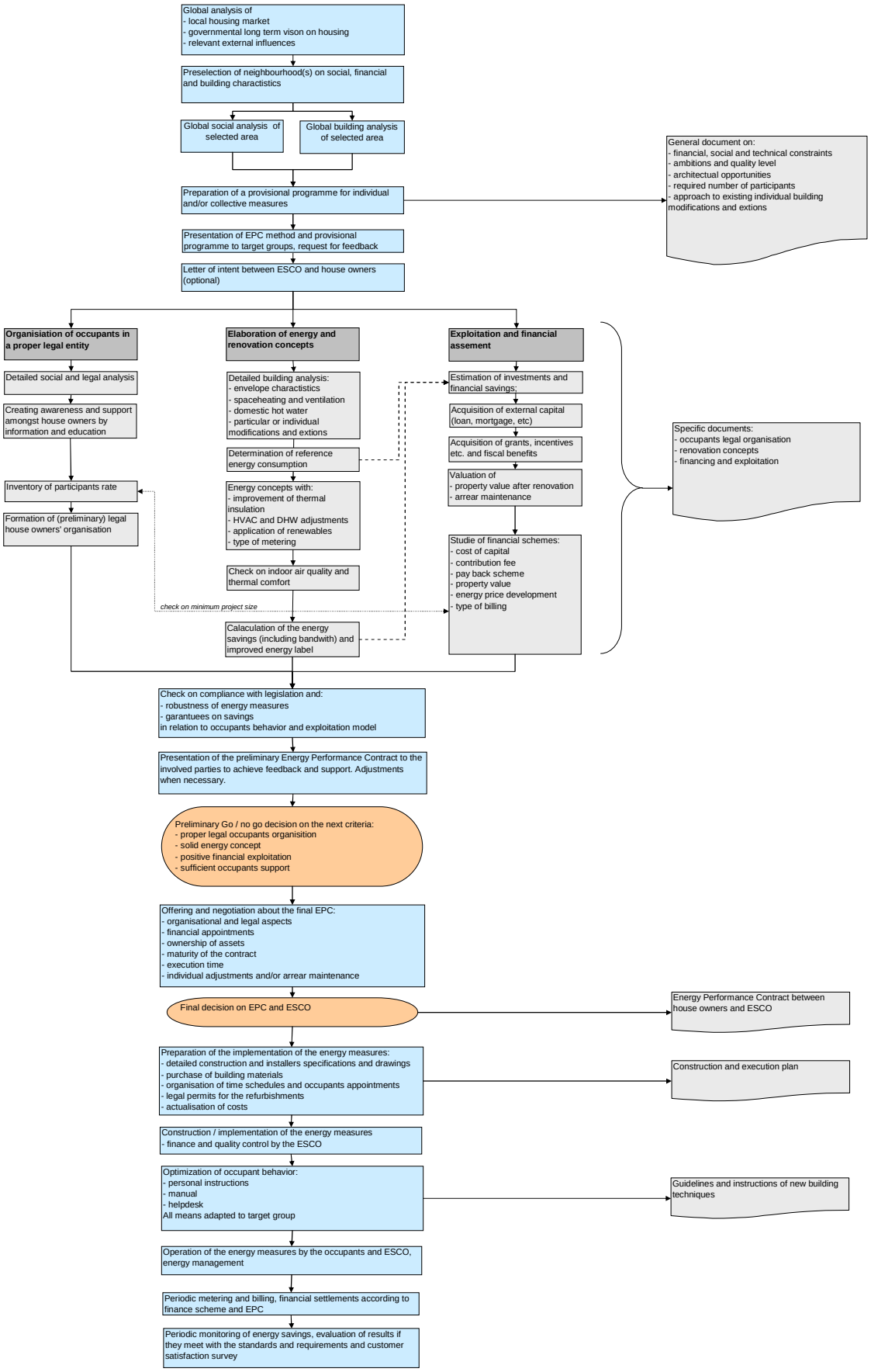
2. Detailed analysis and preliminary contract formation
In this phase, the three main conditions for successful EPC have to be covered:
- a solid legal association of house owners, necessary as a legal entity to which an ESCO can do business;
- a package of building measures for optimal home improvement and energy saving;
- a profitable business case with a positive financial forecast; the increased property value after renovation plays a particular role in this.

The research to these three main conditions is done parallel by specialists, but at some points alignment is necessary. An overall check on the consistency of the studies in relation to the initial concept and risk assessment has to be done by a general project manager. A presentation of the results and a preliminary contract to the target group may result in feedback for a final proposal.

3. Final contract formation
The ESCO makes an offer for EPC to the legal representative of the house owners. Details about the renovation, pay-back scheme, financial and legal aspects can be negotiated in the final contract.

4. Implementation of energy saving measures
The preparation and execution of the renovation is done by the ESCO and its subcontractors. Quality assurance by (external) commissioning is of extra importance in this phase. Special attention should be paid to improvement of the occupants behaviour (energy awareness) by personal instructions, understandable manuals etc.

5. Operation of the EPC and ESCO
After the completion and hand-over of the renovated dwelling, the actual EPC starts. Periodic billing and services are executed according to the contract and malfunctions taken care of by professionals. The energy performance should be monitored and compared to the prognoses.


Global analysis of
- local housing market
- governmental long term vison on housing
- relevant external influences
Preselection of neighbourhood(s) on social, financial and building charactistics
Global social analysis of selected area
Global building analysis of selected area
Preparation of a provisional programme for individual and/or collective measures
General document on:
- financial, social and technical constraints
- ambitions and quality level
- architectual opportunities
- required number of participants
- approach to existing individual building modifications and extions
Presentation of EPC method and provisional programme to target groups, request for feedback
Letter of intent between ESCO and house owners (optional)
Organisiation of occupants in a proper legal entity
Elaboration of energy and renovation concepts
Exploitation and financial assement
Detailed social and legal analysis
Creating awareness and support amongst house owners by information and education
Inventory of participants rate
Formation of (preliminary) legal house owners' organisation
Detailed building analysis:
- envelope charactistics
- spaceheating and ventilation
- domestic hot water
- particular or individual modifications and extions
Determination of reference energy consumption
Energy concepts with:
- improvement of thermal insulation
- HVAC and DHW adjustments
- application of renewables
- type of metering
Check on indoor air quality and thermal comfort
check on minimum project size
Calaculation of the energy savings (including bandwith) and improved energy label
Estimation of investments and financial savings;
Acquisition of external capital (loan, mortgage, etc)
Acquisition of grants, incentives etc. and fiscal benefits
Valuation of
- property value after renovation
- arrear maintenance
Studie of financial schemes:
- cost of capital
- contribution fee
- pay back scheme
- property value
- energy price development
- type of billing
Specific documents:
- occupants legal organisation
- renovation concepts
- financing and exploitation
Check on compliance with legislation and:
- robustness of energy measures
- garantuees on savings
in relation to occupants behavior and exploitation model
Presentation of the preliminary Energy Performance Contract to the involved parties to achieve feedback and support. Adjustments when necessary.
Preliminary Go / no go decision on the next criteria:
- proper legal occupants organisition
- solid energy concept
- positive financial exploitation
- sufficient occupants support
Offering and negotiation about the final EPC:
- organisational and legal aspects
- financial appointments
- ownership of assets
- maturity of the contract
- execution time
- individual adjustments and/or arrear maintenance
Final decision on EPC and ESCO
Energy Performance Contract between house owners and ESCO
Preparation of the implementation of the energy measures:
- detailed construction and installers specifications and drawings
- purchase of building materials
- organisation of time schedules and occupants appointments
- legal permits for the refurbishments
- actualisation of costs
Construction and execution plan
Construction / implementation of the energy measures
- finance and quality control by the ESCO
Optimization of occupant behavior:
- personal instructions
- manual
- helpdesk
All means adapted to target group
Guidelines and instructions of new building techniques
Operation of the energy measures by the occupants and ESCO, energy management
Periodic metering and billing, financial settlements according to finance scheme and EPC
Periodic monitoring of energy savings, evaluation of results if they meet with the standards and requirements and customer satisfaction survey

Quality control

The quality of the process can be guarded en ensured by using a so called Model Quality Control Matrix (MQC). This is a general model that can be applied for all kinds of processes (building and building services, industrial etc.). Regarding retrofitting processes it is possible to elaborate a MQC system for the total retrofitting or for separate elements (like building envelope, building services).
The most important characteristic for the elaboration of a MQC for retrofitting however is a structure that follows all the process phases. This enables to build in a number of strategic decision moments in the (building) process and to assess if the retrofitting meets the targets and requirements, as defined in the program phase. As the total quality is determined by several aspects (not only technical but also financial, organisation and communication) 10 different quality control aspects are discriminated.
This leads to a so-called quality matrix. On the horizontal axis of the matrix the phases of the process are distinguished. On the vertical axis of the matrix ten distinguished quality control aspects are listed.
Using MQC or making a document conform the MQC structure it is not necessary (and often not possible) to fill in all cells. But every information that is available can be "recorded and stored" in logical way in a cell, elaborated in specification sheets. Often this information is spread over two or more phases, consequently, over several specification sheets, corresponding with the distinguished phases and/or quality control aspects. It is important to analyse exactly in which phase and for what quality control aspect the information is necessary. Therefore it is important to know the meaning of each different quality control aspect.

Quality control aspect “0 - General” describes the general objective(s) of each phase. This means that also starting points, boundary conditions and points of particular interest must be described as well as the documents and contracts that have to be elaborated in the particular phase.

Quality control aspect “1 - Organisation” gives a description and allocation of all tasks and individual and collective responsibilities. Organisation structures like process certification, the appointment of “official” commissioners etc. can be described in this quality control aspect. Also activities that are necessary for (building) permits, application for grants etc. are described in this chapter.

Quality control aspect “2 - Communication” describes the necessary information exchange between all parties involved in the process is reported. This includes a description about the necessary consultations including which parties, when, the objective and deliverables of each consultation. It also can give descriptions meeting structures, schemes and frequencies. Also description of the information carriers (digital, paper etc.) can be given.

Quality control aspect “3 - Requirements” gives an inventory of internal and external requirements that have an impact on the design or the following phases. This starts with a base level of legal requirements like buildings regulations, standards and others. However, in this aspect also recommendations can be given, according to (higher) quality level. Important, especially in the programme phase, is that the consequences of legal requirements versus quality recommendations are visualised. Quality control aspect “Means” can give tools and instruments for this.

Quality control aspect “4 - Means” includes all necessary calculation methods, execution protocols, checklists, assessment and evaluation tools. It also gives references to standards (like calculation, determination and measurement methods) measurement instruments and literature. In general, often references will be used to avoid unnecessary text. For example, for thermal comfort aspects requirements are given in “3 – Requirements”; in “4 – Means” the determination and measurement methods are given. This can be just a reference to ISO 7726.

In quality control aspect “5 - Purchase” is arranged which necessary external expertise has to be purchased including a description for which subjects. For example, if a retrofitting concept is selected with a certain level of complexity it can be required that consultants with a defined level of expertise have to be concerned in the design phase of the project. If commissioning is required in the realisation phase the organisation of this activity is described in “2 - Organisation”; the purchase of specialised balancers is described in “5 – Purchase”.

In quality control aspect “6 - Time” object planning as well as process planning is guarded.

Quality control aspect “7 - Finances” organises the control and guarding of the object costs.

Quality control aspect “8 - Documentation” organises the reporting of the input and output of all sequencing phases. This includes a description of which specific documents (drawings, calculations, details, instruction manuals, completion and commissioning reports etc.) must be realised at the end of a particular phase.

Quality control aspect “9 - Experiences” reports the evaluation of each phase based on the expected (technical) quality and the continuation of the process (organisation, communication). This aspect can also be used as a tool for project management and steering. For example, if it appears that communication is not passed smoothly measures can be taken to improve the communication process.

It will be clear from these descriptions that it is not possible and necessary to address all the quality control aspects. The control aspects 5, and specially 6, 7 and 9 are much more related to specific projects. On the other hand it is possible to write general guidelines for quality control for retrofitting within this MQC structure without addressing these aspects.

The process phases can be described as follows:

I Programme phase:
In the programme phase an inventory takes place of requirements, demands and expectations of the retrofitting. Also all limiting boundary conditions must be listed and formulated. For the preliminary selection of the retrofitting concept, the level and the building and services to be retrofitted the main consequences are visualised.
At the end of the programme phase the principal, architect and necessary consultants and experts have enough information to make a first selection of the retrofitting concept and systems applied.

II Design phase:
In the design phase the retrofitting concept, as preliminary selected in the programme phase, is elaborated by experts and consultants. Communication with architect and constructor takes place to tune building technical and architectural boundary conditions with the retrofitting concept and vice versa. There will feedback to the starting points of the programme phase. At the end of the design phase a final selection of the retrofitting concept takes place.

III Elaboration phase:
In the elaboration phase the retrofitting concept will be elaborated to a system level and a component level. Specifications will be elaborated and materialisation takes place in this phase. This includes also detailed financial calculations.

IV Realisation phase:
In the realisation phase the actual construction of the retrofitting concept takes place. This phase ends with the acceptance and hand-over of the installation. Note that during this phase, and in particularly during the acceptance, “commissioning” takes place according to the “English” definition (i.e.: testing of the installation of realisation to check if it meets the terms of reference).

V Operation phase
In this phase the actual operation of the building and retrofitting concept takes place after the acceptance and hand-over of the installation. In ASHRAE publication 1996-1 this phase is cold “post-acceptance phase”. In this phase commissioning is the continued adjustment optimisation and modification of the retrofitting concept, including maintenance to meet and to maintain the specified requirements.

For the ECOLISH project the Model Quality Control Matrix is as follows:

	project phase				
quality control aspect	**I programme**	**II design**	**III elaboration**	**IV realisation**	**V operation**
0 general	I.0 General objectives/expectations of the project, presentation of possible financing schemes, of possible energy measures description of contract that has to be signed, possible boundaries (legal, financial)	II.0-1 Description/presentation of energy measures for the specific project, II.0-2agreement on the financing scheme to be used II.0-3 a script of the contract is prepared	III.0-1 Specifications of the energy measures to be implemented, III.0-2 final financial calculations for the specific project, III.0-3 the contract between the different parties is signed	IV.0-1 Construction/implementation of the energy measures, IV.0-2 new agreement between occupants and municipalities (if necessary) IV.0-3 Disconnection from the national grid of energy supplier (if necessary)	V.0-1 Operation of the energy measures by the occupants / ESCOs, V.0-2 energy management of the blocks
1 organisation	I.1-1 Meeting of the parties involved, I.1-2 appointment of a project manager , I.1-3 time schedules of tasks to be realised	II.1– division of tasks who is doing what, who is responsible for commissioning, who is responsible for contacting the existing energy supplier etc	Organisation of time schedules so that all processes are finished as planned	IV.1-1 Organisation of commissioning	
2 communication	I.2-1 information exchange between the different parties, I.2-2Meeting structures, frequency of meetings	Information exchange between The energy consultants and the ESCOs	Information exchange between the occupants, municipalities and ESCOs	Information exchange – discuss commissioning results, authorisation and approval of commissioning	Information exchange between Occupants, municipalities ESCOs
3 requirements	I.3-1 Knowledge of the social and financial status of the pilot location	II.3-1 (mandatory) or required energy labels II.3-2 Compliance with national legislation	III.3-1 Legal permits for the refurbishment		
4 means		II, 4-1 EPBD and national legislation/ National Energy labelling			
5 purchase			III. 4-1Materials / labour purchased within the frames of the ECOLISH project	IV. 4-1Materials / labour purchased within the frames of the ECOLISH project	

	project phase				
6 time					
7 finance		II.6-1 presentation of possible financing schemes II.6-2 Evaluation of the (increased) value of the blocks after refurbishment by real estate experts	III.6-1 Final energy contracting and legal framework	IV.6-1 Financing the measures by the ESCOs IV.6-2 Own contribution of house owners to (if any)	
8 documentation	I.7-1 Reporting – minutes of the meetings	Reporting – II.7-1 Energy studies and calculations II.7-2 script of the contract	III.7-1 drawing construction drawings , III.7-2 commissioning reports, – III.7-3 script of contract	Reporting – IV.7-1contract signed, IV.7-2 manual of energy measures	Reporting – V.7-1 report on operation and instruction maintenance V7-2 energy bills
9 evaluation					V.8 Evaluation of the systems, check if they meet with the standards and requirements

9. SUCCESS STORIES

In general the biggest success story is that the ECOLISH project covered four 'hopeless cases' on four different locations and in different settings in Europe. All pilots had the same initial situation that it concerned individual owned houses or apartments, i.e. no organizations like municipalities or housing companies to take care of the problems. At the same time occupants had very high energy costs and low incomes in combination with poor building technical and indoor environmental conditions. In all four pilots there was the problem of fuel poverty according to the definitions (i.e. fuel poverty occurs if > 10% of the net income is spent on energy costs). In one case, Ogre Latvia, there is the extreme situation that the occupants pay 30 to 50% of their net incomes to heating and electricity costs.
Nevertheless during the action it appeared that it is possible to come up with packages of measures to improve this situation (limiting energy use and better indoor environment, thermal comfort) in combination with feasible financing schemes, affordable and attractive for the occupants.

A second success story of the project is that it was possible to organize occupants on the locations even in the locations where this seemed to be almost impossible to organize this (due to local culture and habits). The occupant's organizations were an important step in the process to energy performance contracting and raising awareness on their situation and energy efficient behavior. This success was emphasized by a visit of occupants from the pilot Heerlen to the pilot Ogre, April 6 and 7 2009.

Figure: Impressions Occupants visit Heerlen to Ogre

A third success story is that one of the major utilities in the Netherlands, Essent, represented in this project by the department Essent Energy Services, recognized this particular market (individual house owners, low incomes) and decided to offer new products for house owners. These products (Saving Plan House) concern a total package including upgrading of the building envelope, upgrading of the energy supply for heating and DHW, financing and execution of the measures. Additionally extra options for renewables like solar energy (thermal and PV) can be chosen.
Also participant Techem is active in the market in several countries in offering ESCO services after the ECOLISH project.

10. CONCLUSIONS

Fuel poverty is becoming a serious problem for social housing due to current trends in energy cost and income development. In social housing, energy costs do not relate to the poor thermal comfort and low indoor air quality. Saving potential and benefits in this building stock are high, but need to be allocated to investments. The low-income target group wants lower costs but isn't financially able to invest themselves and lacks a long term view on its real estate property. Many residential buildings are at the end of their technical and economical lifespan and will soon need extensive renovation. Nevertheless most of the occupants want to stay in their familiar surroundings and they trust on existing social structures. Energy performance contracting (EPC) is a multiple solution to these issues.
Building and energy data of the pilot locations is very important for a correct estimation of the energy saving potential. For privacy reasons, energy companies often refuse to give data of the individual energy consumption. Therefore, is some pilot locations questionnaires were send to all the households and collected by a number of trained occupants. These occupants were trained by experts of ECOLISH to collect as much as possible data on the physical condition of the buildings and the occupant's behaviour. This unique approach resulted for several pilot locations in a lot of detailed data on the building stock en actual energy use. A specific problem is the individual and spread ownership. This can be solved by organising occupants and forming legal entities. This is however time consuming but very important to achieve any results and commitment. In most pilot projects, public bodies were involved in different phases of the social houses life cycle. Nevertheless, no one was really responsible on organizing and supporting the occupants. A multi-level bottom up approach could solve the problems faced. Occupants welcome support as soon as it is well-intentioned and recognized, but may be reluctant to externals. Energy service companies (ESCO's) therefore have to gain the trust of the occupants. Highly mixed occupancy (young and old, different level of education) demands a personal approach to get everybody satisfied with a standard package of measures.

It is important to provide a balanced set of energy saving measures. Measures that improve the energy performance, the indoor air quality and the thermal comfort. They also should appeal to the target group and have a robust saving potential e.g. they should have a low sensitivity to occupant's behaviour. Sensitivity studies in the ECOLISH project show that energy savings by improving the building envelope (insulation, new glazing) are more robust than upgrading the building services (ventilation system, heating/cooling system and domestic hot water). Architectural improvements therefore prefer, but are not common business for ESCO's. An improvement of the building envelope often requires large, partly delinquent investments. The long pay-back time should match the extended lifespan of the building. Real estate experts can quantify the benefit of the increased building value after the renovation on forehand. The lack of vision in the privately owned building stock on the strategic housing and strategic maintenance may complicate the rating of the improved buildings. The technical measures themselves are quite common building practice, but risk allocation in energy savings and financial exploitation is still a big challenge. The basic principle of energy performance contracting is that energy savings correspond to the refund of the investments. In practice, the savings strongly depend on the occupant's behaviour and may not meet the expectations. This sharing of this risk needs expert attention and clear instructions to the occupants.

Most financial constructions require co-financing of the occupants. Because of their low income or even unemployment the occupants lack these financial means and may have difficulties in getting a credit. An offer from an ESCO to a well organised group of house-owners for EPC should include a balanced set of technical measures that fit the target group and a clear plan how to finance this for a group that normally don't have financial possibilities.
The role of municipalities can be important, for example for establishing revolving funds and organising occupants. Political lifespan (4 years) and different political interest can be a threat. ESCO's could play a new and important role. The residential sector can be a new and interesting business area, also individual house owners. Several financing constructions are possible but constructions with mortgage and revolving funds are favourable.
Energy performance contracting for social housing requires close cooperation between social, legal, technical, financial and real estate experts. Key marks with their key actors are: a solid organisation of the house owners (social and legal experts); a balanced set of energy saving measures and corresponding financial scheme (technical and financial experts); a clear long term view on the real estate and its neighbourhood (social and real estate experts). Energy performance contracting reduces fuel poverty, improves quality of life and prevents climate change in one solution. One of the recommendations is that government and administration, from local to EU level, provide good

conditions for this concept that solves multiple problems. Clear legislation, harmonisation of energy saving measures and financial incentives for the application of the concept are these main preconditions. Furthermore, easy accessible data on the individual energy use on neighbourhood scale simplifies feasibility studies for EPC.

