Local investments options in Energy Efficiency in the built environment

An overview of good practices

Client: DG Energy

Rotterdam, 7 November 2012

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Table of contents

1 Re:FIT Project report

Project title		London RE:FIT Building Energy Efficiency Programme
Type of building(s) or construction		Public Sector Building retrofit
Overall aim/objective of project		Save energy and reduce carbon emissions
Type of project		Energy Performance Contracting - procurement framework
Main technologies / approaches		Energy efficiency retrofit
Location		London
Time frame	Start date	Jan 2010
	(Planned) end date	Jan 2014
Project originator/host		Greater London Authority (GLA)
Key stakeholders:		Project originator / host – Greater London Authority
		Public funding sources – ELENA, London Green Fund, ERDF, London Waste and Recycling Board
		Private funding sources – Royal Bank of Scotland

1.1 Project description

The purpose of RE:FIT is to assist public bodies in London to significantly reduce carbon emissions from their buildings, in line with London's target of cutting carbon emissions by 60% by 2025 (as set out in the mayors Climate Change and Mitigation Strategy[1]).

Total (projected) energy saving per year (in GWh/y)		Not yet available
Costs	Depreciation period (years)	10 year contract period typical
	CAPEX (total, in mEUR)	£50 million (through the associated London Energy Efficiency Fund (LEEF[2]) programme) £2,671,000 of which from ELENA to fund the programme delivery unit.
	CAPEX (annualised, in mEUR)	n/a
	OPEX (in mEUR/y)	n/a
	Other costs	n/a
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	28% carbon reduction per project (average predicted savings)
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Demonstrated financial mechanism to public sector Providing local energy saving projects Insulating public bodies from future energy price increases Improved working conditions Stimulus to local employment generation

The project utilises an Energy Performance Contracting approach alongside an associated procurement framework. This involves the public sector building owner identifying a portfolio of buildings that they want to retrofit with energy efficiency measures, setting a target percentage

1 http://www.london.gov.uk/who-runs-london/mayor/publication/climate-change-mitigation-energy-strategy

2 See: http://www.leef.co.uk/

energy saving they would like to achieve and a pay pack period that they are comfortable with. Then one or more of the framework contractors bid to provide these energy savings within the desired project parameters. The winning bidder then carries out and guarantees the resulting energy saving retrofit measures. This guarantees the payback of the initial investment whilst also transferring the delivery risk to the Energy Supply Company (ESCO). This approach is attractive as it provides a cost neutral mechanism to reduce the carbon footprint of public buildings.

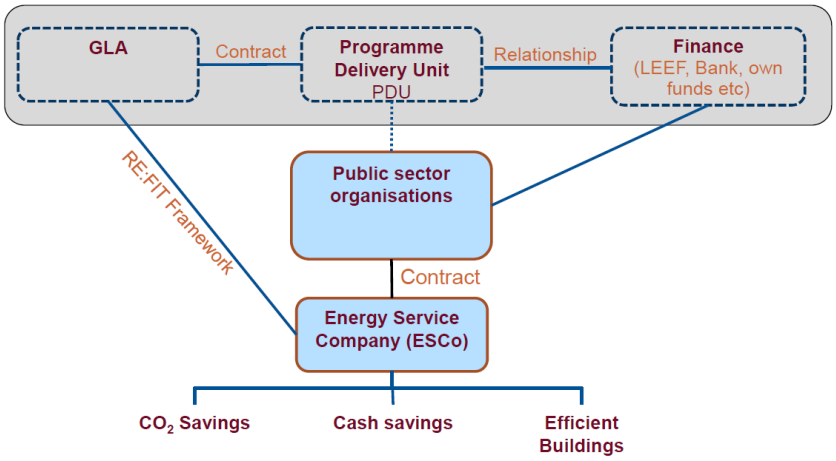
The project concept was developed from a pilot which was originally funded through the Greater London Authority. This pilot targeted 42 buildings with £7 million in investment. The pilot delivered investments that are due to payback within 7 years with the building owners able to benefit from savings of £1 million per year thereafter. This initial phase retrofitted a total area of 145,852 square metres of public buildings and is estimated to save >7,000tonnes of CO_2 per annum.

The delivery framework associated with the RE:FIT programme is a key enabling feature of the programme. The RE:FIT framework streamlines the procurement process for energy services by providing pre-negotiated, EU regulation compliant contracts that can be used with a group of pre-qualified Energy Services Companies (ESCOs) for the design and implementation of energy conservation measures. RE:FIT allows public sector building owners to procure and implement large scale retrofit programmes up to six times faster than if they were to undertake their own OJEU[3] process for public sector procurement.

The current ESCO providers on the framework include the following contractors: Balfour Beatty, COFELY, MITIE, EDF Energy, E.ON Sustainable Energy Business, Hoare Lea Consulting Engineers, Honeywell, Interserve, Johnson Controls, Schneider Electric and Wilmott Dixon Partnerships.

The following diagram outlines how the RE:FIT programme is structured. It is essentially made up of three synergistic elements: the RE:FIT procurement framework (as set up by the GLA), the European Local Energy Assistance (ELENA) funded, programme delivery unit and the financial element (funded through the London Energy Efficiency Fund (LEEF), Banks and public body reserves).

Figure 1.1 RE:FIT Programme Structure



RE:FIT and LEEF go hand in hand and were designed in tandem to complement each other. The following bullet points outline some of the synergies and benefits:

[3] Official Journal of the European Community; a European Union mandated procurement process.

- Established partnership between the two organisations;
- A proven approach means projects are more “investment ready”;
- Guaranteed savings mean minimal risk;
- Fast procurement through existing framework;
- Best practice documentation already in place.

Technologies funded through the RE:FIT programme include the following measures; Photovoltaic panels, building management systems, PC shutdown, solar thermal, insulation, voltage optimisation, fabric improvements, draft proofing, combined heat and power, variable speed drives/pumps, replacement boilers, secondary glazing, variable controls, heat recovery, radiator reflectors and thermostats.

Current (December 2011) pipeline

- Combining the pilot and works in progress mean that so far the project has have retrofitted 75 buildings, which represents a capital investment of 9.269m and an estimated CO_2 reduction of 9,264 tonnes/per annum.
- 35 public sector organisations in London have signed a Memorandum of Understanding to use RE:FIT. Over the last five weeks, more than one MoU has been signed per week. There are London Borough of Bromley, London Borough of Enfield, North East London NHS, the West London Mental Health Trust, London Borough of Kingston and Middlesex University.
- Five organisations in London have selected a supplier from the framework and are currently implementing retrofitting works. There are: University of London, Newham University Hospital, Waltham Forest Primary Care Trust, Kew Gardens and the London Fire Brigade. The total value of these packages of works is £2.2m. Three others organisations are currently in procurement for a supplier, with a planned value approaching £2m. The pipeline for December 2011 onwards currently includes 17 organisations with a total value exceeding £43m, an estimated CO_2 reduction of 35,285 tonnes/per annum and retrofitting 248 public sector buildings.