The main achievements of the ECOLISH project are that in each pilot location, despite the bad local starting situation, it was managed to establish:
- a new or improved organisation of house owners;
- cost-effective packages of energy-saving measures;
- model contracts within the valid legal and financial constraints;
- interest from commercial ESCO's for further implementation.

The pilot locations are typical for the national building stock and thus can lead to large replication.

Summarized key marks with their key actors are:
- a solid organization of the house owners (social and legal experts);
- a balanced set of energy saving measures and corresponding financial scheme (technical and financial experts);
- a clear long term view on the real estate and its neighborhood (social and real estate experts).

Additional conclusions and recommendations considering the main key actors are:

Municipalities:
In most of the pilots public bodies were involved in different phases of the social houses life cycle. Nevertheless in none of the pilots public bodies felt or were was responsible on organizing and supporting the occupants. However a multi-level bottom up approach could solve the problems faced. The monitoring in work package 6 showed that on all occupants welcome support, as soon as it is well-intentioned and recognized
Role of municipalities can be very important for example for establishing revolving funds and organizing occupants. However, political lifespan (4 years) and different political interest can be a threat. This typical problem has been encountered on the pilot location Heerlen, where appointments and agreements were made with occupants, including elaborated contracts. At the end of the project the municipality switched to another strategic vision for the neighborhood (in relation to the problem of shrinkage of the population in Heerlen).

ESCO's
ESCOs can play a new and important role in solving the identified problems in this sector. As a result of the ECOLISH project the residential sector is recognized to be a new and interesting business area, also individual house owners. Several financing constructions are possible but constructions with mortgage and revolving funds are favorable.
ESCOs are an important instrument for delivering improved energy efficiency and contributing to create a market for energy savings, but are not 'a magical' solution. Important is to see that over the last years developments were noticed in the way how ESCOs operate, from traditional supply contracting to integrated EPC with saving guarantees. In ECOLISH ESCOs also address now individual households (sometimes organized in Associations of Owners).
Participant EES noticed that the behavior of residents requires other kinds of guaranty and, at the same time, quality assurance and monitoring of the occupants behavior. The (un)certainties in actual savings (in relation to the predicted savings can be a major threat and barrier for financing constructions. From the other hand, the analyses in work package 5 give directions for the most suitable and robust measures to limit and mitigate this risk.
Low incomes in relation to financing the measures make it necessary for ESCOs to make a distinction between collective and individual measures in combination with the establishment of an association of owners.
Finally, in the traditional market approach of ESCO's only energy supply and building services were included. As a result of the ECOLISH project EES (RWE, Essent) now offer a total integrated package with building services, measures on the building envelope and additional renewables.

11. RECOMMENDATIONS FOR FURTHER ACTIONS

From the calculations and analyses of the energy consumptions and comparison between calculated and measured energy consumptions it appears that there is a significant discrepancy between the designed (calculated) and the real (monitored) total energy use in buildings. This is not only the case in the ECOLISH project but it is a phenomenon that is recognized in general. Although building regulations have been strengthened in EU countries with respect to energy efficiency the real energy use is not decreasing at the same rate and in many occasions even is increasing. Buildings and their systems improve, but building usage and activities in buildings can lead to increasing energy consumption. This can form a major thread for the implementation and the effectiveness of the final 20-20-20 targets set by the EU. The reasons for this discrepancy are generally poorly understood, and often have more to do with the role of human behavior than the building design. Typical characteristics and barriers of EPBD based Energy Performance Ratings are:

- EPR's are (public) instrument of the government for reducing CO2-emission on a macro-level (for obtaining a building permit) as on micro scale occupants' behavior is dominant in the final energy use;
- Only look at Building Regulation related aspects but not at human behavior;
- The starting points are based on reasonable averages, general and sometimes arbitrary;
- The costs are for property developer or housing companies, the benefits are for the occupants who lead in the market to houses that just/only match the building regulations but don't have any additional or optimized energy efficiency measures;
- It cannot been used in the selling and financing of new build houses or for financing energy efficiency measures in existing houses; therefore the potential financial benefits are not utilized or exploited.

To overcome these barriers a total chain approach is recommended relying on three pillars:
1. prediction that is accurate and robust enough.
2. contracting, financing and guarantee.
3. monitoring.

The basis is a solid methodology to calculate a reliable relation between energy saving measures and the prediction of total energy consumption. An understandable output for end-users such as energy costs in Euros is necessary. Then, guaranteed energy saving predictions can be used for contracts between real estate developers or housing companies and the end-users. This should concern the total energy use and not only building regulations related energy use. In such contracts the predicted energy use will be compared by monitored energy use, by smart metering. These necessary methodologies should be developed to improve the reliability of predicted energy consumption, and should be compared with smart metered energy consumption and from that the right instruments for communication. Commitment by the total chain can be accomplished in three ways:

- energy guarantee contracts for end-users, in which maximum energy consumption of their homes are contracted, including responsibilities and bonus/malus systems;
- performance contracts in the total chain, between suppliers, installers constructors and principals (real estate developers, housing companies;)
- new improved finances, based on the improved reliability of predicted energy, such as improved conditions for mortgages or loans for investments in energy efficiency measures.

This approach could take away one of the major barriers for energy performance contracts and ESCOs: i.e. the uncertainty of the real energy savings and therefore the uncertainty of allocation of the energy saving benefits to investments. This approach could offer opportunities for the development of energy saving technologies that take into consideration as well the building related as well as the user related energy use, and the prediction of both expected energy use in new and renovated buildings and cost-benefit relation of energy saving measures to increase implementation of energy contracting and management as well as financing construction in which benefits of savings will be allocated to investments.

12. ABBREVIATIONS AND TERMS

Abbreviations

DHW	Domestic hot water
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Contracting
ESCO	Energy Service Company
ESD	Energy Service Directive
MQC	Model Quality Control
TPF	Third Party Financing

Terms

Community heat and power scheme	A community heat and power scheme involves the provision of thermal and/or electrical energy to a group of buildings. This may include housing provided by local authorities, registered social landlords or private developers, LA Buildings, such as the town hall, or other large energy-consuming infrastructure such as hospitals or universities. Typically, a scheme will include centralised energy efficient electricity generation plant, with the bi-product heat generated from that process being converted into hot water for distribution via a community heating network to the buildings supplied by the scheme.
Delivery Contracting	In contrast to EPC, "Delivery Contracting" (DC, also known as Supply Contracting or Energy Supply Contracting) is focused on the supply of a set of energy services (such as heating, lighting, motive power, etc.) mainly via outsourcing the energy supply. Chauffage, one of the most common contract types in Europe besides EPC, is a form of Delivery Contracting. In a chauffage arrangement the fee for the services is normally calculated based on the client's existing energy bill minus a certain level of (monetary) savings. Alternatively, the customer may pay a rate, for instance, per square meter (EC DO JRC 2005). The ESCO (or ESPC) may also take over the purchase of fuel and electricity.
Energy Performance Contracting	A contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement; an (innovative) financing technique that uses in principle cost savings from reduced energy consumption to repay the cost of installing energy conservation measures
Energy Services	The term 'Energy Services' can cover a wide range of approaches that come together to form the supply of a service or amenity to customers e.g. warmth, cooling, domestic hot water, light and/or power, as opposed to simply the supply of fuel. In this way responsibility for expertise, capital, procurement and maintenance of, for example, heating plant can be transferred from the customer to an energy company. One particularly useful way of providing Energy Services is through a community heat and power scheme.
Energy Service Company	A natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria.

Energy Service Provider Companies	In contrast to an ESCO, “Energy Service Provider Companies” (ESPCs) are natural or legal persons that provide a service for a fixed fee or as added value to the supply of equipment or energy. Often the fuel cost of energy services is recovered in the fee, and the ESPC does not assume any (technical or financial) risk in case of underperformance. ESPCs are paid a fee for their advice/service rather than being paid based on the results of their recommendations. Principally, projects implemented by ESPCs are related to primary energy conversion equipment (boilers, CHP5). In such projects the ESPC is unlikely to guarantee a reduction in the delivered energy consumption because it may have no control or on-going responsibility over the efficiency of secondary conversion equipment (such as radiators, motors, drives) and over the demand for final energy services (such as space heating, motive power and light)
Occupant Communication Plan	To motivate occupants, facilitate their collaboration and commitment to play an active role in improving their living environment.
MQC / Quality and process control	A summary of the total production process including specifications, design, construction, hand-over and operation. It focuses on avoiding failures on all strategic aspects and moments in the process.
SWOT	A strategic planning method used to evaluate the strengths, weaknesses, opportunities, and threats involved in a project or in a business venture.
Third Party Financing	A contractual arrangement involving a third party in addition to the energy supplier and the beneficiary of the energy efficiency improvement measure that provides the capital for that measure and charges the beneficiary a fee equivalent to a part of the energy savings achieved as a result of the energy efficiency improvement measure. That third party may or may not be an ESCO.

ANNEX I Description of the process on the pilot locations and templates for energy performance and ESCO contracts

Pilot Vrieheide, Heerlen the Netherlands

Description of the pilot.
District Vrieheide is situated in the north-east part of the municipality Heerlen in the Netherlands and contains 1045 houses. Most families who live in this district have low incomes or are unemployed. A cluster of 837 single family dwellings, built in 1960 characterizes the district. These dwellings have the biggest problems with energy consumption and the indoor environment. The dwellings are, despite there rather unusual floor plan, a good example of post-war large scale real estate development. At the moment, 80 % is private ownership and a typical selling price is € 85.000.

Figure: District Vrieheide (ECOLISH houses red marked)

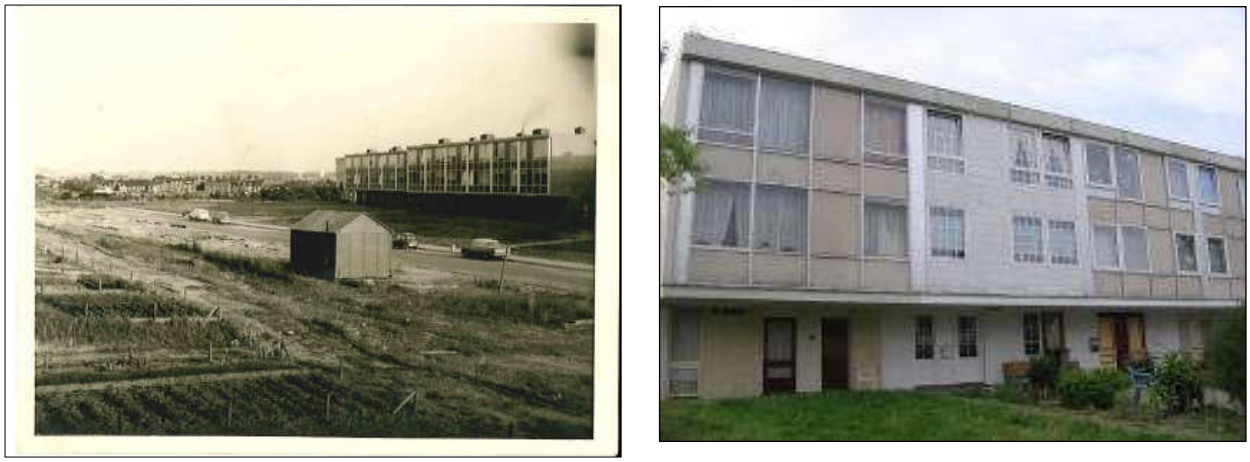


Figure: Vriehiede during construction and actual situation

The municipality of Heerlen has a responsibility to find a solution for the energy consumption and CO_2 emission of this district despite the fact that the house owners have no financial means for investments in energy saving measures, even if there would be a possible benefit on the long term. Main conclusions of the investigations are high energy use due to poor energy efficiency and poor

thermal insulation, poor thermal comfort and indoor air quality. The major barrier is the lack of financial means with the owners and the spread ownership. However, energy savings from 30 to 60 % are feasible. Building analyses, including inventories made by the occupant's organisation, showed problems with moisture and leakage, driving rain, biological degradation, freeze-thaw damage, thermal cracks, detached weather strips, detachment of plaster layer and decay of concrete.

Figure: Impression of the dwellings before and after renovation

The technical analyses started with a photo-inventory of all the dwellings. A detailed inventory in 71 dwellings has been done by a selected number (six) of local inhabitants, which were specially trained by Cauberg-Huygen for the ECOLISH project.
Building analyses showed problems with moisture and leakage, driving rain, biological degradation, freeze-thaw damage, thermal cracks, detached weather strips, detachment of plaster layer and decay of concrete.
Examples of the gas- and electrical installation such as found in the meter cupboard are globally judged by Essent (one of the largest energy companies in the Netherlands). Essent noted some serious defects and called some of the situations quite worrying. Although the inspection of private gas- and electrical installations is not required anymore, it is recommended to investigate and improve the safety of the gas- and electrical installation when upgrading the houses. These additional costs do not relate to the initial aim of ECOLISH, but can probably be financed by it because installers will not connect new components to an improper existing installation. Furthermore, for a number of enlargements and other changes of the dwellings no building permit is available. This may reject residents from corporation in a collective retrofitting in which the municipal government is involved.

The energy analysis by national EPBD-methods was carried out followed by suggestions for rational improvements and cost calculations. Typical gas consumption is approximately1800 m3/year including DHW and cooking. After the fitting of the energy simulations to the real values, several packages of energy-savings measures were elaborated, followed by an economic optimisation. Strategy for energy savings is in three steps:
- individual measures (upgrading building envelope and/or upgrading building services);
- measures on block level (upgrading building envelope and/or collective heating system);
- measures on district level (upgrading building envelope and/or district heating).

Several packages with costs have been elaborated, including packages with renewable energy like solar, co-gen and geothermal mine water.
The general conclusions for pilot Vrieheide Heerlen are:
- there is a wide variety of adjustments on individual houses (enlargements, heating
- system, state of maintenance), which complicate a common approach and therefore
- will raise the investment costs;
- gas consumption is (far) lower than assumed from earlier studies; therefore there is less financial space for improvements.

The maximum energy savings are attributed to the refurbishment of the building systems, and specifically the use of individual heating and the replacement of the existing boilers with high efficient gas fired boilers for space heating and domestic hot water. These measures will result in 20% energy

savings for space heating and 25% for DHW. Also, 40% of energy savings are attributed to the use of solar systems. The savings depend strongly on the current situation: low actual conversion efficiencies for space heating and DHW (because of old appliances) will result in the highest savings. In terms of ventilation, central ventilation with high efficiency heat recovery will save 10% energy, but is difficult to apply in these dwellings. Therefore, natural supply by self-regulating inlet grills in the façade and central fan-assisted exhaust is preferred. Energy measures concerning the upgrade of the building envelope can result to reduction of heating loads up to 40%. The measures include installation of extra insulation on the roof and the external facades and the replacement of the existing glazing with high efficient panes.
An other special opportunity is the quite large flat roofs, which allow large solar systems to be placed optimally and thus have a good contribution of renewable energy (up to 40 % for DHW en electricity).

Refurbishment by Essent
Essent Energy Services has acted as energy service company (ESCO) and has prepared three packages of measures including financing schemes for the pilot scheme location in Heerlen. The basic package covers insulation of the roof and the end walls. The supplementary package also includes insulation of the façades and highly efficient windows at the back of the houses. The comprehensive package additionally provides insulation and new windows. The comprehensive package has been recommended for the pilot scheme location in Heerlen. Funding for the renovation work may be provided by the national government. The interest rate for investments with regard to energy saving measures is 3.5 percent. Following renovation, energy management of the blocks will be performed by Essent Energy Services. This will ensure a reduction in energy use. For the next 15 years, residents must pay the same amount for their energy costs as they paid in the past. However, after this time, bills will be much cheaper and the investments made on refurbishments paid off. Residents are free to choose their own energy supplier. All the proposed measures can be funded by ESCO company Essent Energy services.
The investment costs of the proposed measures are calculated on prefixes. The actual costs may rise because of extra costs for demolition and discharge of existing building elements (partly with asbestos), the replacement of window frames and the increase of the rood edge to cover up the thicker roof insulation. The measures are limited from practice by the typical floor plan and the fact that the houses are occupied.

Besides the effect on energy saving and the reduction of energy costs there are other side-effects of energy-focused retrofitting to take into account:
- An unknown number of the combi-boilers (for central heating and DHW) is rented or leased from private companies. An upgrade could mean that the long-term contract for the hired boiler must be broken, which will cost an extra penalty;
- Improving the comfort by implementing central heating instead of local heating usually results in a higher gas consumption. Increasing the comfort of DHW by switching from an unvented DHW appliance to a high efficiency appliance, but also high volume boiler also causes extra gas consumption due to the extra amount of warm water which the occupants can and will use;
- Improving the sound insulation of the façade (e.g. by double glazing and weather strips) makes the occupants usually more aware of airborne and impact sounds from their direct neighbours;
- The application of mechanical ventilation must be combined with the replacement of open combustion appliances like ‘geysers’ by closed boilers;
- A large improvement of the thermal insulation can result in overheated dwellings in the summertime. Especially south orientated dwellings should get sun shading at the outside of the windows. Otherwise, the occupants will need air-cooling in summer by traditional systems, which is very energy-consuming. A computer simulation of the indoor temperature in summer time will predict whether sun shading is necessary.

The main positive side effect of the retrofitting is probably the life time enlargement of the dwellings. This effect should be valued by real estate experts, moreover to get an idea of the probably higher selling price for retrofitted, energy friendly dwellings. From this point of view, the retrofitting could be communicated as more comfort and appreciation of the dwellings against lower, better manageable energy costs. One third of the population in Vrieheide is pensioners (65^{+}). It is questionable if this particular group is willing to invest in houses with difficult accessibility (stairs).

The process of involving occupants in Heerlen

Heerlen tries to involve citizens from the neighbourhoods in local actions. Inhabitants need to participate and take responsibility for the common liveability and safety of their neighbourhood. Most of the neighbourhoods are organized and have their own 'Occupants Organisation' (OO) with chosen voluntary board members. These organizations are supported by a professional coach from the Alcander Organisation. To every neighbourhood the municipality ascribed an alderman and a liaison officer to discus about neighbourhood problems and municipal plans.

For the Ecolish project a working group was formed during one of the regular meetings. In this working group members of the board and other interested volunteers were present. The working group was instructed to prepare a energy-renovation proposal for all house-owners of the Vasco-dwellings.

During the kick-off meeting of the ECOLISH project this working group arranged a warm welcome to the members of the ECOLISH-team from the different countries, showed them the neighbourhood and invited them into their dwellings. During this visit the local television station made a tv-report and a report was published in the 'Stadskrant' (the municipal monthly information newspaper).


Europees energieproject
ECOLISH

Op 1 en 2 maart vond in Heerlen de start plaats van het Europese energieproject ECOLISH. Dit project heeft als doel het vinden van methoden voor energiebesparing in woningen van mensen met lage inkomens. In dat kader bezochten vertegenwoordigers uit Nederland, Letland, Griekenland en Hongarije de "Vasco woningen" in Vrieheide. Deze woningen kenmerken zich door een zeer hoog energieverbruik. In het project ECOLISH wordt nu onderzocht wat de technische mogelijkheden voor energie besparing zijn, wat de financiële gevolgen en bijhorende oplossingen daarvan zijn en hoe bewoners erbij betrokken kunnen worden. De deelnemende landen hebben een taakverdeling afgesproken en willen op deze manier van elkaar leren en kennis uitwisselen. Heerlen richt zich als specialist in bouwgericht werken vooral op de organisatie van en de communicatie met de bewoners.

Heerlen heeft iets met energie, duurzaamheid en klimaat. De stad wil een positieve bijdrage leveren aan de verbetering van het klimaat en een voorbeeldfunctie vervullen. Burgers en partijen moeten aangezet worden om energie te besparen of te investeren in duurzame energie. Energie is onlosmakelijk verbonden met de identiteit van de stad. Heerlen bouwt een brug van het oude energieverleden, de mijnen, naar een toekomst vol duurzame energie en leveringszekerheid. Nieuwe energie is ook het economisch speerpunt van de stad. In het Klimaatbeleidsplan Heerlen 2004-2010 krijgen onze hoge ambities vorm in ruim 50 projecten op verschillende beleidsterreinen. ECOLISH en de Energiecompetitie passen prima binnen deze Heerlense ambitie. Net zoals bijvoorbeeld het Mijnwaterproject (Climate Star 2005), E-Avantis, de KRO-Energy Survival, de pilot Duurzaam Inkopen en de Actie Energiezuinig Wonen.

Dit project wordt mede gefinancierd door de Europese Unie.

Figure: report published in the 'Stadskrant'.

This working group had several meetings to discus the progress and proposals of the professional advisors.

Inventory Instruction meeting: this meeting was used to educate 6 volunteers from the neighbourhood to help Cauberg-Huygen RI with the technical inventory of 71 dwellings.

Inventory Results meeting: during this meeting Cauberg-Huygen RI reported the results of the inventory and first building analyses to all working group members.

Renovation proposals meeting: this meeting was used to discus the different types of renovation measures that can be taken. This resulted in 4 packages.

Proposal meeting: These renovation packages were further developed by a professional renovation expert and architect and cost calculations were made by Essent Energiediensten.

Site visit to Ogre: the members of the working group visited the pilot location in Ogre during the ECOLISH-meeting in Riga.

Figure: the members of the working group visiting Ogre

Technical and juridical meeting: Because some questions were still not answered one of the packages was reconstructed en calculated in more detail en presented to the working group by Essent Energiediensten. Also an expert on property management, Verweij Vastgoed, was present to inform the working group on all possible ways to organize this renovation within the most ideal juridical constrains. The expert was asked to come up with a detailed info brochure to start informing all dwelling-owners in Vrieheide.

Figure: Technical and juridical meeting

Feedback from the occupants from Heerlen
The working group members enjoyed participating in the ECOLISH project, because they like living in this neighbourhood and these dwelling and they were interested in the retrofitting of their dwellings.
The dwelling-owners are not all highly motivated in retrofitting their house/dwellings. Some of the inhabitants already made a few important retrofitting; like as replacement of the existing windows by double glazing or even complete replacement of the façade. Others do not care or are not able to improve or even maintain their dwelling. Because these dwellings are no apartment-buildings (with a staircase) they are not obliged to have an association of owners to take care of the common building casing. And because these houses where sold to the occupants recently (within the last 10 years) these people are not willingly to hand over parts of their property again to an Association of owners.
To start a renovation-campaign to renovate all the Vasco-dwellings is seen as impossible. A convincing pilot would trigger others to join. And to find one or two blocks of 6 dwelling that would start a complete renovation is still difficult but can be done. 6 Owners have to be found that are willing to invest in their property. They also have to be able to find financing. Although this problem can be solved if the Association of Owners takes the loan.