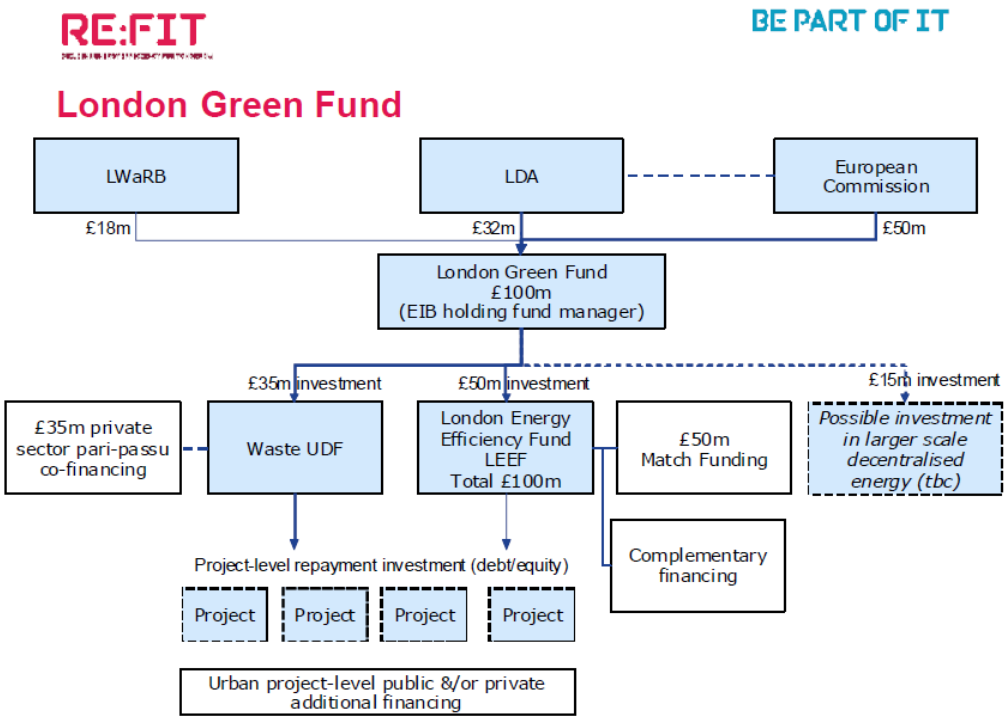
1.2 Financial characteristics

In order to prepare and support public building owners throughout this process the need for specialist technical assistance was recognised. In 2011, the London Development Authority (LDA) was successful in securing ELENA funding to set up a Programme Delivery Unit (PDU) to further drive the uptake of RE:FIT over the next 3 years. The application was for £2,671,000, of which 90% was provided by ELENA and the remaining 10% by the Greater London Authority (GLA). In terms of the projects that it facilitates, the RE:FIT programme has relatively minor costs. The initial pilot invested £7 million in energy efficiency to demonstrate how the instrument might work. Since then there have been 5 more mini-competitions/project financing rounds, leading to the restoration of a further 38 buildings. There are currently a further 320 buildings and £47 million of energy efficiency investments in the pipeline.

The main associated funding methods and instruments are detailed below.

1.2.1 Financial construction

The following outlines the main public funding sources available in London for Energy Efficiency Improvements within public buildings in London.



1.2.2 Conditions & Instruments applied

- Private finance e.g.:
  - Equity;

  The Royal Bank of Scotland (RBS) provides the match funding element to LEEF. Under the current scheme this is up to £50 million. They also support the identification and appraisal of projects, carrying out credit risk assessments, pricing and structuring analysis.

- Public finance:
  - London Green Fund

  The London Green Fund (LGF) provides one potential source of funding to facilitate this investment through the new London Energy Efficiency Fund (LEEF.) The LGF is made up of £32 million from the :London Development Agency (LDA), £50 million from the London European Regional Development Fund (ERDF) Programme and £18 million from the London Waste and Recycling Board through the Joint Energy Support for Sustainable Investment in City Areas (JESSICA) initiative, to invest in numerous sustainable development projects across London. The London Green Fund have set up two Urban Development Funds which are now open for business, one for waste, and the other for investments in energy efficiency projects.

  LEEF invests in projects to retrofit London's public sector building stock with energy efficiency and renewable energy measures. This fund was launched by the Mayor on 2 September 2011, and, like the waste fund, seeks to match the London Green Fund's £50million investment with private finance, taking the total investment pot up to £100million. LEEF is run by the Amber Green consortium, led by fund manager. This fund offers sub market financing costs, fixed rate loan facilities, reduced upfront costs, streamlined approval processes and template document packages. The drawdown profile to match the capital expenditure means 100% funding is available. Repayment is typically over 10 years and tailored to the energy savings guaranteed so is therefore cost neutral.

- Other instruments, e.g.:
  - Technical assistance;

  The programme delivery unit provides ELENA funded technical assistance. This is seen as a key enabler for the overall project. This funding over three years was for £2,671,000, 90% of which was supplied by ELENA, the remainder coming from the GLA.

1.2.3 Risk profile

There is no real risk to the RE:FIT programme itself, as it is the facilitating body in a wider ecosystem of projects and funding sources. However, each of its participating public bodies/building owners does face a range of project risks. These include:

Borrowers Risk

- Borrower credit strength;
- Security;
- Project sponsor buy-in, experience and capacity.

Project Risk

- Loan to cost / value;
- Type of energy conservation measures;
- Revenue streams for repayment;
- Work required to investor readiness.

Financial Risk

- Portfolio Diversification;
- Annual investment targets;
- Energy savings ratios;
- Cost per tonne CO_2 saved;
- Fund level financial returns.

1.3 Analysis

As the project was being developed a range of different operational and financial models that would enable the investments being “on”, or “off”, balance sheet were explored. Making the investment off balance sheet was seen as a complex option. The issues around ownership, liability and the assigning of risk could not be over come. Additionally, the public sector, at the time of initial project development was simply not interested in this type of approach. However, the project is now entering a critical phase where they are looking to develop a second phase of the project with a revised procurement framework for RE:FIT. Due to the recent economic crisis and the effects it has had on public sector finances the option of going off balance sheet is now more attractive. This will be explored as potential financial option for the revised framework; however these discussions are still at a very early stage of development.