General outcome of meetings
During the progress of the Ecolish project the region of Parkstad Limburg with Heerlen as centre and leading city faced a big and important challenge: a shrinking population.

The Dutch population will inevitably shrink in the coming decades. The Central Dutch Bureau for Statistics predicts that around 2035 with its top reached 17,000,000. Some regions, however, much earlier confronted with this phenomenon: Parkstad Limburg is one of the first, as recently established by the National Spatial Planning Office. Between 1997 and 2005 there was a population decline of 4%. In this region occurs a decrease in population, due to a mix of de-industrialization, suburbanization, and a decreasing number of children. The first two developments are specific to the region; the second is a general trend in the Netherlands. The population in the region will drop to 18% by 2035. This has great impact on the built environment. Traditional tools and methods of planning are largely focused on a situation of growth: a growing population, a growing housing demand and a growing economy. For housing policy creates a shrinking population in very different circumstances to operate.
But the Heerlen region wants to face this situation as an opportunity! Shrink calls for a reversal of the traditional growth-thinking, a new form of growth-thinking, focused on prosperity and welfare through the greater scope available. Economic growth is indeed possible without population growth. And shrinkage is such an opportunity for those parts of districts that are not loved and very deprived, a chance to fully address in consultation with residents. From 2015 a substantial amount of housing 'should be removed from the market. This is a costly and difficult task, but the region is prepared. In harmony and in close cooperation with concerned corporations we are thinking about strategies to deal with shrinkage, not to shrink from going.
Vrieheide is a very deprived neighbourhood with a poor social construction and much neglected building stock and public space. This results in several problems for the future the municipality has to deal with. Because of this the municipality has recently ordered for a complete new urban vision on the neighbourhood. All options are open for discussion, even demolition of all of parts of the Vasco-dwellings.
In order to communicate a conscious and clear approach, the municipality has ordered the working group not to start up the renovation-campaign for Vrieheide. The municipality wants to wait for the results of the new urban vision.

Adjustment of final retrofitting plans
Although a final realisation of a renovation is not accomplished, the prepared Ecolish approach however is seen as a very usefull tool that can be used for those Vasco-dwellings that remain after a reconstructing of the neighbourhood.
The municipality is also involved in some other renovation plans with Association of Owners. The outcome and experience of the Ecolish-project have already shown useful in those plans and are also used in a national workgroup which investigates a similar matter.
Because long-term measures are not an option at the moment the municipality decided to start an awareness campaign (klimaatwijken) in this neighbourhood which is originated by Steunpunt Duurzaam Bouwen (Belgium) .

Monitoring and evaluation
The meetings were enough with the working group who understood the importance of the retrofitting, communicated with the Municipality of Heerlen, Cauberg-Huygen RI, Essent Energiediensten and Verweij Vastgoed.
The occupants considered the organization of the meetings and the presentations of the measures successful. Although it was mentioned that presentations should be very simple and clear to the group of occupants present.

BespaarGarant Overeenkomst

nummer XXXX-XX

Naam:

➢

Bestaande uit:

- Machtiging en Financieel resumé
- BespaarGarant Overeenkomst XXXX-XX
- Energievoorziening - Algemeen

Bijlagen:

I Energieprogramma
II Energiemanagement Overeenkomst
III Model Financieel Overeenkomst

Behorende bij BespaarGarant overeenkomstnummer 2008-05

Tussen
……

en

Essent Energiediensten BV, Zutphenseweg 6, 7418 AJ Deventer, hierna te noemen "EED", te dezen rechtsgeldig vertegenwoordigd door dhr. P.G. van Dam, Directeur Essent Energiediensten BV.

Is de volgende overeenkomst gesloten

1. KLANT contracteert bij EED de dienst zoals beschreven in "BespaarGarant overeenkomst nummer xxxx-xx" (inbegrepen de daarbij behorende bijlagen).

2. Klant verplicht zich om in de huurcontracten voor:

   …..
   …..
   ……

   op te nemen dat de huurder zich conformeert aan de afspraken in deze overeenkomst.

3. De huurders betalen hiervoor maandelijks, deels in de vorm van een voorschot, de volgende totale bedragen:

   (a) Energiemanagement
   € ……..

   Het bedrag wordt jaarlijks geïndexeerd conform BespaarGarant Overeenkomst

   (b) Energiekosten warmte- en warmtapwater levering woningen (voorschot)
   € ……..

   (c) Elektriciteit Algemene Voorziening (lift, verlichting algem.)
   € ……..

   (d) Energiekosten warmte/warmtapwater en koude levering Hospice (voorschot) € …….

   (e) Energiekosten warmte/warmtapwater en koude levering Domani (voorschot) € …….

   Energiekosten worden jaarlijks aangepast en afgerekend conform BespaarGarant Overeenkomst

Totaal inclusief 19 % Btw.
€ …….

   * Voor specificatie per huurder zie Bijlage III Model Financieel Overzicht

4. EED draagt zorg voor inning van (voorschot) betaling en jaarafrekening bij de huurder, als bedoeld in lid 3 van dit artikel. Op de jaarafrekeningen m.b.t. de kosten energiemanagement, warmte/koude voorziening en elektriciteit algemene voorziening zullen de betaalde voorschotten worden verrekend.

5. Bij leegstand treedt KLANT op als huurder.

EED draagt geen debiteurenrisico richting huurders. Ingeval van wanbetaling zal EED de huurder maximaal tweemaal aanmanen, waarna bij verder uitblijven van deel(betalingen), KLANT zorg draagt voor nakoming van die betalingsverplichtingen.

Aldus in drievoud opgemaakt en ondertekend te ……., ……. Datum…….

KLANT Directie EED

Regiomanager

Ondergetekenden:

…….

en

Essent Energiediensten BV, Zutphenseweg 6, 7418 AJ Deventer, hierna te noemen "EED", te dezen rechtsgeldig vertegenwoordigd door dhr. P.G. van Dam, Directeur Essent Energiediensten BV.

nemen in aanmerking dat:

- de KLANT het pand gelegen aan de Dominicanenplein/Nieuwstraat te Venlo, in eigendom heeft;
- het pand een eigen gasaansluiting (EAN-code) heeft;
- het pand een eigen elektriciteitsaansluiting (EAN-code) heeft;
- partijen het optimaliseren van energie-efficiëntie en het realiseren van duurzame energie binnen kaders van een economische gezonde bedrijfsvoering, als een zeer belangrijke doelstelling zien;
- invulling aan deze doelstelling kan worden gegeven door het toepassen van het door EED ontwikkelde BespaarGarant- contract ten behoeve van de zakelijke markt;
- KLANT een installatie heeft/aanschaft en onderhoudt, welke voldoet aan de door EED genoemde randvoorwaarden en deze beschikbaar stelt voor het produceren van ruimteverwarming, warmtapwater en koude t.b.v. de huurders/bewoners;
- EED namens de KLANT de exploitatie van de warmtelevering aan de huurders/bewoners verzorgt en daartoe gas en elektriciteit inkoopt voor de omzetting in warmte respectievelijk koude en elektriciteit t.b.v. de algemene voorziening;
- EED als gevolg daarvan de facturatie en incasso uitvoert richting de huurders/bewoners voor de dienstverlening welke direct of indirect verbonden is aan de uiteindelijke warmtelevering;
- EED geen energieleverancier is;
- EED bemiddelt bij de inkoop van energie door de KLANT voor het betreffende pand;
- de energielevering in het kader van deze overeenkomst beperkt is tot elektriciteit en gas t.b.v. de ketels in cascade opstelling;
- EED notaverlegging biedt voor de facturering van de ingekochte energie;
- KLANT in relatie tot de energieleverancier te allen tijde de betalingsplicht behoudt voor de energielevering.

en zijn als volgt overeengekomen:

Artikel 1: Inhoud van de overeenkomst

1. EED streeft gedurende de looptijd van deze overeenkomst een besparing van het energieverbruik in het pand, gelegen aan de …… te …….

   Deze Overeenkomst omvat de volgende onderdelen:

   a. Energiemanagement:

Energiemanagement omvat het permanent bewaken van het energieverbruik en het functioneren van de installatie. EED draagt zorg voor een goede uitvoering van de monitoringsdiensten gedurende de contractperiode. De kosten hiervan vormen onderdeel van het contract. In de Bijlage "Energiemanagement Overeenkomst"zijn de afspraken nader vastgelegd.

b. Administratie en facturatie:
EED biedt de faciliteit facturatie en incasso naar de huurders/bewoners van:
……..
……
……..

Dit betreft geleverde warmte, elektriciteit algemene voorziening en kosten warmtemeting, welke door middel van een voorschot en eindafrekening worden verrekend met de huurder/bewoner.

Tevens draagt EED zorg voor facturatie en incasso van vaste maandbedragen die samenhangen met de bedoelde warmte en elektriciteitslevering (zie punt 2 van dit artikel).

c. Inkoop elektriciteit en aardgas:
EED biedt de faciliteit de coördinatie van inkoop van energie in opdracht van KLANT, terzake elektriciteit en aardgas ten behoeve van de warmtepomp, Cv-ketels en gemeenschappelijke voorzieningen op basis van notaverlegging van de energienota.

De hoeveelheid warmte die door de warmtepomp geproduceerd wordt is qua energieverbruik gebaseerd op 3.091 graaddagen. Jaarlijks zal met betrekking tot de geleverde warmte een definitieve afrekening plaatsvinden op basis van de werkelijk geregistreerde graaddagen in KNMI station Maastricht.
In deze afrekening zal tevens een correctie plaatsvinden naar vakantieperiodes en stookgedrag.

Er wordt gewerkt aan een profielenmethodiek. Dit is een verfijning van de graaddagenmethodiek. Deze zal bij wet worden vastgelegd. Hoe precies en wanneer is niet bekend. Indien in de looptijd van dit contract deze verfijnde systematiek gaat gelden voor warmtelevering in plaats van 'graaddagen", dan zal die systematiek worden toegepast.

2. De maandelijkse kosten, deels in de vorm van een voorschot, zijn vastgesteld op een bedrag van € ……. inclusief 19% BTW (zie Machtiging en Financieel resumé), de opbouw daarvan is als volgt:

(a) Energiemanagement
€ ……

Het bedrag wordt jaarlijks geïndexeerd conform BespaarGarant Overeenkomst

(b) Energiekosten warmte- en warmtapwater levering woningen (voorschot)
€ ……

(c) Elektriciteit Algemene Voorziening (lift, verlichting algem.)
€ ……

(d) Energiekosten warmte/warmtapwater en koude levering Hospice (voorschot) € ……..

(e) Energiekosten warmte/warmtapwater en koude levering Domani (voorschot) € ……

Energiekosten worden jaarlijks aangepast en afgerekend conform BespaarGarant Overeenkomst

Totaal inclusief 19 % Btw.

€ ……

3. Jaarlijks vinden de volgende aanpassingen plaats:
   a. Indexering van de kosten energiemanagement, geschiedt jaarlijks conform de CBS index voor de consumentenmarkt. Indexering vindt plaats per 1 januari van het kalenderjaar.
   b. De voorschotbetaling voor het gasverbruik wordt verrekend met de kosten van het werkelijke verbruik conform de jaarafrekening van de energieleverancier.
   c. De voorschotbetaling voor het warmteverbruik wordt verrekend met de kosten van het werkelijk verbruik conform de jaarafrekening van EED

4. De maandelijkse termijn zoals genoemd in lid 2 van dit artikel zal op de eerste dag van de maand, op grond van de door de KLANT te ondertekenen machtiging, automatisch worden geïncasseerd, en jaarlijks worden aangepast en verrekend overeenkomstig het bepaalde in lid 3 van dit artikel .

Artikel 2: Aanvang, looptijd en einde van de overeenkomst

a) De overeenkomst gaat in bij oplevering, omstreeks …….;

b) De duur van de overeenkomst is een periode van 15 jaar;

c) De overeenkomst eindigt:
   - na afloop van de tijdsduur van de overeenkomst. EED zal uiterlijk 6 maanden voor het verstrijken van de contractduur de KLANT een aanbieding doen om de BespaarGarant Overeenkomst te continueren;
   - bij het aangaan van een nieuwe overeenkomst tussen KLANT en EED, welke in de plaats treedt van de onderhavige overeenkomst. Aanleiding hiertoe kan zijn dat gedurende de looptijd van de overeenkomst KLANT een andere bestemming geeft aan het pand, respectievelijk partijen vaststellen dat er een duidelijk afwijkend energiepatroon/gebruik voor het pand optreedt waardoor modificatie in de installatie vereist is;
   - door ontbinding als bedoeld in artikel 6 van deze overeenkomst.

Artikel 3: Inlichtingen

1. Partijen zullen elkaar steeds zo goed en zo tijdig mogelijk op de hoogte stellen van alle gegevens en voorvallen, welke voor de uitvoering van de overeenkomst van belang kunnen zijn.
2. Partijen streven naar een optimale werking van de installatie alsmede naar het realiseren van de beoogde energie-efficiency/besparing. Daartoe is goede samenwerking noodzakelijk.
3. Partijen zullen ervoor zorg dragen dat te allen tijde iemand bereikbaar is in verband met urgente voorvallen, zoals calamiteiten, schaden, storingen en dergelijke. Hiertoe kan de KLANT het calamiteitennummer 0475- 851 555 gebruiken.
4. Zowel de KLANT als EED zullen bij de uitvoering van het bepaalde in of krachtens deze overeenkomst, die zorg betrachten die van een zorgvuldig handelende partij mag worden verwacht.

Artikel 4: Toegang tot en bereikbaarheid van de installatie

1. De installatie moet goed bereikbaar blijven in verband met herstelwerkzaamheden, bedrijfsvoering en dergelijke.
2. De KLANT verplicht zich de door of vanwege EED aangewezen functionarissen in de gelegenheid te stellen al datgene te doen wat nodig is om de installatie te

controleren, te onderhouden. Een en ander met inachtneming van de bij de KLANT geldende orde- en veiligheidsvoorschriften.

Artikel 5: Schade en aansprakelijkheid

1. EED is niet aansprakelijk indien op enigerlei wijze ten gevolge van haar dienstverlening op grond van deze overeenkomst een belemmering, onderbreking of verhindering in de warmtevoorziening ontstaat, behoudens bij opzet of grove schuld van EED. Indien door of tengevolge van de dienstverlening op grond van deze overeenkomst de geleverde warmte letsel of schade of ander nadeel wordt veroorzaakt, is EED niet aansprakelijk tenzij sprake is van opzet of grove schuld.

2. EED is nimmer gehouden tot vergoeding van bedrijfsschaden, waaronder mede begrepen winst- of inkomstenderving, noch tot vergoeding van immateriële schade, tenzij sprake is van opzet of grove schuld door EED.

3. Indien EED aansprakelijk is voor zaak- en personenschade dan zal die schade beperkt zijn tot schade welke een onmiddellijk en rechtstreeks gevolg is van een aan EED toerekenbare tekortkoming in de nakoming van haar contractuele verplichtingen en deze schade redelijkerwijze niet voorkomen en/of beperkt had kunnen worden door de KLANT. Uitgesloten van aansprakelijkheid is schade ter dekking waarvan de KLANT een verzekeringsovereenkomst heeft afgesloten of waarvoor het volgens de verkeersopvattingen gebruikelijk is dat ter dekking van deze schade een verzekeringsovereenkomst wordt afgesloten.

4. Aansprakelijkheid voor zaak- en personenschade is gelimiteerd tot een bedrag van € 900.000,- per schadegeval en/of meerdere schadegevallen tengevolge van dezelfde oorzaak. In geval van zaakschade is EED slechts aansprakelijk indien en voor zover de zaakschade een bedrag van € 2.000,- te boven gaat. Aansprakelijkheid voor overige vermogensschade is uitgesloten.

5. De uitsluitingen en beperkingen van aansprakelijkheid als vermeld in dit artikel worden evenzeer bedongen voor en ten behoeve van de ondergeschikten van EED en ieder ander die door haar in het kader van het contract wordt gebruikt, alsmede voor en ten behoeve van hen van wie EED geleverde diensten betrekt.

Artikel 6: Ontbinding

1. Zowel KLANT als EED staat het vrij om bij tekortkoming van de wederpartij in de nakoming van haar verbintenissen deze overeenkomst op grond van art. 6:265 BW te ontbinden. Ontbinding vindt plaats door een schriftelijke verklaring, welke per aangetekende post aan de wederpartij wordt gezonden.

2. Als tekortkoming van KLANT, bedoeld in het eerste lid, zal onder meer worden beschouwd dat deze:
   a) na éénmaal schriftelijk in gebreke te zijn gesteld, in gebreke blijft het overeengekomen bedrag tijdig en volledig te betalen of in gebreke blijft enige andere bepaling van de overeenkomst behoorlijk na te komen;
   b) de installatie voor een ander doel gebruikt of laat gebruiken dan waarvoor de installatie bestemd is, tenzij vooraf goedkeuring is verleend door EED;
   c) in staat van faillissement wordt verklaard of indien hem surséance van betaling wordt verleend of indien beslag wordt gelegd op de onroerende zaken van klant voor zover relevant voor deze overeenkomst.

3. Het in vorige lid bepaalde laat onverlet het recht van EED op vergoeding van verplichtingen, schade, kosten, interesten en laat tevens onverlet het recht om nakoming te vorderen.

4. Als tekortkoming van EED, bedoeld in het eerste lid, zal worden beschouwd:
   a) het niet behoorlijk nakomen van de verplichtingen ten aanzien van de werkzaamheden als omschreven in de Overeenkomst (inbegrepen de bijlagen). Indien zulks zich naar het oordeel van de KLANT voordoet zal de KLANT EED schriftelijk in gebreke stellen en EED alsdan een redelijke termijn vergunnen haar verplichtingen alsnog na te komen;
   b) dat zij in staat van faillissement wordt verklaard of indien surséance van betaling wordt verleend;
   c) het regelmatig in gebreke blijven ten aanzien van de werkzaamheden zoals bedoeld in art. 1 van deze overeenkomst.

5. De KLANT zal EED onverwijld kennis geven van een eventuele beslaglegging op diens roerende of onroerende goederen of gedeelte daarvan en/of op de geplaatste installatie, van de aanvraag tot faillissement of tot surséance van betaling. Voorts dient KLANT de beslagleggende deurwaarder, de curator of bewindvoerder onverwijld inzage te geven in de overeenkomst.

6. EED zal KLANT onverwijld kennis geven van de aanvraag tot faillissement of tot surséance van betaling. Voorts dient EED de curator of bewindvoerder onverwijld inzage te geven in de overeenkomst.

Artikel 7: Overdracht en overname

De KLANT kan zonder schriftelijke toestemming van EED zijn rechten en verplichtingen voortvloeiend uit deze overeenkomst niet aan derden overdragen. EED zal zijn toestemming nimmer op onredelijke gronden onthouden.
EED kan zonder schriftelijke toestemming van de KLANT zijn rechten en verplichtingen voortvloeiend uit deze overeenkomst niet aan derden overdragen.

De KLANT zal zijn toestemming nimmer op onredelijke gronden onthouden. Indien de rechten en plichten worden overgedragen aan een andere volle dochtermaatschappij van Essent NV zal de KLANT bij voorbaat toestemming verlenen voor deze overdracht.

Artikel 8: Geschillen

Alle geschillen welke voortvloeien uit hoofde van deze overeenkomst of een van de bijlagen zullen worden voorgelegd aan de daartoe bevoegde rechter in het Arrondissement 's-Hertogenbosch onder toepassing van het Nederlandse recht.

Bijlagen bij deze overeenkomst: Energieprogramma, Energiemanagement Overeenkomst en Model Financieel Overzicht.

Aldus in drievoud opgemaakt en ondertekend te Deventer, ……. 2008

KLANT Directie EED

Regiomanager

behorende bij BespaarGarant overeenkomstnummer XXXX-XX

1. De Installatie

1.1. Algemeen

De installatie is bestemd voor ruimteverwarming, warmtapwater en koeling voor …….

NB: Deze overeenkomst heeft geen betrekking op de levering/verkoop van de installatie. Echter het energieprogramma van EED is gebaseerd op een installatie zoals beschreven in artikel 1.2. van deze bijlage, welke voldoet aan de uitgangspunten als bedoeld in artikel 1.3 van deze bijlage.

Indien KLANT een installatie heeft of aanschaft welke afwijkt van bovenvermelde randvoorwaarden, zal KLANT EED hierover informeren. EED zal dan berekenen welke gevolgen die afwijking heeft voor haar dienstverlening en zo nodig zal EED d.m.v. een addendum de gewijzigde dienstverlening vastleggen en toevoegen aan dit contract.

1.2. Beschrijving van de installatie

De installatie omvat de volgende onderdelen:

- een elektrische warmtepompinstallatie met een thermisch vermogen van 130 kW levert de basislast voor de ruimteverwarming;
- aanvullend ketelvermogen middels 3 HR ketel(s) met elk een thermisch vermogen van 65 kW voor de pieklast;
- de warmtepomp onttrekt middels een aquifersysteem in de wintermaanden warmte uit de bodem;
- in de zomermaanden wordt de bodem geregenereerd en kan de exploitant indien gewenst gratis koeling worden aangeboden;
- de warmtepomp en de ketels worden in cascade geschakeld met een voorkeursregeling voor de warmtepompinstallatie;
- een centrale rookgasafvoer met luchttoevoer voor de ketels;
- regelkleppen;
- benodigde afsluiters en terugslagkleppen;
- een buffervat ;
- voorraadvat(en).
- hoofdleidingen van de cv tot in de meterkast van de appartementen;
- warm watercirculatieleiding tot in de meterkast van de appartementen met pomp en toebehoren;
- warmtemeters in de meterkast van de appartementen;
- watermeters in de meterkast van de appartementen.

1.3 Uitgangspunten

Bij de specificatie van de installatie is EED ervan uitgegaan dat in de wooneenheid een Laag Temperatuur Systeem met vloerverwarming met een maximale temperatuur van 45 ^{o}C wordt toegepast. De temperatuur van het geleverde warme tapwater bedraagt 65 ^{o}C. De installatie zal gerealiseerd worden in een door derden ter beschikking gestelde ruimte. De ruimte dient geschikt te zijn als opstellingsruimte.

De opstellingsruimte dient voorzien te zijn van een elektrische aansluiting van 3*250 ampère, een gasaansluiting G16 en een aansluiting op de riolering. Ten behoeve van de monitoring dient de ruimte te worden voorzien van een analoge telefoonlijn. Monitoring geschiedt via het Priva besturingssysteem.

2. Tarieven Elektriciteit en Gas

Bij aanvang van dit contract zal het leveringsbedrijf van Essent, terzake de benodigde gas t.b.v. de ketels in cascade opstelling, gedurende de periode van 1 jaar de energieleverancier zijn op voorwaarde dat tegen marktconforme tarieven wordt geleverd. Daartoe wordt een afzonderlijk leveringscontract tussen het Leveringsbedrijf van Essent en de KLANT gesloten. Voor de goede orde: EED is niet het leveringsbedrijf van Essent.

Uiterlijk 1 december van het kalenderjaar worden de prijzen respectievelijk de voorschotten voor het komende kalenderjaar aan de KLANT kenbaar gemaakt.

2.1. Elektriciteit

Elektriciteit wordt geleverd t.b.v.

- de warmtepompinstallatie;
- de algemene voorzieningen (lift, verlichting alg. ed).

De elektriciteit van de warmtepomp wordt separaat gemeten.

Het elektriciteitsverbruik valt onder het kleinzakelijk tarief. Daarbij is uitgegaan van de vigerende tarieven.

De door het lokale netwerkbedrijf in rekening gebrachte kosten voor aansluiting, transport en bemetering worden integraal doorberekend.
Alle heffingen en belastingen worden eveneens integraal doorberekend.

2.2. Gas

Het gasverbruik valt onder het kleinverbruikerstarief. We zijn uitgegaan van de vigerende tarieven. De door het lokale netwerkbedrijf in rekening gebrachte kosten voor aansluiting, transport en bemetering worden integraal doorberekend.
Alle heffingen en belastingen worden eveneens integraal doorberekend.

Middels een meting wordt de omvang van de geleverde warmte in GigaJoule (GJ) vastgesteld.

De berekening van uit elektriciteit en gas resulterende tarieven voor Warmte is weergegeven in de bijlage III Model Financieel Overzicht.

Ruimteverwarming
Op het warmteverbruik voor ruimteverwarming hebben de weerkundige omstandigheden een essentiële invloed op het feitelijke warmteverbruik. Maandelijks zal dan ook een correctie op graaddagen plaatsvinden. De te hanteren graaddagen zijn de gewogen graaddagen voor Maastricht zoals die door EnergieNed op internet worden gepubliceerd.

Vooralsnog definiëren wij het streefverbruik voor het complex op 922 GJ per jaar bij 2.960 graaddagen (0,311 GJ per graaddag). Voor elke graaddag méér of minder wijzigt het totale streefverbruik derhalve met 0,311 GJ.

Warm Tapwater

Elke wooneenheid heeft een individuele meting waarmee de hoeveelheid geleverd warm tapwater in m^3 wordt vastgesteld. De hoeveelheid warmte in GJ die via dit tapwater wordt geleverd wordt berekend door het aantal m^3 te vermenigvuldigen met 0,21. De kosten voor de hoeveelheid warmte benodigd voor warm tapwater worden via de voorschotnota en eindafrekening warmte met de huurders verrekend.

Koude
Middels een meting wordt de omvang van de geleverde koude in GigaJoule (GJ) vastgesteld voor Domani en Hospice.

2.3. Facturering en incasso

De (toekomstige) bewoners, zijnde huurders van:
……
……
……
betalen maandelijks een voorschot op basis van het Model Financieel Overzicht (bijlage IV) aan EED. Eenmaal per jaar zal een eindafrekening worden opgesteld op basis van werkelijk verbruik en vigerende energietarieven.

Tariefwijzigingen die in de loop van een opnameperiode optreden zullen worden behandeld op een wijze zoals gebruikelijk bij een systeem van jaarlijkse meteropname.

De KLANT zijnde …….. is/blijft hoofdelijk aansprakelijk voor de nakoming van de betalingsverplichting van zowel warmte als elektriciteit algemene voorziening door de huurders/bewoners.

behorende bij BespaarGarant overeenkomstnummer XXXX-XX

Energiemanagement omvat de volgende werkzaamheden:

1. Aan de hand van de energieconsumptieanalyse en uitgevoerde energiebesparende maatregelen jaarlijks definiëren van het streefverbruik met bijbehorende parameters;

2. Het zorg dragen voor relevante instellingen van de nieuw aangebrachte regelinstallatie in relatie tot het contract. Hieronder wordt o.a. verstaan kloktijden, vakanties, gewenste temperaturen, etcetera en het waarborgen van een juiste inregeling van de nieuw geplaatste CV installatie (stookgrens, stooklijnen,etc.);

3. Het voortdurend registreren van energiestromen en relevante procesparameters;

4. Het zorg dragen voor het doorsluizen van automatische storingsmeldingen vanuit de regelinstallatie naar uw meldkamer. De exacte invulling hiervan zal in onderling overleg nader worden afgestemd;

5. Het wekelijks op afstand inlezen en het analyseren van de meetwaarden uit de nieuwe regelinstallatie. Indien nodig zal hierop worden geanticipeerd.

6. Het voortdurend optimaliseren van de installatie, zodat zo veel mogelijk energie wordt bespaard met behoud van comfort;

7. Het jaarlijks rapporteren van het werkelijke energieverbruik in relatie tot het te behalen streefverbruik en het aandragen van eventuele verbeteropties;

8. Het jaarlijks actualiseren van uitgangspunten m.b.t. het BespaarGarant contract in verband met de door EED te verzorgen jaarafrekening. Hieronder wordt verstaan: indexering (bv. op loonkosten, Btw en REB), bepalen van de invloed van eventuele afwijkingen in gebruikstijden of gewenste temperaturen op het contract streefverbruik en de invloed hiervan op de door EED in rekening te brengen maandbedragen.

9. EED biedt als faciliteit de coördinatie van inkoop van energie in opdracht van KLANT, terzake elektriciteit t.b.v. de warmtepomp, ketels en gemeenschappelijke voorzieningen op basis van notaverlegging van de energienota.

   EED biedt de faciliteit facturatie en incasso naar de huurders/bewoners van:
   …….
   ……..
   …….

   Dit betreft geleverde warmte, warmtapwater en elektriciteit algemene voorziening, welke door middel van een voorschot en jaarafrekening worden verrekend met de huurder/bewoner.

   Tevens draagt EED zorg voor facturatie en incasso van vaste maandbedragen die samenhangen met de bedoelde warmte en elektriciteitslevering.

1. Berekening prijzen voor Warmte.

Berekening kosten per jaar.

	Vast	Variabel
1. Levering Gas HR ketel		
Vaste kosten		€ …….
Variabele kosten	€ ……..	
2. Transportkosten Gas HR ketel		
Vaste kosten		€ ……..
Variabele kosten	€ ……	
3. Levering Elektriciteit warmtepomp		
Vaste kosten		€ …….
Variabele kosten	€ ……	
4. Transportkosten elektriciteit warmtepomp		
Vaste kosten		€ …….
Variabele kosten	€ ……	

Totaal

€ ……A……. € ……B……

5. Berekening geleverde warmte:
Som alle warmteleveringen volgens warmtemeters …….. GJ

Totaal Geleverde warmte
…….C……GJ

6. Administratiekosten Leverancier: D €

Warmteprijs = B/C €/GJ Vast bedrag voor warmte: (A + D).

2. Berekening prijzen voor Koude

Berekening kosten per jaar.

	Vast	Variabel
1. Levering Elektriciteit warmtepomp		
Vaste kosten		€ …….
Variabele kosten	€ ……	
2. Transportkosten elektriciteit warmtepomp		
Vaste kosten		€ …….
Variabele kosten	€ ……	

Totaal

€ ……E……. € ……F……

3. Berekening geleverde warmte:

Som alle koudelevering volgens energiemeters
…….. GJ

Totaal Geleverde koude
…….G……GJ

Koudeprijs = F/G €/GJ Vast bedrag voor koude: (E).

Deze tariefcalculatie wordt telkens achteraf uitgevoerd op basis van gerealiseerde elektriciteits- en gaskosten.

Totaal overzicht kosten huurder/bewoner:

Bedragen in €/maand (deels geschat)

Woningen	**excl. BTW**	**BTW**	**incl. BTW**
Kosten warmte en warmtapwater			
Energiekosten elektriciteit algem.			
Energiemanagement			

De bovenstaande kosten zijn per woning. De totale maandelijkse kosten voor de 7 woningen bedragen € 694,82 incl. BTW per maand. Prijspeil 1-07-2008.

Hospice	**excl. BTW**	**BTW**	**incl. BTW**
Kosten warmte en warmtapwater			
Kosten koude			
Energiemanagement			

De totale maandelijkse kosten voor Hospice bedragen € 1.181,14 incl. BTW per maand. Prijspeil 1-07-2008.

Domani	**excl. BTW**	**BTW**	**incl. BTW**
Kosten warmte en warmtapwater			
Kosten koude			
Energiemanagement			

De totale maandelijkse kosten voor ….. bedragen € 1…….. incl. BTW per maand. Prijspeil ……..

Pilot Ogre Latvia

Description of the pilot
The municipality of Ogre is situated in central Latvia, 36 kilometres east of the capital, Riga. In 1861, when the Riga-Daugavpils railway was opened, Ogre began to develop into a health resort. Following annexation by the Soviet Union and the Second World War, Ogre was transformed into an industrial centre with a rapidly-growing population and the need for multi-occupant housing.

The pilot scheme area in the municipality of Ogre includes 10 residential buildings with a total of 238 flats. The blocks were erected in two different styles. Some of the buildings were built between the early 1970‘s and early 1990‘s with bricks and panelling; they range from 3 to 5 floors in height. They have central heating, and the toilets and bathrooms are separate.

These types of blocks are the best from Soviet times and are in quite good condition. They experience fewer problems with the heating and have large rooms and balconies. They do not have lifts however. The first blocks in the second style were built in the early 1960‘s and consist of white bricks. The buildings in the pilot scheme area are three storeys high and have central heating. These flats are much smaller however and the toilets and bathrooms are combined. They have intersection rooms and no balconies. The flats have passed into the property of the occupants. Most people still live in their own flats; only a few have been rented out to other people.

Residential buildings in Latvia are one of the essential heat consumers during the heating season. In 2003 the residential sector in Latvia has consumed 74% of all amount of produced heating energy. The largest part of consumed heat was used to heat buildings. The majority of residential buildings were constructed within the period from 1965 to 1990. At this time mainly typical buildings were constructed. Types of buildings 103, 316, 318 and 467 series were among the most widespread. Till 1991 the heat energy saving issue was not paid sufficient attention to in Latvia, since the price for fuel was very low. As a consequence, building envelopes with a very low thermal resistance were used in the building constructions.

Figure: Samples of analysed buildings and impressions of daily life in Ogre

According to regulations existing in USSR, a standard thermal resistance of building envelopes was calculated with account to climate conditions and building envelope thermal inertia. In climate conditions of Latvia the standard thermal resistance for exterior brick walls was in average 0.75 m2K/W and for exterior expanded-clay concrete walls – 0.85 m2K/W, which is at least 3 times less than the values specified in the current LBN standard (Latvian Construction Standard) 002-01 "Heat engineering of building envelopes" which is valid in Latvia. It should be noted also that in the process of installation of building envelopes a correct sequence of operations was not often observed and technology was not duly supervised. Taken as a whole, all these factors, especially when considering current high energy costs, result in high costs for upkeep of buildings. One-pipe heating systems with the connection to the centralized heating system were used to heat buildings. Till 1991 a direct connection through elevators was mainly used. Since 1997 the elevators has been gradually replaced by plate-type heat exchangers, thus moving away the internal engineering networks of the buildings from the external heat supply networks. Heating systems of the buildings were made of steel pipes. Self-ventilation was used as indoor air ventilation. Outside air intake occurred mainly through windows. Air chambers were used to take out air from kitchens and lavatories. Mainly gas was used for cooking. Electric stoves were used in buildings which had more than 9 floors.
Till 1997 hot water was mainly generated in central heating points which served groups of 4-5 buildings. Since 1997 the generation of hot water was gradually transferred from central heating points to individual boiler houses installed in each building. At the end of 50s local gas running water heaters, which were located inside the apartments, were used in buildings of certain types to generate hot water. Hot water supply systems were installed with the use of mainly zinc-plated steel pipes with recycle cables. Heated towel rails were usually connected to riser pipes. In separate cases heated towel rails were connected to the heating systems. However, this method has not been widely used. Researches evidence that the houses, in which heated towel rails are connected to the heating system, the water consumption in summer time is higher than in houses where heated towel rails are connected to the hot water supply system. For reduction of energy consumption for hot water supply it is possible to use measures like switching off hot water circulation during the nights, reduction of temperature during the night, pipe insulation and full hot water system reconstruction.
In general the buildings in the pilot location represent typical housing built in the 60-80ties throughout Latvia and other Soviet Republics, thus allowing applying project results in other areas and increasing the added value of the project. According to the results of the social questioning, the average inhabitant of the pilot location is a women in the age of 55 years, which lives (married or unmarried) with a partner or with a partner and children, has graduated secondary education establishment (most probably vocational) and has very low income (most probably from 140 to 280 EUR per one person of the household). Paying of costs for heating is a major problem for approximately 40% of inhabitants as 39% of respondents spend more than 40% of their income on energy costs.

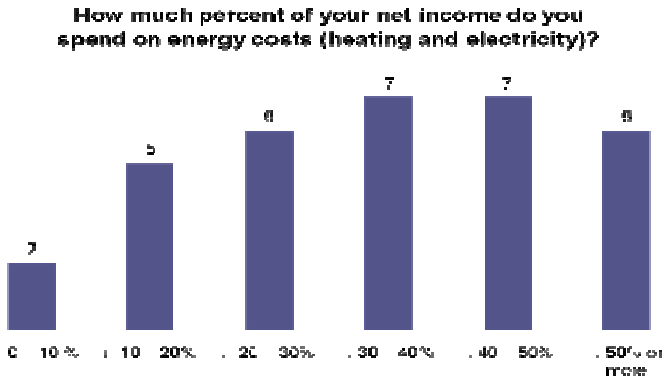


Figure: Energy costs as percentage of net income in pilot Ogre

The low level of inhabitants welfare to a great extent can be explained by such aspects as the fact that there are 40% of respondents, who live alone or alone with children, and 38%, who don't have regular salaried work (approximately 1/3 of the respondents are pensioners). In spite of the complaints on some certain facilities and maintenance sectors in the neighbourhood and in the municipality in general, with lack of parking places indicated as the most topical problem, people have noticed the

implemented improvements and consider their neighbourhood and Ogre town as a pleasant place for living. The same concerns also the housing, as in most cases residents are satisfied with the different aspects of their house and 2/3 have indicated that they certainly wouldn't like to move to another place. Among the improvements, necessary to be made in the building, inhabitants are mentioning also insulation of outside walls, roofs and facade, change of windows in the staircase, change of radiators and improvement of ventilation.
Although inhabitants are aware of the necessity to be co-responsible for improving their living environment and 46% of them have expressed interest to participate in the insulation of the house, only part of them would be ready to play an active role in changing the situation.

Involving ESCO's
Sun Energy Baltic" Ltd., a daughter company of foreign energy service company "Zone Energy", is the only ESCO Company in Latvia, 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 initiated several projects in Valmiera. As there are no other ESCOs of such profile in Latvia, they are the only potential ESCO for the pilot in Latvia.
Sun Energy Baltic has been contacted by Ogre and several meetings were organized, both with the leadership of our municipality and municipal agency Malkalne. They were successful, and both parties are interested to develop cooperation between "Sun Energy Baltic" and Ogre on the basis of EPC. Still, after acquainting with the overall characteristics and specific data of our pilot houses, "Sun Energy Baltic" came to conclusion that the houses of the pilot location are too small to be interesting for them from the business point of view - they (being a business company and looking for a profit) don't see financial benefit from investing in these houses. The only possible solution, that could be considered, could be if they take all our pilot houses together as a whole, add some other real estate of the area and invest in all those buildings together at one time.

There occurred another problem, which makes the success of this idea quite doubtful even if we convince ESCO to invest in our pilot houses. "Sun Energy Baltic" is using following financial mechanism: they apply for EU financing under activity "Improvement of Heat Insulation of Multi-Apartment Residential Buildings" of the ERDF operational programme "Infrastructure and Services" (50%) and take a credit for the remaining amount (50%). But for receiving ERDF financing, there is a strict rule, set by the Regulations of the Cabinet of Ministers that the houses have to be in the possession of flat owners (that is, maintenance rights are given to the flat owner's society or to an authorized person). In the context of ECOLISH project it means that there has to be an Occupant Organization established for receiving the financing. It concerns also Ogre, as our pilot houses are not in the flat owners possession - so there should be Occupant Organizations created in all these houses.

The process of involving occupants in Ogre
In the case of the pilot location in Ogre, three main meetings were organized in Ogre with the participation of the inhabitants:
- The first meeting was held on 21.05.2008 in the premises of municipal agency "Malkalne";
- The second meeting was held on 02.07.2008 in the hall of Ogre Music School;
- The third meeting was held on 02.03.2009 in the hall of Ogre municipality.

Information on the project was presented also in the annual meeting of the house oldies of the multi-apartment houses, which was held in Ogre Culture Centre in 15.10.2009. Representatives of 107 houses from the whole Ogre town attended the meeting.
In addition, information was provided to the oldies of the houses and other visitors at a regular basis during individual meetings in MA "Malkalne".
The following parties attended the meeting in "Malkalne": house oldies, the project management team, the leadership of municipal agency "Malkalne" and a representative of Riga Technical University.

Figure: Pictures from the meeting in Malkalne in 21.05.2008

The following parties attended the meeting in the Music School of Ogre: inhabitants, project management team, leadership of municipal agency "Malkalne", and a representative of Riga Technical University. The following parties attended the meeting in the municipality: inhabitants, house oldies, project management team, and representatives of the Riga Technical University, representatives of PAROC Ltd, thermo-auditing company VEK Ltd, the Ogre municipality, the Mortgage and Land Bank of Latvia.

Figure: Pictures from the meeting in the municipality of Ogre in 2.03.2009

Feedback from the occupants

The feedback from the inhabitants was collected through the inhabitants' questioning on the implementation and financing of the energy-efficiency measures, which was done in the pilot area in May 2009 with intention to clarify the occupants' opinion concerning the available possibilities and proposed actions. 238 questionnaires were distributed to the inhabitants of the multi-apartment houses involved; 31 filled-in questionnaires were received and summarised.

In general, the inhabitants are aware of the benefits of the retrofitting and are positive towards making improvements in the existing dwellings. To the question "Would you wish that there are energy-efficiency improvements implemented in your house, for example, insulation of facade or end walls?" 71% of the respondents answered "Yes", 29% - "No". Those who said "No" mentioned as reasons:

- the end or facade walls and in some apartments also the inner walls are already insulated;
- the insulation of the house is worth implementing only after adjusting of the heating mains, heating pipes in the cellar and heating regulation;
- if all the houses will be insulated, it will increase the heating tariffs;
- the apartment is too warm in winter;
- the financial situation in Latvia concerning the labour and salaries doesn't allow participating financially.

Still to the question "Would you be ready to participate in implementation of energy-efficiency improvements with your co-financing?" 39% have given answer "Yes", 47% - "No", 14% - "I don't know". It means that due to lack of financing and other reasons inhabitants are not very enthusiastic about investing in their housing by themselves and are waiting for support from aside.

One of the questions, asked to inhabitants, was: "Would you be ready to participate in implementation of energy-efficiency improvements and to sign energy performance contract, if it doesn't require additional financial contributions from your side?"; 58% answered it with "Yes", 28% - "No", 14% - "I don't know". Those who said "No" mentioned as reasons:

- the information is not sufficient;
- it will be hard to follow the usage of resources and control the actual situation;
- it is too complicated;
- it is hard to survive in the economical crisis;
- unbelieving to the idea.

Those who said “I don’t know” mentioned as reasons the necessity for more detailed information and the unclear financial aspects.

When asked to compare different possibilities of financing energy-efficiency measures, 73% of respondents have given preference to the financing scheme combining 3 financial sources - municipality 50%, house accumulations 30%, inhabitants 20%. Since 2004, the end walls and in some cases the facades are insulated in more than 20 buildings in Ogre town with this financial mechanism, and it is well-known to Ogre inhabitants. The Energy Performance Contracting has been positively evaluated by 27% of the respondents. Support provided by the activity “Improvement of Heat Insulation of Multi-Apartment Residential Buildings” of the ERDF operational programme “Infrastructure and Services” was evaluated as less preferred, as 50% of the costs have to be financed by inhabitants.

General outcome of meetings

The inhabitants have indicated the main energy-efficiency measures that should be implemented in their housing with intention to improve the current situation (arranged according to inhabitants’ preference):

- insulation of roof;
- changing of utilities (water pipes, sewerage, heating system);
- insulations of end walls and facade walls;
- changing of windows in staircases;
- changing of outer doors.

Some inhabitants have mentioned also insulation of the basement, securing of the possibility to regulate the radiators, renewals of external heating mains, cleaning of ventilation system, etc.

The identified financial scheme plans to apply for the currently available EU financing under 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%). In the case of the involvement of an ESCO the 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, and reducing the inhabitants’ fear of long-term commitments.

Such a scheme is planned to be used as long as the ERDF financing will be available. Afterwards, alternative financial sources (new energy-efficiency improvement programmes, municipal support, etc.) will be searched.

In most cases for receiving financing for energy efficiency improvements in multi-apartment houses, there is a condition that the house has to be taken in the possession of the flat owners either by giving the management rights to an inhabitants’ organisation (society of flat owners or cooperative society of flat owners) or to an authorised person. It concerns also the EU financing under the activity “Improvement of Heat Insulation of Multi-Apartment Residential Buildings” of the ERDF operational programme “Infrastructure and Services”. It means that the inhabitants have to consider taking the house in their possession, which brings along also terminating the contractual commitments with the municipal agency “Malkalne”. It is a very complicated task, as people are satisfied with the current order and are not willing to take risks and change the safe system to an unknown one. They also have no time and no wish to take additional duties and commitments in maintaining the house, but the most important reasons is the lack of money for people.

Adjustment of final retrofitting plans

The inhabitants have indicated the main energy-efficiency measures that should be implemented in their housing with intention to improve the current situation. Therefore, in case of practical introduction of an Energy Performance Contracting, a decision should be made on the energy measures to be implemented, thus allowing ESCO to start preparation of the applications with intention to receive ERDF financing for the houses of its interest.

Monitoring and evaluation

The number of meetings was sufficient for giving inhabitants the necessary information presenting and discussing the project aims, the activities and outcomes, the characteristics of the proposed investments, the potential and mechanism of the Energy Performance Contracting, the EU role, and for getting feedback from the inhabitants.

The implemented process is considered understandable to the inhabitants of the pilot-houses. Every apartment was approached by invitation letters to the meetings and questionnaires with explanations on the project tasks and proposed schemes. Inhabitants had a possibility to take part in the meetings; information was provided also via house oldies and direct contacts.

The procedure implemented in the frames of the ECOLISH project was successful. It would have been preferred a higher responsiveness from the side of inhabitants concerning the attendance of the meetings, but also there has to be taken into account that the income level of the inhabitants is very low (in many cases no more than 280 EUR per person) and, besides, a great number of the people in the pilot area are pensioners, who have no big interest about the further condition of their house. The situation is hardened also by the financial and economical crisis in Latvia, due to which many people have lost their jobs, and the salaries (and even the pensions for retired people) are reduced even more. It is psychologically very hard for the people, as they don't feel safe and are afraid for their future, and they are not very enthusiastic about new proposals and new commitments in such a very difficult period.

As a suggestion for the future, the area of implementing the Energy Performance Contracting should be expanded to larger territories with more houses, having bigger number of apartments.

As ESCO is a business company and, as for every business unit, the main aim of its action is to gain profit, the most important reason for interest from ESCO side is the possibility to earn income in result of energy performance contracting.

DAUDZDZĪVOKĻU MĀJAS ENERGOPĀRVALDES LĪGUMS

Ogrē

200___.gada ___. _____
Nr. _____

Daudzdzīvokļu mājas Ogrē, _____ ielā Nr.___ dzīvokļu Nr._____
_____
_____
_____īpašnieki, turpmāk tekstā – Īpašnieki, paužot savu brīvu gribu, no vienas puses, un
_____,_____
,
Juridiskās personas nosaukums reģistrācijas Nr.
_____ personā, kas rīkojas, pamatojoties uz
Juridiskās personas pilnvarotā pārstāvja amats, vārds, uzvārds
_____, turpmāk tekstā – Energoapgādes pakalpojumu uzņēmums (EAPU), no otras puses, abi kopā turpmāk tekstā – Puses, savstarpēji vienojoties, bez maldības, viltus un spaidiem noslēdz šādu līgumu, turpmāk tekstā – Līgums:

1. LĪGUMA PRIEKŠMETS

1.1. Īpašnieki uzdod EAPU, bet EAPU apņemas veikt nekustamā īpašuma, kas atrodas Ogrē, _____ ielā Nr. ____, un sastāv no zemes gabala _____ kv.m platībā, ____ stāvu daudzdzīvokļu dzīvojamās ēkas kopīpašumā esošo daļu (turpmāk tekstā - Īpašums) energopārvaldīšanu, ar to saprotot Īpašuma uzturēšanu un enerģijas (siltuma/elektrības) patēriņa izdevumu samazināšanu, par saviem līdzekļiem veicot Īpašuma energoefektivitātes paaugstināšanas pasākumus (Pielikums Nr. _____).

1.2. EAPU uzņemas visus riskus par energoefektivitātes paaugstināšanas pasākumu efektivitāti un energopatēriņa izdevumu samazināšanos Pielikumā Nr. ____ noteiktajā apjomā.

1.3. Atlīdzība par EAPU sniegtajiem Īpašuma energopārvaldīšanas pakalpojumiem ir balstīta uz energoefektivitātes paaugstināšanas pasākumu rezultātā sasniegto Īpašuma patērētās enerģijas ietaupījumu.

2. EAPU PIENĀKUMI UN TIESĪBAS

2.1. EAPU ir pienākums:

2.1.1. godprātīgi veikt Īpašuma pienācīgu energopārvaldīšanu, kura ir vērsta uz pārbaudāmu un izmērāmu Īpašuma energoefektivitātes paaugstinājumu un energopatēriņa samazinājumu atbilstoši Līguma noteikumiem;

2.1.2. apdrošināt savu civiltiesisko atbildību saistībā ar Līguma 2.1.1.punktā noteikto pienākumu izpildi;

2.1.3. Līguma darbības laikā par saviem līdzekļiem veikt visu iekārtu un sistēmu, kas tiks uzstādīti energopārvaldīšanas mērķiem, apdrošināšanu pret pilnu vai daļēju bojāeju un mehāniskiem bojājumiem;
2.1.4. veikt saņemto maksājumu un ar Īpašuma energopārvaldīšanu saistīto dokumentu pienācīgu uzskaiti un glabāšanu saskaņā ar normatīvo aktu prasībām;

2.1.5. pārstāvēt Īpašnieku intereses jautājumos, kas saistīti ar Īpašuma energopārvaldīšanu valsts un pašvaldības iestādēs, attiecībās ar visām fiziskajām un juridiskajām personām, kā arī uz atsevišķa Īpašnieku sapulces pilnvarojuma pamata – tiesās un kredītiestādēs;
2.1.6. reizi gadā sagatavot un iesniegt Īpašnieku sapulcei apstiprināšanai Īpašuma energopārvaldīšanas atskaiti.
2.1.7. Ja izdevumi netiks samazināti Līgumā noteiktajā apjomā, ciest ar to saistītās negatīvas sekas.

2.2. EAPU ir tiesības:
2.2.1. iekasēt no dzīvokļu īpašniekiem maksu par Īpašuma energopārvaldīšanu saskaņā ar Līguma noteikumiem balstoties uz sasniegto Īpašuma patērētās enerģijas ietaupījumu.
2.2.2. veikt Īpašnieku dzīvokļos esošo komunikāciju un Īpašuma elementu renovāciju, apsekošanu un remontu, ne vēlāk kā trīs dienas iepriekš saskaņojot šo darbu veikšanas laiku ar Īpašniekiem;
2.2.3. dot Īpašniekiem norādījumus attiecībā uz energopārvaldīšanas mērķiem uzstādīto iekārtu un sistēmu izmantošanu;
2.2.4. nepieciešamības gadījumā sasaukt Īpašnieku sapulci.

3. ĪPAŠNIEKU PIENĀKUMI UN TIESĪBAS

3.1. Īpašniekiem ir pienākums:
3.1.1. piedalīties Īpašuma energopārvaldīšanā atbilstoši Līguma noteikumiem, Īpašnieku sapulces lēmumiem un normatīvajiem aktiem;
3.1.2. savlaicīgi un pilnā apjomā veikt EAPU visus Līgumā paredzētos maksājumus tā noteiktajā kārtībā;
3.1.3. saskaņā ar iepriekšēju vienošanos (avārijas situācijās – nekavējoties) nodrošināt EAPU tā pienākumu veikšanai piekļūšanu Īpašnieku dzīvokļos esošajām komunikācijām un citiem Īpašuma elementiem;
3.1.4. nekavējoties ziņot EAPU par konstatētajiem koplietošanas telpu, komunikāciju, būvkonstrukciju un citu Īpašuma elementu bojājumiem vai apstākļiem, kas var izraisīt šādus bojājumus;
3.1.5. rakstiski saskaņot ar EAPU dzīvokļu inženiertehnisko iekārtu un ietaišu nomaiņu
3.1.6. ievērot normatīvajos aktos noteiktos dzīvojamo telpu lietošanas noteikumus, sanitārās normas, drošības tehnikas un ugunsdrošības noteikumus, saudzēt Īpašumu, tā komunikācijas un citus tā elementus.

3.2. Īpašniekiem ir tiesības:
3.2.1. saņemt no Pārvaldnieka paskaidrojumus par viņa darbību Līguma 2.1.punktā minēto pienākumu veikšanā, par Īpašuma energopārvaldīšanas izdevumiem un citiem ar Īpašuma energopārvaldīšanu saistītiem jautājumiem;

3.2.3. iesniegt EAPU priekšlikumus un ierosinājumus Īpašuma energopārvaldīšanas jautājumos.

4. FIKSĒTAIS ENERGOPATĒRIŅŠ

4.1. Pamatojoties uz EAPU veiktā energoaudīta rezultatiem Līdzēji vienojas par sekojošo fiksēto enerģijas patēriņu Līguma darbības laikā: _____ gadā. Fiksētais enerģijas patēriņš nozīmē to, ka neatkarīgi no tā, vai enrgopārvaldīšanas rezultātā Īpašuma enerģijas patēriņš samazināsies, Īpašnieki maksās EAPU samaksu par enerģiju pēc Līguma fiksētās likmes. Ja enerģijas patēriņš faktiski būs samazinājies, gūtos ietaupījumus Līguma darbības laikā saņems

EAPU. Gadījumā, ja Līdzēji konstatē, ka faktiskais enerģijas patēriņš un līdz ar to izdevumi ir lielāki nekā fiksētajā enerģijas patēriņā noteikts, EAPU uz sava rēķina veic visus nepieciešamos pasākumus, lai samazinātu enerģijas patēriņu un izdevumus un sasniegtu fiksētā enerģijas patēriņa apmēru, ka arī kompensē Īpašniekiem zaudējumus (starpību, par kādu enerģijas patēriņš un izdevumi ir lielāki nekā fiksētajā enerģijas patēriņā noteikts).
4.2. Lai konstatētu faktisko enerģijas patēriņu, Līdzēji vienojas vienu reizi mēnesī/ pusgadā/ gadā, sākot no ..... veikt mērījumus, ar mērķi noteikt Īpašuma faktisko enerģijas patēriņa daudzumu un izmaksas.

5. MAKSĀJUMI UN NORĒĶINU KĀRTĪBA

5.1.Ar Līguma noslēgšanas brīdi, Īpašnieki uzsāk maksāt EAPU ikmēneša maksājumu šādā apmērā:_____ , t.sk. PVN (kopējais maksājums
nedrīkst pārsniegt Īpašnieku līdzšinējos maksājumus par enerģiju).
Ikmēneša maksājums sastāv no:
5.1.1. atlīdzības par energopārvaldīšanu - _____ Ls;
5.1.2. Iekārtu un sistēmu izpirkuma maksas - _____ Ls;
5.1.3. atlīdzības enerģijas piegādātajiem par patērēto enerģiju saskaņā ar Līguma noteikto fiksēto enerģijas patēriņu, kuru EAPU ir pienākums pārskaitīt enerģijas
piegādātajiem, kas sastāda - _____Ls.
5.2.Punktā 5.1. noteiktais maksājums automātiski tiek palielināts šādos gadījumos:
5.2.1. palielinās maksājumam piemērojamo nodokļu un nodevu apmēri, saskaņā ar tiesību aktiem tiek piemēroti jauni, papildus nodokli vai nodevas – ar izmaiņu spēkā stāšanās brīdi;
5.2.2. tiek palielinātas cenas par piegādāto enerģiju– ar izmainu spēkā stāšanās brīdi. Gadījumā, ja enerģijas cenas tiek samazinātas, tas nesamazina EAPU noteiktā maksājuma lielumu.
5.3. Visi Īpašnieku norēķini ar EAPU tiek veikti, ieskaitot naudas līdzekļus EAPU norādītajā bankas kontā, pamatojoties uz Pārvaldnieka sagatavotiem un piesūtītiem rēķiniem, līdz _____.
5.4.Ja Īpašnieki neievēro Līguma noteikto maksāšanas termiņu, tie maksā nokavējuma naudu 0.5% apmēra no nokavētās summas par katru nokavēto dienu.

6. PUŠU ATBILDĪBA

6.1. Puses ir savstarpēji atbildīgas viena otrai par zaudējumiem, kas kādai no Pusēm radušies otras Puses darbības vai bezdarbības rezultātā, Latvijas Republikas normatīvajos aktos noteiktajā kārtībā.
6.2. Ja EAPU veic darbības, nepildot vai nepienācīgi izpildot Līguma 2.1.punktā noteiktos pienākumus, kā arī, ja šīs darbības nav izdarītas Īpašnieku interesēs, tad šādu darbību sekas attiecas tikai uz pašu EAPU.
6.3. Puses nav atbildīgas viena otrai par Līguma saistību nepildīšanu vai nepienācīgu pildīšanu, iestājoties tādiem nepārvaramas varas apstākļiem kā dabas stihijas, ugunsgrēks u.tml., kurus Puses nevarēja paredzēt un ar saprātīgiem līdzekļiem novērst.

7. LĪGUMA TERMIŅŠ, LĪGUMA PAPILDINĀŠANAS, GROZĪŠANAS UN LAUŠANAS NOTEIKUMI

7.1. Līgums stājas spēkā ar brīdi, kad Puses to parakstījušas, un ir spēkā ____ gadus – līdz 200____.gada ____. _____.
7.2. Ja energopārvaldīšanas gaitā EAPU konstatē darbu un Līgumā noteikto mērķu izpildes neiespējamību vai darbu turpināšanas nelietderīgumu un var to pamatot, EAPU ir pienākums apturēt Līguma izpildi ar attiecīgu rakstveida paziņojumu. Šādā gadījumā Līdzējiem _____ dienu laikā jāvienojas par tālāko darbu veikšanas kartību un virzieniem vai Līguma izbeigšanu.
7.3. Līguma darbības pēdējā dienā, pie nosacījuma, ka EAPU ir saņēmis visus šajā Līgumā noteiktos maksājumus, EAPU ar pieņemšanas – nodošanas aktu nodod visas Līguma mērķiem uzstādītās iekārtas un sistēmas Īpašnieku īpašumā.

7.4. EAPU ir tiesības nekavējoties vienpusēji lauzt Līgumu šādos gadījumos, informējot par to Īpašniekus rakstveidā:
7.4.1. ja Īpašnieki ilgāk par ____ dienam kavē kādu no Līgumā noteiktajiem maksājumiem un neveic tos arī pēc rakstveida atgādinājuma saņemšanas;
7.4.2. ja Īpašnieki regulāri bojā EAPU uzstādītās iekārtas un sistēmas vai izmanto tās citiem mērķiem nekā paredzēts Līgumā.

7.5. Īpašniekiem ir tiesības nekavējoties vienpusēji lauzt Līgumu šādos gadījumos, informējot par to EAPU rakstveidā:
7.5.1. ja EAPU ___ mēnešus/ gadus pēc kārtas nenodrošina Līguma noteiktos ietaupījumus un līdz ar to nesasniedz Līguma mērķus;

7.6. Līguma pirmstermiņa izbeigšanas gadījumos, kas minēti 7.4.punktos, pēc EAPU izvēles tas uz Īpašnieku rēķina demontē visas energopārvaldīšanas mērķiem uzstādītās iekārtas un sistēmas, un Īpašnieki sedz EAPU visus ar Līguma laušanu radītos zaudējumus vai arī Īpašnieki 14 (četrpadsmit) kalendāro dienu laikā samaksā EAPU visus nesamaksātos Līgumā noteiktos maksājumus saskaņā ar 5.1.punktu (izņemot negūto peļņu), un EAPU nodod Īpašniekiem visas Līguma mērķiem uzstādītās iekārtas un sistēmas īpašumā ar pieņemšanas–nodošanas aktu.
7.7. Līguma pirmstermiņa izbeigšanas gadījumos, kas minēti 7.5.punktos, EAPU ir tiesības demontēt visas Līguma mērķiem uzstādītās iekārtas un sistēmas uz sava rēķina, taču tam ir pienākums atmaksāt Īpašniekiem visus par šo iekārtu izpirkšanu veiktos maksājumus

saskaņā ar 5.1.punktu un segt Īpašniekiem ar Līguma laušanu radušos tiešos zaudējumus, izņemot negūto peļņu.
7.8. Līgums var tikt izbeigts ari citos normatīvajos aktos noteiktajos gadījumos.

8. NOBEIGUMA NOTEIKUMI

8.1. Visi Pušu strīdi un nesaskaņas, kas var rasties Līguma izpildes gaitā, tiek risināti pārrunu ceļā. Ja Puses šādā veidā vienošanos panākt nespēj, strīdi normatīvajos aktos noteiktajā kārtībā izšķirami Latvijas Republikas tiesās.
8.2. Ja spēku zaudē kāds no Līguma noteikumiem, tas neietekmē citu Līguma noteikumu juridisko spēku.
8.3. Līgums pilnībā atspoguļo Pušu vienošanos, Puses ir to izlasījušas un piekrīt visiem tā noteikumiem, ko apliecina, parakstot Līgumu.
8.4. Līgums ir sastādīts uz ____ lappusēm 2 eksemplāros, no kuriem pa vienam glabājas pie Īpašuma apsaimniekotāja un EAPU.[Type text]

9. PUŠU REKVIZĪTI

Īpašnieki:

Dzīvokļa Nr.	Īpašnieka vārds, uzvārds/ nosaukums	Personas kods/ reģistrācijas Nr.	Informācija par pārstāvi (pilnvarojumu apliecinošie dokumenti)	Paraksts

EAPU:

_____

_____

_____

nosaukums, reģistrācijas Nr.

paraksts un tā

z.v. atšifrējums

Pilot Pieria Greece

Description of the pilot
Pieria Prefecture is located in North Greece combining mountainous areas (Mt. Olympus, Mt. Pieria) and areas by the sea (Thermaikos Gulf). Katerini is the capital of the prefecture, with a total population of 56.434 inhabitants located in the centre of the Prefecture with a total area of 93.459 acres, mainly flat. Katerini has 4 organised settlements of low income social housing.

Responsible for these settlements is the Workers' Housing Organisation, but individuals have full ownership of their apartments (either living in them or renting them). In the framework of the ECOLISH project, the oldest settlement among the low income social housing was chosen as the pilot location for Greece as it seems the most interesting from energy point of view for the Energy Performance Contacting. The blocks under examination were constructed in an area of approximately 20acres (total area of the location is 23.838,70 m2). Within this area 150 apartments and 5 stores are located. The settlements are organized in 18 blocks (17 blocks of apartments and 1 block of stores), which were built in two different periods, namely in 1977 (building permit of 1974) and 1981 (building permit of 1978).

Figure: Samples of analysed buildings

Figure: Solar system (l) and visit of the ECOLISH team (r) in Pieria

In total 28 apartments were thoroughly investigated for what concerns their building characteristics, energy behaviour, indoor quality and social characteristics.

The energy use of the examined buildings mainly consists of electricity used for lighting, cooling, cooking and electric appliances and red diesel used for heating. In general, primary electricity in Greece is mainly generated from lignite. At the moment there is one single electricity provider in the country, namely the Public Enterprise of Electricity. Except for energy from renewable sources, there are currently almost no other alternative electricity supply options.

Therefore, there are not much possibilities for upgrading the energy supply on location and options are limited to very extensive measures like district electricity from other primary sources, which need major efforts and investments to be implemented and are therefore unlikely to be implemented. For the heating supply however, there are different options available, the more conventional one being the replacement of red diesel fuel by natural gas. Other options for heating could be the implementation of renewable heating (like biomass) or district heating.

The following options seem to have the greatest potential from both energy saving as well as technical, social and financial point of view and will be further investigated in the continuation of the project:

- introduction of thermal insulation;
- sealing cracks and minimise thermal bridges;
- replacement of fenestration and glazing;
- improvement of ventilation;
- improvement of shading, installation of ceiling fans;
- replacement of central heating system and piping;
- introduction of heat cost allocation and thermostatic valves;
- installation of solar water heaters, solar heating/cooling and/or photovoltaics.

It is shown that through the variable energy measures the contribution to the energy savings can vary from 15% to 50%. It seems that among the energy measures the most efficient one is the use of low energy luminaires. This is also the cheapest solution; however this measure should be funded by the occupants themselves, as in the case of Greece, because of legal reasons, ESCO cannot undertake this task because it is not legal to have access and control on the use and maintenance of items inside the property.

The control of the systems' set points and the monitoring of the energy consumption per dwelling through thermostats and heat cost allocators result in considerable energy savings also with reasonable costs.
The less expensive solution with minimal cost and considerable energy results is the use of night ventilation in hot climates, if this is operable via openable windows. Also the use of ceiling fans can be a low energy solution with satisfactory energy savings. On the other hand, occupants with their

behaviour can increase the energy consumption of their dwellings, this is the case of uncontrollable opening of windows for improving the thermal comfort levels and the indoor air quality of the indoor spaces.
All energy measures seem to contribute significantly to the improvement of the indoor environment and the energy performance of dwellings. None of these should be considered as 'risky' measures by the investors, with the condition that the relevant education to the occupants takes place. Most of the time, occupants are aware of the availability of the different energy savings but are not informed regarding their performance, cost, lifetime or effectiveness.

Also their behaviour and acceptance of technology choices depends on their education and brought up. Information should be given on the environmental and energy performance of buildings and guidance on the use of the new implemented devices. Examples already mentioned include the following:

- energy consumption and adjustment of set points;
- adjustment of set points when using ceiling fans;
- closure of windows when air conditioning is on;
- 'correct' choice of luminaries types, and effective use of these according to daylight and occupation of spaces;
- not alteration of internal spaces i.e. erection of internal partitions or placement of spacious furniture in naturally ventilated spaces that may alter the designed air-paths.

The process of involving occupants in Pieria
In the Pieria pilot location, no organisation, public or private-organised by the occupants existed in the area of the social housing, responsible either for building subjects or for social subjects. As a result it was difficult to organize meetings inviting all occupants, as nothing like this was organized ever since 1977 that the blocks were built). For this reason a multilevel approach methodology was adapted; house to house visit, visits for notification of the project, visits for social subjects, visits for technical subjects, organization of special meeting of occupants, participation in occupants' general assemblies, telephone calls, special letters. Meetings' schedule was based on the bottom-up approach and on private meetings with each occupant, at least in first level, in order to explain all parameters, not only of the ECOLISH project but also of the general legislative framework that govern the overall project's subject. Contacting directly and organizing the occupants concluded to be the best approach.
Meetings took place in 8 consequent time periods, starting from 01/02/2008, that the project was notified to the selected pilot location. In more detail:

1. Initial house by house meetings.

Subject: Initial information regarding ECOLISH and energy efficiency in social housing. Information regarding the involved parties. 10 leaflets on RES and energy efficiency were handed out along with informative official letter. Discussion on organizing the occupants' subjects. Dates: from 01/02/2008 to 08/02/2008. Venue: Each occupant house. Experts present: Two persons from Pieriki. Attendants: 85 occupants.

2. Second level house by house meetings.

Subject: Detailed presentation of ECOLISH project and of actions to be implemented at local level. Information on what it will be required to be done by the occupants. Total number of visits: 105 visits in each occupant house. Dates: from 09/02/2008 to 19/02/2008. Experts present: One person from Pieriki. Attendants: 105 occupants.

3. Open meeting with pilot block occupants

Subject: Details on who occupants are proposed to be organized in order to implement ECOLISH project's actions. Date: 20/02/2008. Venue: Communal area of pilot location. Experts present: Two persons from Pieriki. Attendants: 22 occupants.

4. Meetings on social subjects

Subject: Meetings with the occupants on social characteristics of the pilot location. Possibilities of organizing occupants and how were analysed. Social information requested for the relative social analysis was gathered. Duration of each meeting was more than one hour, leading to important feedback on social subjects. Total number of visits: 28 visits, in each occupant house. Date: from 08/04/2008 to 22/04/2008. Experts present: Two persons from Pieriki.

5. Meetings on technical subjects

Subject: Meetings with the occupants on technical characteristics of each apartment, each block and the pilot location in general. Technical information requested for the relative technical analysis was gathered. Duration of each meeting was more than one hour, leading to important feedback on technical problems, along with photographing of important building mal-functions.
Total number of visits: 28 visits, in each occupant's house. Date: from 23/04/2008 to 30/04/2008 and 09/08/2008. Experts present: One person from Pieriki and one person from NKUA.

Figure: Technical meetings photographing

6. Feedback Meetings

Subject: Feedback Meetings with the occupants on organizing subjects. Feedback on the potentialities of organizing the occupants was screened. Details on EEC, EPC and ESCO were initially presented.
Total number of visits: 28 visits. Date: from 15/01/2009 to 28/02/2009.
Venue: Each occupant house. Experts present: Two persons from Pieriki.

7. Telephone information provided Meetings on technical subjects

Subject: In the meantime of the social and technical analysis by the NKUA, Pieriki made telephone calls to the occupants in order to inform them on the progress and on the future presentation of results. Total number of telephone calls: 85. Date: from 25/04/2009 to 30/05/2009.
Experts present: One person from Pieriki.

8. Meeting-presentation of ECOLISH project results-Feedback session

Subject: Final meeting with the occupants in order to present the results of the analysis materialised by NKUA, the financing opportunities of the proposed measures by TECHEM, the accomplished and future steps by PIERIKI, date: 16/09/2009.
Venue: A local gathering place, just opposite the blocks that were selected, as it is their every-day meeting place and they are familiar with it. Door to door information and telephone invitations took place, in combination with posters in the pilot location. Drinks and snacks were offered to all of them, along with presentations of results and actions to be implemented.
Experts present: Two persons from Pieriki, one person from NKUA and two persons form TECHEM.
The number of occupants that participated was larger than estimated as 30 occupants participated in the presentation meeting. Important was the fact that occupants from 16 out of 17 blocks joined the presentation event-mainly building managers. In this way full coverage of the blocks were succeeded. 12 occupants of the pilot blocks (simulated) attended the meeting. On the site, it was decided to present the results in a conversation format, followed by the feedback session. TECHEM provided installation proposals. Also legal support was offered during the event.

Meeting Poster

Meeting Poster

Meeting Agenda

Meeting Attendants

Meeting Attendants

Meeting Presenters

Feedback from the occupants

Depending on the phase of the project and on the progress of organising the occupant's process, different feedback was received by the occupants. Feedback could be separated in two groups, Initial and Final.

Initial Feedback

Occupants were rather unaware of the processes described in the ECOLISH project. Moreover, they provided Pieriki with an initial working framework that trust had to be cultivated between them and Pieriki, since such work was not implemented before in such a location. Especially after meetings 1 to 5 described above, the following feedback was received:

- No trust to Organisation of Social Housing existed among the occupants, since the actual cost spent for their apartments were even double the one predetermined (the lack of trust has to do with the central authority and not the local office);
- All of the occupants were still suspicious on the subject of "why someone wants to do something like that for free?";
- Nevertheless, the following results were gathered:
- Initial acceptance to support regarding technical and social analysis was expressed unanimously;
- Funding the interventions was out of the question!
- Even saying that the Organisation of Social Housing could support the funding was creating frustration;
- Difficult to explain Energy Performance Contracting, some misunderstood that we were an installation company that want to materialize the proposed interventions. No input by the partner in charge of this specific subject;
- Difficulties on understanding the concept due to low educational level, age above 60 and low income workers and pensioners;
- Feedback led to the successful trust development between the researchers and experts of Pieriki and the occupants. In such way, the main difficulty that the occupants had, to invite an unknown person (researcher) in their own house, have been surpassed. Finally, the following feedback information have been noted and surpassed, as proved by the final results of the project:
- Ignorance of the role of Pieriki Anaptixiaki;
- Suspicion about the researchers' purposes and the potential future benefits for them;
- Negative attitude against anyone who might have any interference with the construction of the buildings due to the low quality of the buildings;
- Finally, due to the low educational level of the occupants, the researchers had difficulties to explain the procedure and the purposes of the project.

Final Feedback

Initial feedback comments were more general, and answered during the project duration. On the other hand, final feedback comments were more technical and required immense answers, given during meetings 6 to 8, and especially the meeting No. 8. The following feedback comments were received, answered in full by experts of Pieriki, NKUA and TECHEM:

- Cost per intervention is calculated?
- How the central heating system will work after the interventions?
- System alternation is required?
- What are the differences with autonomous heating per apartment?
- What is the cost for the heat cost allocators presented?
- The old pipes have to be removed?
- How the heat cost allocator and the system installed works?
- Does someone have to enter each apartment in order to calculate energy consumption?
- Heat cost allocators have to be installed in all heating radiators?
- What is the guarantee?
- What is the minimum energy saving?
- Damages will be done to the apartments?
- Existing fuel (oil) will be used?
- What it will be paid when the apartments will be empty or not-used for a long period?

Feedback comments were made clear to occupants, and as a result Pieriki, NKUA and TECHEM will be invited in the first General Assembly of the new period were decisions on heating technologies subjects will be discussed.

Although in the beginning occupants were negative regarding retrofitting their dwellings, the step by step approach adapted after the feedback received led to the result that occupants are interested in retrofitting their dwellings, nevertheless the cost is an important scepticism factor. Moreover, some of them have made individual interventions, mainly related to the indoor environment, such as double glazing, A/C split units, covering their own expenses. This proves the, in general, interest to retrofit their dwellings, nevertheless cost support, especially due to the general crisis situation, is more than essential. Finally, the technical analysis results of NKUA were accepted as proposals, especially as they were provided in a step by step format and cost analysis.
As a result to the aforementioned, the idea of an ESCO was not "banned" in the end. Although in the first meetings with the occupants such a subject was creating negative reactions, in the end, and after the relative explanations by TECHEM (the ESCO partner at local level) their reactions were smoothed. Finally, discussions on how an ESCO will operate the established operating system were elaborated, leading to the result than an ESCO could offer them important support in their retrofitting decisions.

General outcome of meetings
General outcome of the meetings organized and executed in the pilot location is that occupants are receptive to support. Although they are negative in general regarding external support, mainly due to the fact that no support was offered to them by no one until now, when explaining in detail the scope of the support to be offered their hesitation was overcame. Initial feedback described in the above paragraph was processed and solution processes were adapted in order to solve all faced situations:

- Ignorance of the role of Pieriki Anaptixiaki. *Now all occupants know the development role of Pieriki Anaptixiaki;*
- Suspicion about the researchers' purposes and the potential future benefits for them. *Researchers are being invited in occupants houses, clear scope of Pieriki and ECOLISH project have been understood by occupants;*
- Negative attitude against anyone who might have any interference with the construction of the buildings due to the low quality of the buildings. *The simplified financial framework of ECOLISH project has been understood by occupants;*
- Finally, due to the low educational level of the occupants, the researchers had difficulties to explain the procedure and the purposes of the project. *Every day vocabulary explained everything easily, terms as heat cost allocators have been understood by occupants.*

In conclusion occupants require support, not only in terms of energy efficiency but also in terms of social and surroundings subjects. Since such support was not offered due to the common practice in Greece, it was offered to them in the framework of ECOLISH project, by Pieriki (1st level) and NKUA, Techem (2nd level).
In terms of the energy retrofitting the following energy retrofitting interventions is feasible to be carried out, by partner Techem:
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.

In terms of financial scheme to be used is energy performance contracting proposal between partner Techem Company (ESCO) and the occupants of the blocks. The main idea of contracting Techem, is the energy maintenance of the blocks by Techem and the upgrade of the buildings systems. 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.

Adjustment of final retrofitting plan

Next step to be carried out is the signing of the contract between the ESCO and the building. For this reason the decision of the blocks' General Assembly is required. Since the General Assembly will decide to sign the contract with the ESCO, the Building Manager will be authorized to sign the contact, whilst the General Assembly decision will be part of the contract to be signed. Then the ESCO will have the right to implement the interventions decided in the General Assembly of the blocks.

In more detail, based on the consent achieved, the General Assembly authorizes the Building Manager and the services company to constitute the private agreement of the building, which content the General Assembly has approved orally. The Private Agreement should include all the related subjects (energy calculations, costs distribution, etc.). As a result, the only legally based framework for organizing legally the Occupants for the actions of ECOLISH project is the combination of the General Assembly of the joint-ownership along with the energy performance contract (building management contract) to be signed with a third party as ECOLISH partner TECHEM.

From the final meeting and the occupant's feedback it was clear that the retrofitting will take place in two stages:

First stage of the retrofitting: At a first stage the retrofitting will include the installation of heat cost allocators and the conversion of each dwelling to an autonomous heating unit. Techem will take over the energy management of the blocks. The inhabitants will pay their bills to Techem who will be responsible for the collection and the monitoring of the energy consumption of each flat. This will be implemented as soon as the energy performance contracting is signed between the occupants and Techem

Second stage of the retrofitting: At a second stage all the other energy measures that are examined will be implemented. These include the replacement of the existing boilers, the insulation of the pipes, the installation of external roof insulation, and the paintings of the blocks externally with paints with high solar reflectance.

Monitoring and evaluation

Meetings with the occupants could be described as more than enough, since in Pieria pilot location organizing activities started from zero point and, moreover, more than the meetings described in the Grant Agreement were materialized. Pieriki's presence at the pilot location was continuous during the project duration, and since the same experts were responsible for the actions to take place at the pilot locations, familiarity has been developed. Pieriki's expert provided support not only in energy efficiency but also in social subjects. Thus, due to lack of responsibilities, many social aspects could not be faced. Occupants were facing Pieriki's expert not only as the project's implementers but also as the individuals with which technical and social aspects could be discussed, leading at least to rationalisation of situations. Nevertheless, the process was not so easy to be understandable by the occupants. Due to their ignorance and medium level of education, the processes of the ECOLISH project were difficult to be explained. For this reason, Pieriki's experts in strong collaboration with NKUA and TECHEM have simplified the concept of the project's processes. Following the bottom-up approach and based on the feedback of the numerous meetings with the occupants, the real questions have derived and so the processes were described in detail and as simplified as possible, in order to achieve the maximum comprehension. In the end, the occupants have understood what an ESCO could offer them and what is the existing legal framework in Greece. Participation of ESCO to meetings helped the comprehension of the process, since they could provide immense answers to the feedback provided. The procedure, as described in the ECOLISH project Grant Agreement, was adapted in full. Moreover, the bottom-up approach methodology was adapted in our case-study since no organizing framework existed before the implementation of the project. In such, the bottom-up approach actions were inserted in every step of the project; selection of the pilot location, approach of the occupants, organization of meeting, presentation of the measures and ESCOs. As a result, the procedure followed was successful at local level taking into consideration the limited existing level of organizing. An important success factor was the adaption of the local characteristics of the selected pilot location and the national legal framework, which have to be examined in detail. The adaption of the local characteristics in the procedure described in the Grant Agreement led to the success of the project's local actions and to the definition of the procedure as successful. Initial steps of the procedure could be avoided; nevertheless they reassured the legal coverage and communication actions of all possible involved parties (outside the project).

Involvement of ESCO Techem.

The ESCO's interest (Techem) to participate in the project was multi-level, lying in three different levels: local, national and European. At local level ESCOs have the opportunity to contact the pilot location and with the support of the local actor to discuss with the occupants the potentiality of signing a local contract. More detailed examination and analysis of the location was offered, since local and academic partners were involved in the pilot location process. Such results could act as results' input to further contracts. At national level, although the existing legal framework and the market requests were known to ESCOs, coding of the existing framework could provide an important tool to them. At European level, exchange of knowledge between similar companies is always an important toll of knowledge development. Moreover, the local conditions in different countries could also provide important feedback to all participants ESCOs.

CONCEPT

The proposed contract follows the general frame of a "building administration contract", an agreement which has become very common as, due to lack of time, building administrators delegate many of their tasks to external specialised companies.

The main benefits of this concept are:

- Its flexibility; it allows for a multitude of EPC operations to be carried out, ranging from one-off building refurbishment works to regular heat cost allocation.
- Its integration of costs; the financing model is external to the contract, which only provides for a monthly compensation to the contractor. This should be extracted from the monthly fees collected, following the allocation of energy and other costs.

It is of course possible to designate different contractors for the different operations to be carried out, but this would not be in the spirit of EPC where the initial investment is covered by the usage savings.

STRUCTURE OF CONTRACT

Signees

(a) Building administrator or other representative with delegated power of attorney from the joint ownership General Assembly
(b) External Contractor (company or freelancer)

Assignments to the Contractor

(a) Building energy performance upgrading interventions (optional)

(b) Building administration monthly tasks

Terms

[1] Allocation of expenses

[2] Dissemination of expense letters of notification

[3] Collection of dues

[4] Render of dues collected -Compensation

[5] Maintenance / technical services

[6] Payment of dues (by occupants)

[7] Facilitation of implementation (by occupants)

[8] Extent of responsibility

(a) for works (optional)

(b) for monthly operations

[9] Validity and resolution of the contract

APPENDIX

- Financial proposal
- Allocation of costs

CONTRACT

ΣΥΜΒΑΣΗ

Στην Κατερίνη σήμερα …./…../……, οι κάτωθι υπογράφοντες, αφενός: α) _____, ο/η οποίος/α ενεργεί εν προκειμένω ως νόμιμος/η

εκπρόσωπος της ένωσης προσώπων των συνιδιοκτητών της πολυκατοικίας που βρίσκεται στην Κατερίνη επί της οδού _____, δυνάμει της σχετικής εντολής και πληρεξουσιότητας που έλαβε από την γενική συνέλευση των συνιδιοκτητών της πολυκατοικίας αυτής, ονομαζόμενος στο εξής "Α' Αντισυμβαλλόμενος" Και αφετέρου β) (Η εταιρεία / ο ελεύθερος επαγγελματίας) _____, ονομαζόμενος στο εξής "Β΄αντισυμβαλλόμενος", συμφώνησαν τα ακόλουθα:

Η Ένωση των Συνιδιοκτητών του κτιρίου δίνει δια του πρώτου συμβαλλόμενου διαχειριστή της την εντολή στον Β΄αντισυμβαλλόμενο (α) να αναλάβει την υλοποίηση των παρακάτω εργασιών αναβάθμισης της ενεργειακής απόδοσης του κτιρίου _____, εντός του χρονικού διαστήματος _____,

(β) να αναλάβει την παροχή υπηρεσιών διαχείρισης με τους όρους και συμφωνίες που περιγράφονται κατωτέρω.

[1] Κατανομή Δαπανών Θα προβαίνει στον υπολογισμό και την έκδοση ειδοποιητηρίων για την συμμετοχή της κάθε οριζόντιας ιδιοκτησίας στις κοινόχρηστες δαπάνες. Για τον σκοπό αυτό θα ακολουθεί το

σύστημα κατανομής δαπανών που περιγράφεται από τον σχετικό πίνακα που παρέδωσε ο διαχειριστής της πολυκατοικίας και επισυνάπτεται στο παρόν.

[2] Διανομή Ειδοποιητηρίων

Θα προβαίνει στην αρχή κάθε μήνα στην διανομή των ειδοποιητηρίων των λογαριασμών κοινοχρήστων σε κάθε οριζόντια ιδιοκτησία της πολυκατοικίας.

[3] Είσπραξη Δαπανών

Θα προβαίνει στην εφάπαξ μηνιαία είσπραξη των κοινοχρήστων δαπανών που αναλογούν στην κάθε οριζόντια ιδιοκτησία από τον ιδιοκτήτη ή ένοικο αυτής.

[4] Απόδοση Εισπράξεων -Αμοιβή Θα παραδίδει στον διαχειριστή της πολυκατοικίας το ποσό των εισπράξεων εκάστου μηνός, ώστε αυτός να προβαίνει στις πληρωμές των λογαριασμών της πολυκατοικίας, αφού

προηγουμένως παρακρατήσει την αμοιβή της, όπως αυτή προσδιορίζεται στην Οικονομική Προσφορά.

[5] Τεχνική Εξυπηρέτηση Θα λειτουργεί και θα έχει στην διάθεση της πολυκατοικίας, υπηρεσία τεχνικής εξυπηρέτησης
η οποία θα συνίσταται στην διατήρηση τηλεφωνικού κέντρου σε ώρες αγοράς με την διατήρηση συνεργαζόμενων συνεργείων -τεχνικών των απαραίτητων ειδικοτήτων.

[6] Καταβολή Δαπανών Άπαντες οι κύριοι ή οι ένοικοι οριζοντίων ιδιοκτησιών της πολυκατοικίας θα έχουν την υποχρέωση να καταβάλλουν, στους εντεταλμένους υπαλλήλους του Β' Αντισυμβαλλόμενου,

το ποσό των κοινοχρήστων δαπανών που αναλογεί στην υπηρεσία που παρέχει κάθε μήνα στην οριζόντια ιδιοκτησία τους, λαμβάνοντας και σχετική απόδειξη είσπραξης.

[7] Διευκόλυνση εργασιών Άπαντες οι κύριοι ή οι ένοικοι οριζοντίων ιδιοκτησιών της πολυκατοικίας θα έχουν την υποχρέωση να διευκολύνουν τους εντεταλμένους υπαλλήλους του Β' Αντισυμβαλλόμενου,

στην υλοποίηση των εργασιών που του ανατέθηκαν, παρέχοντας την αναγκαία πρόσβαση στους χώρους τους στο προκαθορισμένο χρονικό διάστημα.

[8] Έκταση Ευθύνης. (α) ΟΒ' Αντισυμβαλλόμενος αναλαμβάνει πλήρως όλες τις αστικές και ποινικές ευθύνες στην
περίπτωση ατυχήματος ή ζημίας που πιθανόν να προκληθεί από τις εργασίες αναβάθμισης της ενεργειακής απόδοσης του κτιρίου. (β) Ο Β΄ Αντισυμβαλλόμενος ουδεμία ευθύνη φέρει για την οικονομική διαχείριση της

πολυκατοικίας, ευθύνη που ανήκει αποκλειστικά στην πολυκατοικία και στους νόμιμους εκπροσώπους της. Η ρητή υποχρέωσή του βρίσκεται μόνο στο να παραδίδει τις εισπράξεις των κοινοχρήστων που θα πετυχαίνει δια του εισπρακτικού μηχανισμού του στον διαχειριστή της πολυκατοικίας.

[9] Ισχύς και Λύση της Σύμβασης

Η διάρκεια της σύμβασης αυτής ορίζεται σε _____ έτη. Ως ημερομηνία έναρξης ισχύος της, ορίζεται η __/__/_____ και λήξης η __/__/_____ Η σύμβαση ανανεώνεται αυτόματα για ίσο χρονικό διάστημα κάθε φορά, εκτός αν κάποιο από

τα συμβαλλόμενα μέρη ενημερώσει εγγράφως τον αντισυμβαλλόμενο έναν μήνα πριν από την λήξη.

Οι εδώ συμβαλλόμενοι μπορούν να καταγγείλουν οποτεδήποτε την μεταξύ τους σύμβαση με έγγραφο που πρέπει να επιδίδεται στον αντισυμβαλλόμενο έναν τουλάχιστο μήνα πριν. Σε περίπτωση καταγγελίας της σύμβασης γίνεται οικονομική εκκαθάριση κατά την οποία οι εδώ συμβαλλόμενοι εκκαθαρίζουν τυχόν οικονομικές διαφορές ή άλλες εκκρεμότητές τους. Εφόσον κάποιος όρος καταστεί ανενεργής ή ακυρωθεί λόγω αντίθεσης του με την ισχύουσα νομοθεσία, δεν επηρεάζεται από τον λόγο αυτό η ισχύς των λοιπών ορών της συμβάσεως.

ΟΑ' Αντισυμβαλλόμενος

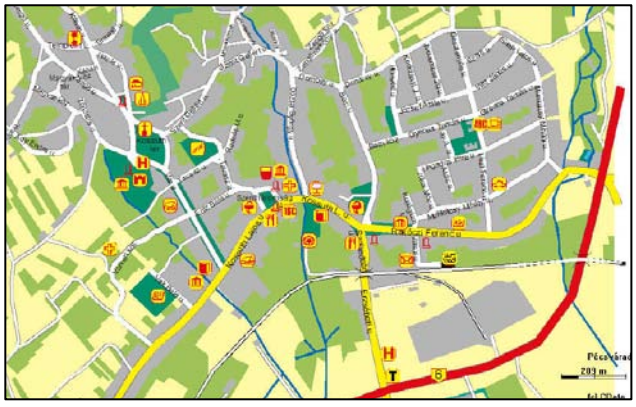
ΟΒ' Αντισυμβαλλόμενος

ΠΑΡΑΡΤΗΜΑ

- Οικονομική Προσφορά
- Σύστημα Κατανομής Δαπανών

Pilot Pécsvárad – Hungary

Pécsvárad is situated in the south part of Hungary, about 180 km from Budapest. The investigated houses were built in 1960 – 1970. The 121 dwellings located in 10 buildings. The minimum area is 65 m^2, the biggest flat is 105 m^2.



The houses in Pécsvárad were built more than 30 years ago based on the standard at that time. Nowadays the buildings are characterised by high energy use, due to poor energy efficiency of heating installations and poor thermal insulation (heat loss through transmission), poor thermal comfort and indoor air quality. Major barrier is the lack of financial means as well as with the owners as housing corporations. In the ECOLISH-framework a detailed inventory in 107 dwellings has been done by a selected number of local inhabitants, which were specially trained for ECOLISH. Building analyses showed problems with moisture and leakage, driving rain, biological degradation, freeze-thaw damage, thermal cracks, detached weather strips, detachment of plaster layer and decay of concrete. The houses are mostly equipped with radiators and gas-boilers. Approximately 89 % of the house uses electrical heater for DHW (domestic hot water). Natural ventilation is the process of supplying and removing air by operable windows. There is now natural ventilation, passive stacks. When applying (small) fans it is necessary to consider the presence of open combustion appliances in a number of dwellings. Main conclusions of investigations are: high energy use due to poor energy efficiency and poor thermal insulation; poor thermal comfort and indoor air quality; lack of charisma. Also here the major barrier is the lack of financial means, well as with the owners as with the housing corporations although energy savings from 40 to 80 % is feasible. During the measures based on the Hungarian regulation we calculated the requirement of the retro filling of the building, we calculated the specific heat demand coefficient and primary energy consumption. Originally the external wall is 38 cm brick with cavity. It was suggested to put 6 cm insulation to improve U_{wall} = 1,34 W/m^2,K to U_{wall} = 0,45 W/m^2K. The windows are double glassed with U_{window} = 2,5 W/m^2,K, but must be changed to U_{window} = 1,6 W/m^2,K. The roof is uninsulated with ceramic inset, 11 cm insulation is suggested to improve the U_{roof} = 1,31 W/m^2K to U_{roof} = 0,29 W/m^2,K. The roof in the cellar is a little bit better, but also uninsulated with ceramic inset, U_{roof} = 0,98 W/m^2K. Necessary to put 4 cm insulation and in this case will change to U_{roof} = 0,49 W/m^2K.

The process of involving occupants in Pécsvarad
From the beginning of the Ecolish project eight meetings took place. All meetings took place at the Community Center of Pecsvarad.
Meeting 1 **:** In the first meeting, an introduction of the ECOLISH project was carried out. The meeting was held on 02.18.2007.
Meeting 2: The second meeting was held on 09.26.2007.
Meeting 3: The third meeting was held on 12.11.2007.
Meeting 4: The fourth meeting was held on 02.13.2008.
Meeting 5: The fifth meeting was held on 04.15.2008, representatives of Techem Hungary were present.
Meeting 6: The sixth meeting was held within the period June- July-August 2008. Social questioning took place in the dwellings of each inhabitant.
Meeting 7: The seventh meeting was held on 11.02.2009, 65 participants form the inhabitants were present.
Meeting 8: The eight meeting, took place on 7th December 2009.


Figure: Pictures of attendants from the 1st meeting

Feedback from the occupants
The inhabitants enjoyed participating in the ECOLISH project**.** They were interested in the retrofitting of their apartments with one condition, to be supported financially by the government or the municipality because most of the inhabitants can not afford to spend money on the apartments retrofitting.
The apartment owners (99% of the inhabitants are the flat owners) are motivated in retrofitting their house/dwellings. Some of the inhabitants already made a few important retrofitting; like as replacement of the existing windows with new plastic insulated one, replacement of the existing gas boilers.
The question is how to treat and make unitary solution for the whole house when some dwellings are retrofitted while most of the dwellings are not.
In Hungary the ESCO projects are always related to a product or a service. Independent ESCO in Hungary is not typical; they sell some of their service, for example, TECHEM can only pay the project if in the project there will be a heat allocator. In Pecsvarad each dwelling has individual heating and therefore there is no need for heat allocators.

General outcome of meetings
a. Energy retrofitting
Each dwelling got the Energy Certificate and the list of those measures which can decrease the energy consumption. Each individual apartment owner can apply for different tenders that would help with the realization of the retrofitting.
b. Financial scheme
The housing co-operative is looking for tender applications and ESCO companies which can execute the retrofitting and remodelling.

Adjustment of final retrofitting plans
Occupants going to decide and agree upon which of the suggested measures will be used, the scale of the retrofitting and to find a proper ESCO company.
Until now there was no ESCO in Pecsvarad, therefore there is a need to be found.

Monitoring and evaluation

The meetings were enough with the occupants who understood the importance of the retrofitting, communicated with Pecsvarad Municipality, PTU, and with the housing co-operative.

The inhabitants realized the necessity of the retrofitting which would lower their utility bills. According to the social analysis that was carried out in Pecsvarad, the average household spends 20% of their monthly income on energy bills.

The occupants considered the organization of the meetings and the presentations of the measures successful.

The owners of the dwellings would have got financial support from a government founding if the houses were made from concrete. Is should be note that on the beginning of the ECOLISH project there was no legislation made for retrofitting implementation of the concrete made buildings.

In Hungary there was no ESCO company participating in the ECOLISH project. Additionally, the ESCO companies involved in the other countries did not give an offer for the Hungarian location.

ÜZEMELTETÉSI SZERZŐDÉS

A. Szerződő Felek

egyrészről a	Pécsvárad, …. szám alatti Társasház
cégjegyzékszám:	
Adószám:	
Bankszámlaszám:	
Képviseli:	
mint Megrendelő,	
másrészről a	Hydronic Systems Hungary Kft.,
Cégjegyzékszám:	01-09-564138
Adószám:	
Bankszámlaszám:	Citibank 10800014-10000006-11159471
Képviseli:	Tábori Tibor igazgató,
mint Üzemeltető.	

B. Szerződés tárgya

1. Jelen szerződés alapján az Üzemeltető a Megrendelő megbízásából vállalja a Pécsvárad …… szám alatti Társasház újonnan kialakított, önálló kazánházi rendszerének 8 évig tartó energiatakarékos üzemeltetését..
Üzemeltető a Társasházban a beruházás üzembehelyezését követő kezdőnappal, fűtési- és használati melegvíz üzemeltetését, valamint annak mérését és elszámolását nyújtja.

B/I. Az Üzemeltető a jelen szerződésnek megfelelően vállalja:

1. Az általa nyújtott fűtési- és használati melegvíz üzemeltetés energiaszükségletének csökkentését a bázisévekhez - 2006-2008 - viszonyítva, a jelenlegi fűtési- és használati melegvíz felhasználási szokásai mellett. Ennek érdekében az Üzemeltető jogosult a fűtési- és használati melegvíz szolgáltató rendszerek beszabályozását a minél nagyobb mértékű megtakarítás érdekében elvégezni, a komfortfokozat megtartása mellett.
2. A folyamatos fűtési- és használati melegvíz szolgáltatását.
3 A fűtési hibaügyelet kiépítését, állandó, folyamatos hibaelhárítást a hét minden napján 24 órán át.
4. A fűtési rendszer lakásonkénti időszakos ellenőrzését /első évben havi, majd évi 4x rendszerességgel /
5. A fűtési rendszer rendszeres , folyamatos karbantartását.
6. A mérőórák havi leolvasását illetve a mérőóra állások begyűjtését, a központi gázmérő óra fogyasztása alapján a fizetendő költségek kiszámítását, lakásonkénti lebontását, az aktuális hónapra érvényes fűtés (kWh) és melegvíz (m^3) egységárat.
7. Tájékoztatja a társasház képviselőjét és/vagy a lakókat a fizetendő összegről és részletes kimutatást nyújt ennek alátámasztására.

B/II. Kiindulási adatok és teljesítendő paraméterek

A Társasházban (az üzemeltetést igénybe vevőnél), a fűtési rendszer átépítése során a MESTEC energia ellátási modulrendszerre való átállás valósult meg. A rendszer a Társasház tulajdonát képezi. A kazánokra 4+4 éves garanciadokumentum alapján a forgalmazó/kivitelező biztosítja meghibásodás esetén a költségvonzatokat.

1. Az Üzemeltető kötelezettséget vállal arra, hogy a szerződés időtartama alatt ellátja a folyamatos irányítási és szakmai felügyeletet.
2. Üzemeltető vállalja, teljesíti azt a követelményt, hogy a beépített szabályzórendszerek, beszabályozása feleljen meg a mai technikai szint követelményeinek. Mindent elkövet tevékenységével azért, hogy annak eredményeképpen Megrendelő jelentős megtakarításokat realizálhasson.
3. A szerződés szempontjából a fűtés átépítésének befejezése után a fűtési rendszer, (ami önálló földgáz üzemű modul-kazánrendszer, ami külső-belső hőmérsékletszabályozás, egyéni mérhetőség és kizárhatóság követelményei szerint működik) állapotának rendszeres -havi- ellenőrzése is az Üzemeltető feladatát jelenti.

C. Az üzemeltetés gazdasági alapja

1. Az Üzemeltető vállalja, hogy az általa üzemeltetett és karbantartott berendezéseket a legkorszerűbb energiatakarékossági és környezetvédelmi követelményeknek megfelelően üzemelteti, figyelembe véve a megfelelő komfort biztosítását.

D. Az Üzemeltető joga és kötelezettségei

1. Az Üzemeltető által nyújtott szolgáltatás megnevezése: SZJ 40.30.91.0 Fogyasztói szolgáltatás.
2. Az Üzemeltető kötelezettséget vállal arra, hogy a tevékenység biztosítása érdekében saját, vagy alvállalkozói kapacitásként a szükséges szakembergárdát foglalkoztatja.
3. A teljesítés során az Üzemeltető jogosult alvállalkozó igénybevételére, azonban alvállalkozóiért úgy felel, mintha a munkát maga végezte volna.
4. Az Üzemeltető kötelezettséget vállal arra, hogy biztosítja a Megrendelő hőenergia-ellátását a mindenkori fűtési hőigénynek és a használati melegvíz igénynek megfelelően.

D/I. Karbantartás, hibaelhárítás:

1. Fűtés esetén a gázkazánok karbantartását az Üzemeltető a fűtési idényen kívül végzi el.
2. Használati melegvíz ellátás esetén a leállás maximális időtartama 2 nap. Tervezett karbantartás szombat, vasárnap is végezhető.
3. Rendkívüli esetben, vagy nem tervezett leállás esetén a leállás időtartamát az Üzemeltető a Megrendelővel előzetesen egyezeti, amennyiben a leállás oka ezt lehetővé teszi.
4. A szerződésben az üzemeltetői tevékenység ellátásával kapcsolatban vállalt munkáit az Üzemeltető a Megrendelővel történő előzetes egyeztetés után gyártó programja alapján végzi. 5. A karbantartásokra általában a fűtési idényen kívül (IV. 15 – X. 15 között), a műszaki ellenőrzésekre a fűtési idényben folyamatosan (X. 15 – IV. 15 között) kerül sor.
6. A berendezések rendeltetésszerű üzemeltetése során esetlegesen előforduló meghibásodások javítása a szolgáltatás része. Minden alkatrész gyártói garanciáján belül.
7. A javítás megkezdése a bejelentéstől számított 6 órán belül történik. Bejelentést tehet bármely lakó, de a Megrendelő vállalja, hogy munkaidőben lehetőség szerint a képviselőn keresztül teszi meg a bejelentést.

D/II. Az üzemeltetési díj nem tartalmazza az alábbiakban felsorolt tevékenységek díjtételeit

1. Eseti hatósági előírások – kéményseprő, gázszolgáltató, építési hatóság, környezetvédelem – szerinti beruházások, felújítások, kiegészítések, melyek eltérnek a jelenlegi szabályozástól, vagy nem tartoznak bele az újonnan kiépített fűtési rendszer állagmegóvási kötelezettségébe.
2. Hatósági környezetvédelmi mérések, melyeket a szerződés terjedelmén túl a hatóság ír elő, illetve kezdeményez.

3. A Megrendelőnek a szerződéskötés hatályba lépte utáni hatósági és egyéb kötelezettségek teljesítésével kapcsolatban keletkező fizetési kötelezettségeit.
4. A Megrendelő tulajdonában lévő, a kazánház által ellátott fűtési rendszeren elvégzett felújítási munkák. E pont vonatkozásában

Karbantartás körébe tartozik:

-TELJES FŰTÉSI RENDSZER
-MELGVÍZ RENDSZER A TARTÁLYOKIG --a teljes új fűtési rendszerre.

Felújítás körébe tartozik:

MELEGVIZ RENDSZER-minden javítás ,módosítás felújítás mivel a beruházás során nem volt átalakítás, maradt a régi

D/III. Az Üzemeltető jogai

Amennyiben a bejelentett üzemzavar:
- a berendezés rendeltetésével ellentétes használat, idegen beavatkozás, vagy szakszerűtlen átalakítás következménye,
- valamint ha az elemi kár, vagy Vis major következménye,
a hibaelhárítás költségei a Megrendelőt terhelik.

E. Ár és fizetési feltételek

1. Üzemeltetési díj
Az üzemeltetési díj tartalmazza a szolgáltatással kapcsolatos minden költséget, így a folyamat követelményeinek megfelelő beszabályozásokat is, kivéve az D/II. pont alapján meghatározott összegeket.
Az üzemeltetés havi díja a Felek megállapodása alapján:
24.-Ft/lakás/ négyzetméter +ÁFA (az ÁFA mindenkori törvényes értékével növelten).

2. Az üzemeltetési díj minden évben a KSH által közzétett inflációs rátával kerül változtatásra, mindig január elsejei nappal visszamenőleg.
3. Amennyiben a szerződés időtartama alatt a Magyar Forint (HUF) mint fizetőeszköz helyettesítésre kerül, akkor a szerződésben meghatározott forintösszegek automatikusan helyettesítésre kerülnek az új, törvényes fizetőeszközzel, az átváltás időpontjában érvényes árfolyam figyelembevételével.
4. Jelen szerződés alapján az Üzemeltető minden hónap 3-áig, 1 példányban benyújtja a számlát a Megrendelőnek. A tárgyhavi számla tartalmazza a tárgyhavi üzemeltetési díjat.
5. A számla késedelmes kiegyenlítése esetén a Megrendelő, a késedelmesen átutalt összeg után a késedelemmel érintett naptári félévet megelőző utolsó napon érvényes jegybanki alapkamatnak megfelelő késedelmi kamatot köteles fizetni az üzemeltető részére /PTK.301§ (1)/.

6, BANKI ÉS FUNDAMENTA KÖLTSÉGEK KÖZÖS KÖLTSÉGBEN
7, GÁZSZÁMLÁK A MÉRT EGYÉNI DÍJAK BESZEDÉSÉVEL FIZETENDŐK

F. A szerződés időtartama

1. A szerződésben meghatározott feltételek alapján a Felek a szerződést határozott időre, 2009. December 1.-től kezdődően, 8évre (96 hónap) hozzák létre.
Az újonnan kialakított, önálló kazánházi rendszer 2009. október 17.-én próbaüzemre beüzemelésre került, ezen szerződéshez szükséges végső beszabályozása 2009. november 30.-ig befejeződött.
2. Jelen szerződés a Felek aláírásával lép hatályba.

G. Együttműködés a határozott idő elteltét követően.

1. A Felek megállapodnak abban, hogy a F. 1. pontban meghatározott időszakot követően is együttműködésre törekednek.
2. Ennek érdekében Felek kötelesek a szerződés időtartama alatt ennek megfelelően eljárni.

H. Biztosítékok

1. A Megrendelő a jelen szerződés szerinti, üzemeltetési díjat, mint költségvetési tételt, a szerződés futamideje alatt a Társasház éves költségvetésében szerepelteti és jóváhagyatja, a Társasházi Törvény hatályos rendelkezései szerint.

I. A szerződés megszüntetése

1. Amennyiben a Megrendelő jelen szerződést a F.1. pontban meghatározott időszak letelte előtt meg kívánja szüntetni, úgy azon szándékát a megszüntetési időpont előtt 60 /hatvan/ nappal írásban kell az Üzemeltetővel közölnie! Azonnali felmondásnak a berendezések üzemeltetési biztonsága érdekében nincs helye!

J. Vis Major

A Vis Major olyan külső, elháríthatatlan, kivételes esemény(ek), mely(ek) a Felek működésétől független(ek), az adott műszaki állapotban nem elhárítható(ak) és nem megoldható(ak).
Ilyenek például:
- természeti katasztrófák, (árvíz, szélvihar, földrengés, tűzvész),
- háborús esemény, szabotázs, felkelés, sztrájk, szándékos rombolás, merénylet, stb.

Ilyen esetekben az Üzemeltető a Megrendelővel együttműködve mindent megtesz a szolgáltatás fenntartásáért, mielőbbi helyreállításáért. Az esemény nagyságrendjétől függően Felek felülvizsgálják jelen szerződés fenntarthatóságát.

K. Egyéb rendelkezések

1. Jelen szerződés tartalmát a Felek üzleti titokként kezelik, azt harmadik személynek csak a másik fél előzetes írásbeli hozzájárulásával adják ki. A Megrendelő lakóközösség minden tagja szerződő félnek minősül ebből a szempontból, akik jogosultak a szerződés tartalmának megismerésére.
2. Jelen szerződésben nem, vagy nem megfelelő részletezettséggel szabályozott kérdésekben a Magyar Köztársaság Polgári Törvénykönyvéről szóló 1959. évi IV. tv, valamint a kapcsolódó jogszabályi rendelkezések az irányadóak.
3. Szerződő Felek esetleges vitáik során törekszenek a megegyezésre, annak hiánya esetén a területileg illetékes bírósághoz fordulnak.
4. Szerződő Felek jelen szerződést annak elolvasása és értelmezése után, mint akaratukkal mindenben egyezőt, jóváhagyólag írják alá.
5. Jelen szerződés melléklete a szerződés elválaszthatatlan részét képezi.
6. Amennyiben jelen szerződés bármely kikötése érvénytelennek bizonyulna, az a szerződés egyéb - az érvénytelenített résszel nem összefüggő - rendelkezéseit nem érinti. Felek megállapodnak, hogy amennyiben az érvénytelenség okát egy későbbi jogszabályváltozás kapcsán orvosolni lehet, úgy mindent megtesznek az adott szerződésrész érvényben, illetve hatályban tartása érdekében, és e szerződésrészek tekintetében a szerződést külön megerősítettnek tekintik.
7. Az Üzemeltető a munkaterület átadás-átvételekor megnyitja a üzemeltetési naplót, amelyet a szerződés teljesítése során, a munkaterületen tart, biztosítva munkaidőben a hozzáférés lehetőségét a Megrendelő illetve annak képviselője részére. A naplóban rögzíteni kell a teljesítéssel, a Megrendelő helyszíni ellenőrzésével és vizsgálatával kapcsolatos észrevételeket. Kazánházban—Mangi Lajossal.
8. Felek kölcsönösen és haladéktalanul egymás tudomására hozzák azon értesüléseket, tényeket, körülményeket, amelyek a szerződésnek megfelelő teljesítést akadályozzák.

9. Felek kölcsönösen, illetve külön-külön is megteszik mindazokat az intézkedéseket, nyilatkozatokat, amelyek a szerződésnek megfelelő teljesítést akadályozó körülmények elhárítása érdekében szükségesek.

L. Mellékletek

A fűtési energiával kapcsolatos berendezések műszaki dokumentációi, garancia iratai (1.számú melléklet), és a magtakarítás valamint a vállalt kártérítési garanciára vonatkozó üzemeltetési nyilatkozatot (2.számú melléklet).

A szerződésben nem szabályozott kérdésekben a Ptk. vonatkozó rendelkezései az irányadóak.

A felek jelen szerződést elolvasták, értelmezték és magukra nézve kötelezőnek elfogadják.

Budapest. 2009. December 01.

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Megrendelő nevében:
Üzemeltető nevében:

Jelen szerződés 4 db eredeti példányban készült, amely
1. példánya az Üzemeltetőt,
2. példánya a Megrendelőt,
3. példánya a SZVB-t,
4. példánya a Megrendelő illeti.

ANNEX II: Template survey form basic technical investigation

Survey form:

1. General details

Name:					
Address:				House number:	
Postal code:		City:			
Survey carried out by:					
Date of survey:					
Ownership situation:	☐	Private owner			
	☐	Housing association	Name:		
Can photos be taken?	☐	Yes			
	☐	No			

2. General information of the residence

Type of residence: (as viewed when standing at the front door and facing the house)	☐	Left end-of terrace house
	☐	Terraced house
	☐	Right end-of terrace-house
Number of occupants per residence	…….	Children up to 12 years
	…….	Adults 13 to 65 years
	…….	Seniors older than 65 years

3. Structural / architectural

Window/door frames: (if front, back and side walls have different types of frames, indicate this on the facade drawing)	☐	Wood	
	☐	Synthetic	
	☐	Aluminium	
Glass: (if front, back and side walls have different types of glass, indicate this on the facade drawings)	☐	Single glazing	
	☐	Double glazing	
	☐	HR^{+} glass	
	☐	HR^{++} glass	
Existing insulation:	Facade	Yes / no / unknown	
	Roof	Yes / no / unknown	
	Floor on the ground floor	Yes / no / unknown	
Existing extension:	☐	Yes	
	☐	No	
State of maintenance	good / moderate / poor		

4. Installations

Space heating					
Heating-equipment:	☐	VR boiler	☐	HR 100 boiler	
	☐	HR 104 boiler	☐	HR 107 boiler	
	☐	Other, namely ……			
Location of apparatus:					
Heating system:	☐	Radiators	☐	Other, namely:	
Thermostatic radiator present:	☐	Yes			
	☐	No			
Domestic hot water					
Warm water generating appliance:	☐	Kitchen geyser	☐	Gas-fired combi appliance	
	☐	Bath geyser	☐	Other, namely……	
	☐	Electric boiler			
Draw-off point warm water:	☐	Shower	☐	Dishwasher	
	☐	Bath	☐	Kitchen	
Cooking apparatus					
Cooking apparatus:	☐	Electric			
	☐	Gas			
Other					
Air conditioner present:	☐	Yes, permanent air conditioning	Solar collector:	☐	Yes warm tap water
	☐	Yes, portable air conditioning		☐	Yes, electricity
	☐	No		☐	No

5. Ventilation

Type of ventilation:	☐	Natural inlet and outlet
	☐	Natural inlet / mechanical outlet
Draught proofing (e.g. weather stripping)	☐	Yes
	☐	No

6. Behaviour occupants

Lowering temperature at night:	☐	Yes	Heating in bedrooms:	☐	Yes
	☐	No		☐	No
Setting thermostat (day time):	…… ℃				
Presence: (number of people that are at home at the time mentioned)	Work days	8.00 – 18.00 hours	Number of people		
		18.00 – 0.00 hours	Number of people		
		0.00 – 8.00 hours	Number of people		
	Weekend	8.00 – 18.00 hours	Number of people		
		18.00 – 0.00 hours	Number of people		
		0.00 – 8.00 hours	Number of people		

How do you ventilate? (windows or grids, open or shut)	Living room	Grid / windows	frequency	
	Bedrooms	Grid / windows	frequency	
	Kitchen	Grid / windows	frequency	
	Bathroom	Grid / windows	frequency	

7. Usage

Natural gas		m^3	Usage period	from …….. to……..
Electrics		kWh	Usage period	from …….. to ……..

8. Other

Which kinds of maintenance work/ improvements / alterations have been carried out with regard to the residence in the past ten years? (Installation of insulation, double glazing, extensions, moving inside walls, renewing the kitchen, paintwork etc.)

Are there any specific complaints with regard to the amenities?

What improvements would you like to have made to your residence?

Take photos of:

- central-heating boiler (if the type of boiler is not clear)
- gas meter
- electricity meter
- extensions
- facades
- patches of mildew and damp
- ventilation facilities
- other noticeable matters

Please note the photo numbers here

…… to ……..

ANNEX III: General example template for ESCO contract

MODEL

Energy Performance Contract

Number .....

PROJECTNAME

- .....
- .....
- .....

Consisting of:

- Authorization and financial résumé
- Energy Performance Contract 2008-05
- Energy Supply – General

Attachments:

I	Energy Program
II	Energy Management Agreement
III	Model Financial Agreement

Authorization and financial résumé

Belonging to Energy Performance Contract Number .....
Between

……..., ……..., ……, hereinafter referred to as "CUSTOMER", at this legally represented by ……, Director,

and

……..., ……..., hereinafter referred to as "ESCO", at this legally represented by ……, Director.

The following agreement is closed

1. CUSTOMER contracts in the service of ESCO as described in "Energy Performance Contract agreement number 2008-05" (including the annexes)

2. Customer committed to the leases for:

   ……;
   ……..;
   ……..,

   to believe that the tenant does conform to the agreements in this Agreement.

3. The tenants pay this month, partly in the form of an advance, the following total amounts:

   a) Energy Management
      € ……..
      The amount is indexed annually according Energy Performance Contract

   b) Energy-heat homes and hot water supply(advance)
      € ……

   c) General Electricity Supply (elevator, lighting, general)
      € ……..

   d) Energy heat / cold and hot water supply Meeting Room
      € ……
      (advance)

   e) Energy heat / cold and hot water supply Dining Room
      € ……
      (advance)
      Energy costs are adjusted annually and judged according Energy Performance Contract
      Total including 19% VAT.
      € ……..

      * For details see Annex III per tenant Model Financial Review

4. ESCO is responsible for collecting (advance) payment and annual settlement with the tenant, as provided in paragraph 3 of this article. At the annual statements regarding

the cost of energy management, heat / cold supply and electricity supply, the overall advances are settled.

5. When vacancy occurs CUSTOMER as a tenant.
   ESCO bears no risk of default towards tenants. of default ESCO will urge the tenant up to twice, followed by further failure of part (payments), CUSTOMER is responsible for fulfilment of those commitments.

Thus drawn up in triplicate and signed in …, ...

CUSTOMER	ESCO
…….	…….

Energy Performance Contract .....

Undersigned:

……., ……., hereinafter referred to as "CUSTOMER", at this legally represented by ……., Director.

and

……, ……., hereinafter referred to as "ESCO", at this legally represented by ……., Director ...

take into account that:

- CUSTOMER ows te property located on the …… …….. at ……;
- the property has a private gas connection (EAN code);
- Property has an own electricity connection (EAN code);
- Parties want to optimize energy efficiency and achieving sustainable energy within a framework of sound economic management as a key objective to see;
- Interpretation to this objective can be given by applying the ESCO developed by Energy Performance Contract for the business market;
- CUSTOMER owns an installation and will maintain it, which satisfies the conditions mentioned ESCO and makes available to produce space heating, hot water and cold receivers for the tenants / residents;
- ESCO supplies behalf CUSTOMER operation of the heat supply to the tenants / occupants and so provides gas and electricity purchases for the conversion to heat or cold and receivers for the overall electricity supply;
- ESCO does run the billing and collection towards the tenants / residents for the services that directly or indirectly related to the final heat supply;
- ESCO is no energy supplier;
- ESCO mediates in the purchase of energy by the CUSTOMER for the particular property;
- The energy supply under this agreement is limited to electricity and gas receivers for the boilers in cascade arrangement;
- ESCO offers to reverse note provides diversion for the billing of the purchased energy;
- CUSTOMER in relation to the energy supplier at all times retain the payment obligation for energy supply.

and have agreed as follows:

Article 1: Contents of the agreement

1. ESCO seeks during the term of this Agreement, a saving of energy in the building, located at the …… ……..

   This Agreement includes the following components:

   a) Energy Management:
   Energy management includes the permanent monitoring of energy consumption

and operation of the plant. ESCO will ensure a smooth implementation of the monitoring services during the contract period. These costs are part of the contract. In the Appendix "Energy Management Agreement, the arrangements set out below.

b) Administration and invoicing:
ESCO provides billing and collection facility to the tenants / residents:
……;
……..;
……., everything on behalf of the CUSTOMER.

These are supplied heat, electricity supply and overall cost heat measurement, which by means of an advance statement to be settled with the tenant / occupier.

ESCO also helps ensure billing and collection of fixed monthly amounts related to such heat and electricity supply (see paragraph 2 of this article).

c) Purchase electricity and natural gas:
ESCO provides the facility to coordinate purchasing power on behalf of CUSTOMER, relevant electricity and gas for the heat pump, boilers and communal facilities on the basis of notes diversion of the energy bill.

The amount of heat produced by the heat energy terms is based on 3.091 degree days. Every year, on the heat delivered a final settlement be based on the actual degree days recorded in whether station at …….
This statement will also be a rebate for holiday and combustion behaviour.

We are working on a profile methodology. This is a refinement of the degree days method. This will be fixed by law. How and exactly when is not known. If the term of this contract will apply this sophisticated system for providing heat instead of "degree days", then that system will be applied.

2. The monthly costs, partly in the form of an advance, are set at an amount of € …… including VAT 19% (see Financial Empowerment and résumé), its profile is as follows:

a) Energy Management
€ ……
The amount is indexed annually according Energy Performance Contract

b) Energy-heat homes and hot water supply(advance)
€ ……

c) General Electricity Supply (elevator, lighting, general.)
€ ……

f) Energy heat / cold and hot water supply Meeting Room
€ ……
(advance)

d) Energy heat / cold and hot water supply Dining Room
€ ……
(advance)
Energy costs are adjusted annually and judged according Energy Performance Contract
Total including 19% VAT.
€ ……..

3. Annual adjustments are the following location:

   a) Directory of the energy cost management, done annually according to the CBS index for the consumer. Indexing is by January 1 of the calendar year.
   b) The advance payment for gas is offset against the cost of the actual consumption according to the annual statement of the energy supplier.
   c) The advance payments for the heat is offset against the cost of the actual consumption according to the annual settlement of ESCO

4. The monthly payment referred to in paragraph 2 of this article will be on the first day of the month, under the authorization signed by the CUSTOMER to be automatically collected, and settled and adjusted annually in accordance with paragraph 3 of this article .

Article 2: Commencement, duration and termination of the agreement

a) The contract will at completion, about .....;
b) The duration of the contract is a period of 15 years;
c) Termination:
   - after the duration of the contract. ESCO will within 6 months before the expiry of the contract to make an offer to the CUSTOMER Energy Performance Contract Agreement to continue;
   - when entering into a new agreement between CUSTOMER and ESCO, which takes the place of this contract. Reason for this may be that during the term of the contract CUSTOMER another destination indicates the property or parties identify a clearly different pattern of energy / use the property for which modification occurs in the plant is required;
   - by dissolution as provided in Article 6 of this Agreement.

Article 3: Information

1. The parties will each still as good and as timely as possible aware of any data and events relating to execution of the agreement may be relevant.

2. Parties aim for optimum operation of the plant and to achieve the desired energy-efficiency/savings. This needs a good cooperation.

3. Parties will ensure that any time someone has reached in relation to urgent events such as disasters, damages, malfunctions and the like. End, the CUSTOMER the emergency number 0475 - 851 555 use.

4. Both the customer and ESCO will in implementing the provisions under this Agreement, exercise the care of a diligent party should be expected.

Article 4: Access to and accessibility of the facility

1. The installation must remain easily accessible due to restoration, management and the like.
2. CUSTOMER obliged by or on behalf ESCO appointed to have the opportunity to do what is necessary to verify the installation, maintenance. This subject of the order applicable to the CUSTOMER and safety.

Article 5: Liability and Damages

1. ESCO is not liable if in any way because of its services under this agreement would prevent, or inhibit interruption occurs in the heat, except by intent or gross negligence of ESCO. If by or resulting from the services under this Agreement provided the heat damage or injury or other harm is caused, ESCO is not liable unless there is intent or gross negligence.

2. ESCO has never held company for compensation for damage, publishing or profit or revenue, or compensation for moral damage, except in cases of intent or gross negligence by ESCO.

3. If ESCO is liable for property and bodily harm that will be limited to damages which an immediate and direct consequence of an ESCO attributable to failure to perform its contractual obligations and not reasonably avoid this injury and / or could be restricted by the CUSTOMER. Excluded from liability covers damages which the CUSTOMER has entered into an insurance contract or covered under the usual traffic views to cover the damage that an insurance contract is concluded.

4. Liability for property and personal damage is limited to an amount of € 900.000, - per occurrence and / or multiple claims arising from the same cause. In case of damage to ESCO is only liable if and insofar as the damage to an amount of € 2000, - beyond. Liability for other property damage is excluded.

5. The exclusions and limitations of liability specified in this article are also stipulated for and on behalf of the dependents of ESCO and any other by it in the context of the contract is used, and for and in behalf of those who provided services ESCO involve.

Article 6: Dissolution

1. Both ESCO and CUSTOMER are free to defect from the party in fulfilling its obligations under this Agreement art. 6:265 BW to dissolve. Dissolution takes place through a written statement which by registered mail is sent to the other party.

2. If failure of CUSTOMER, referred to in the first paragraph, will be demonstrated inter alia that:

   a) once after notice in writing to be made, fails the agreed amount on time and to cover it or fail any other provision of the agreement to be good;
   b) the plant for a purpose other than to use or allow the installation which is intended, unless prior approval is granted by ESCO;
   c) in a state of bankruptcy or receivership if it is granted or if confiscated the properties of customer relevant to this Agreement.

3. In the preceding paragraph shall not prejudice the right of ESCO to reimbursement obligations, damages, costs, interest and affect and prejudice the right to demand compliance.

4. As a shortcoming of ESCO, referred to in the first paragraph, will be considered:

   a) failure to properly fulfil the obligations regarding the work identified in the Agreement (including the annexes). If this will occur in the opinion of the CUSTOMER, CUSTOMER writing of default to the ESCO and then a reasonable time permitting its obligations still to come;

b) it is declared bankrupt, or if suspension of payments is granted;

c) to default on the activities referred to in Art. 1 of this Agreement.

5. CUSTOMER will immediately announced ESCO at a possible seizure of its movable or immovable property or part thereof and / or placed on the plant, the application for bankruptcy or receivership. CUSTOMER Furthermore, the attaching officer, the liquidator or administrator immediately disclose the agreement.

6. ESCO will promptly notify CUSTOMER the application for bankruptcy or receivership. Furthermore, the ESCO liquidator or administrator immediately disclose the agreement.

Article 7: Transfer and acquisition

CUSTOMER may without the written permission of ESCO its rights and obligations under this Agreement to third parties. ESCO will never consent on unreasonable grounds. ESCO can without written consent of the CUSTOMER rights and obligations under this Agreement to third parties.

CUSTOMER will never consent on unreasonable grounds. If the rights and obligations are transferred to another wholly owned subsidiary of Essent NV, the CUSTOMER in advance to authorize this transfer.

Article 8: Disputes

Any dispute arising under this Agreement or any of the annexes will be submitted to the competent court in the District 's-Hertogenbosch, extending the Dutch law.

Annexes to this Agreement: Energy Program, Energy Management Agreement and Model Financial Review.

Thus drawn up in triplicate and signed in ……, ...

CUSTOMER	ESCO
……..	……

Annex I ENERGY PROGRAM

Belonging to Energy Performance Contact .....

1. **Installation**

1.1. **Overall**

The system is intended for space heating, hot water and cooling
The Dominicans Square residential / ……...

Note: This agreement does not address the supply / sale of the plant. However, the energy program of ESCO is based on a system as described in Article 1.2. of this Annex, which complies with the principles laid down in Article 1.3 of this Annex.

If customer has an installation or purchase any of the above conditions differs, CUSTOMER will provide ESCO with more information. ESCO will calculate the effect that exemption for its service and, if necessary, through ESCO an addendum to the modified service record and add to this contract.

1.2. **Description of the installation**

The installation includes the following components:

- an electric heat pump system with a thermal capacity of 130 kW provides the basis for the space heating load;
- additional boiler capacity by 3 HE boiler (s) with each thermal power of 65 kW of peak load;
- the heat pump extracts using an aquifer system in the winter months heat from the soil;
- In the summer the soil is regenerated and the operator will be offered free cooling if desired;
- the heat pump and the boilers are connected in cascade with a preferential treatment for the heat pump installation;
- a central flue with air for theθ boiler;
- control valves;
- necessary valves and check valves;
- buffer (s);
- storage vessel (s);
- main pipes of the resume into the meter box of the apartments;
- hot water circulation pipe to the meter box of the apartments pump and accessories;
- heat meters in the meter boxθ of the apartments;
- meters in the meter box of the apartments.

In specifying the installation ESCO is assumed that the living unit with a low temperature floor heating system with a maximum temperature of 45 °C is applied. The temperature of hot tap water supplied is 65 °C. The plant will be realized in a room provided by third parties. The room should be suitable as a preparation space. The drawing room should be provided with an electrical connection of 3 * 250 amps, a G16 and a gas supply connection to the sewer. For monitoring, the space to be provided with an analog phone line. Monitoring is via the Priva system.

1.3. Description of the building envelope

The measures includes the following components:

▪ 330 m^2 Isolation roof	0,24 W/m^2K
▪ 103 m^2 Exterior Isolation facades head	0,24 W/m^2K
▪ 31 m^2 Exterior Isolation façade wall	0,24 W/m^2K
▪ 83 m^2 High Efficiency glazing living room rear	1,10 W/m^2K
▪ 69 m^2 High Efficiency glazing bedroom rear	1,10 W/m^2K
▪ 77 m^2 Isolation bottom floor wall	0,24 W/m^2K
▪ 60 m^2 Isolation bottom floor facade rear	0,24 W/m^2K

2. Electricity and Gas Prices

At the start of this contract, the delivery company Essent, the relevant receivers for the required gas boilers in cascade arrangement, during the period of 1 years energy supplier are provided at market rates is provided. For this purpose a separate supply contract between the Supply Company of Essent and closed the CUSTOMER. For the record: ESCO is not the supply company of Essent.

By December 1 of the calendar year, prices or the payments for the next calendar year to the CUSTOMER expressed.

2.1. Electricity

Electricity is supplied except on behave of
- the heat pump installation;
- the general amenities (elevator, lighting general).

The electricity of the heat pump is measured separately.

Electricity consumption falls below the small business rate. This is based on current rates.

By the local network company charges for connection, transmission and metering are fully charged.
All duties and taxes are also fully charged.

2.2. Gas

Gas consumption falls below the retail rate. We are based on current rates. By the local network company charges for connection, transmission and metering are fully charged.
All charges and taxes are also fully charged.

By one measurement, the volume of the supplied heat in gigajoules (GJ) found.

The calculation resulting from electricity and gas tariffs for heat is shown in Annex III Model Financial Review.

Space heating
In the heat consumption for space weather conditions have a critical influence on the actual heat. Monthly will place a correction on degree days. The method of the weighted degree days degree days for …… by EnergieNed as published on

the internet.

Being, we define the target consumption for the complex at 922 GJ per year at 2.960 degree days (0.311 GJ per degree-days). Heating degree day for any more or less change the overall target consumption therefore 0.311 GJ.

Hot water
Each housing unit has an individual measurement by which the quantity supplied hot water is fixed in m3. The amount of heat in GJ that tap water is supplied through this is calculated by multiplying the number m3 with 0.21. The cost for the amount of heat needed for hot water through the deposit note and final heat with the tenants settled.

Cold
Through a measurement of the amount delivered in cold gigajoule (GJ) for …… and …….

2.3. Billing and collection

The (future) residents, being of tenants:
……;
…….;
……,
pay a monthly payment based on the Model Financial Review (Annex IV) to ESCO. Once a year a statement will be based on actual consumption and current energy prices.

Tariff Changes during a recording period action will be treated in a manner customary in a system of annual meter reading.

CUSTOMER being ……. is / remains jointly and severally liable for the fulfilment of the commitment of both heat and electricity supply by the general tenants / residents.

Annex II Energy Management Agreement

Belonging to Energy Performance Contract Number .....

Energy management includes the following activities:

1. Using the energy consumption analysis and energy saving measures implemented annually defining the target parameters associated with consumption;

2. Ensure the relevant institutions of the new control system made in relation to the contract. This also implies clock time, holidays, desired temperature, etc. and ensuring a proper adjustment of the newly placed central heating installation (fuel line, fuel lines, etc.);

3. The continuous recording of energy flows and relevant process parameters;

4. The care for moving messages from the failure of automatic control system to your control room. The specification of this will be further adjusted by mutual agreement;

5. The weekly remote reading and analyzing the measurements from the new control system. If necessary this will be anticipated.

6. The continuous optimization of the plant, so as much energy savings while maintaining comfort;

7. The annual report of the actual energy consumption in relation to consumption and to achieve target, the submission of any improvement options;

8. The annual updating of assumptions regarding the Save Garant contract in respect of the ESCO to provide annual settlement. Defined indexing (eg wages, VAT and REB), determine the impact of any deviations in use in temperatures in the contract or desired target consumption and their impact on the ESCO is the effective month.

9. ESCO provides a facility to coordinate procurement of energy in order to CUSTOMER relevant receivers for the electrical heat pump, boilers and common facilities based on the energy bill note diversion.

   ESCO provides billing and collection facility to the tenants / residents:
   ……;
   ……..;
   ……., everything on behalf of the CUSTOMER.

   These are supplied heat, hot water and electricity supply overall, which by means of an advance statement to be settled in years and the tenant / occupier.

   ESCO also helps ensure billing and collection of fixed monthly amounts related to such heat and electricity supply.

Annex III Model Financial Review

1. Heat Calculation prices.

Calculating costs per year.

	Fixed	Variable
1. HR Delivery Gas boiler Fixed costs	€	
Variable costs		€ ... ...
2. Packaging HR Gas boiler Fixed costs	€	
Variable costs		€ ... ...
3. Electricity supply pump Fixed costs	€	
Variable costs		€ ... ...
4. Postage electricity heat Fixed costs	€	
Variable costs		€ ... ...
total of	€ ... A... ...	€ ... B …..
5. Calculation supplied heat: Sum all heat supply by heat meters	... ... GJ	
Total heat delivered	.... C ... . GJ	
6. Administrative Supplier:	D €	
Heat Price = B / C € / GJ	Packages for heat: (A + D).	

2. Prices for Cold Calculation

Calculating costs per year.

	Fixed	Variable
1. Electricity supply pump Fixed costs		€ ... ...
Variable costs	€	

2. Postage electricity heat
   Fixed costs € ... ...
   Variable costs
   € ... .

   Total € E ... ...
   € F ... ...

3. Calculation supplied heat:
   Sum all cold supply under energy meters .... GJ

   Total delivered cold
   .... G ... . GJ

   Cold Price = F / G € / GJ Packages for cold: (E).

   This rate calculation is performed each post based on realized electricity and gas costs.

   Total survey cost tenant / occupier:

   Amounts in € / month (partly estimated)

.....	ex. VAT	VAT	in. VAT
Costs heat and hot water			
Costs elektricity general			
Energymanagement			

The above costs are per apartment. The total monthly cost for the ……. dwellings amounts € …… inc VAT per Mon Price level .....

.....	ex. VAT	VAT	in. VAT
Costs heat and hot water			
Costs elektricity general			
Energymanagement			

The total monthly cost for Meeting Room amount to € ….. inc VAT per Mon Price level .....

.....	ex. VAT	VAT	in. VAT
Costs heat and hot water			
Costs elektricity general			
Energymanagement			

The total monthly cost for Dining Room amount to € ….. inc VAT per Mon Price level .....

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