In terms of what could be done better, or changed in future, the importance of ambitious initial applications was noted as important. Public sector cautiousness means applicants with extensive building stocks may initially only apply for a small proportion of their buildings to be refurbished. However, on successful implementation of a few buildings they have returned (often within 12 months) to reapply. The process of reapplication is time consuming and expensive for all involved (the applicant, the funders and the programme delivery unit). In future, a phased approach to renovations will be promoted, so that renovations can still be done at a speed comfortable to the

public body involved, whilst also leaving the option open to future renovation phases, without the need to reapply to the scheme from scratch.

ESCO partners undertaking energy performance contracting require an established baseline of information in order to estimate and guarantee what savings they will be able to generate for the public sector client. In the past this baseline energy information has not always existed and this has limited the number of buildings within which renovations could take place. Initial project experience has demonstrated this and there is now more active education of participating public organisations regarding the importance of establishing a verifiable baseline of energy data. This is now demanded of potential applicants as the first step in the project cycle.

Originally the main barriers to these investments may have been technical capacity, lack of resources, procurement complexity and lack of financial instruments. Many of these have been overcome, but banks and the public sectors attitude to lending has hardened over recent times. This is likely to remain the main challenge to this project in the foreseeable future.

Overall, the RE: FIT programme is on track to achieving what it set out to do. Some of the learning points outlined above may make it more effective in the future, but most of these affects were unforeseeable. Even with the benefit of hindsight, little would be done differently today. The combination of framework, LEEF funding and delivery unit is considered widely to be at the forefront of public sector energy performance contracting. Furthermore, the RE:FIT framework has value out with of London, as various regions and cities around the UK are in the process of copying and creating similar initiatives of their own. There is no reason why this approach could not be utilised more widely around Europe. Particularly, in times of limited public finances energy performance contracting provides an attractive mechanism to fund large capital intensive energy efficiency investments within the public sector building stock. If not for this mechanism, many of these investments would unlikely have taken place.

1.4 Conclusion

From the outset of this project the main barriers to public sector investment were recognised as internal resources, procurement complications and capital availability. It has successfully overcome these challenges through the setting up of the programme delivery unit, the RE:FIT procurement framework, and the complimentary LEEF financing scheme. However, much has changed since the original model was devised, i.e. the banking and Euro zone financial crisis. With this in mind, it may necessitate a new approach and the possibility of carrying out public energy efficiency loans and renovations off balance sheet may need to be explored.

In principle the RE:FIT model works and nothing major would be done differently for the second phase. The core pillars on Energy performance contracting, of simplified procurement frameworks, guaranteed savings and low cost finance are sound and will be tweaked to improve their effectiveness for future phases. Water savings may also be included within the scope of the scheme to maximise the environmental benefits of the programme. For a more advanced, yet similar model Berlin was highlighted as a best practice example in the area of Energy Performance Contracting.

2 Paris Energy Efficiency School Refurbishment Project Report

Project title		CPE-Ecoles Ville de Paris
Type of building(s) or construction		School refurbishment for energy efficiency
Overall aim/objective of project		To reduce Paris Schools energy related emissions and energy usage by 30% by 2020.
Type of project		PFI school energy efficiency refurbishment programme
Main technologies / approaches		Replacement windows, insulation, energy management and heating systems.
Location		City of Paris
Time frame	Start date	Dec 2009 (contract start date 1st Dec 2011)
	(Planned) end date	Dec 2031
Project originator/host		Department of Public Administration (DPA) within the City of Paris
Key stakeholders:		Project originator / host – City of Paris
		Public funding sources - Elena
		Private funding sources – Lending Bank
		Others (e.g. facilitators) – SPV delivering the programme of works

2.1 Project description

Table 2.1 General Project Description

Total (projected) energy saving per year (in GWh/y)		10.7
Costs	Depreciation period (years)	20
	CAPEX (total, in mEUR)	34
	CAPEX (annualised, in mEUR)	17
	OPEX (in mEUR/y)	1
	Other costs	n/a
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	EUR 750,000 saving per annum, or 10.7GWh
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Not quantified Response to Paris climate action plan

This project profile is based on a literature review and an interview with Arnaud Le Bel Hermile, Project Chief of the CPE – Ecoles initiative.

The project originated from the City of Paris in response to the Paris Climate Plan, a Parisian equivalent / response to the International Kyoto protocol. This plan outlines how the city aims to reduce their energy usage and carbon emissions by 30% by 2020, based on 2004 levels. The Department of Public Administration (DPA) within the city council is responsible for providing support services to all public authority bodies with regards to architecture and the built environment. Within this department a specialist sustainable development team of three persons was set up. This team were the originators of the “energy efficiency project for schools”. The purpose of the project is to save energy within schools in order to reduce their emissions in line with the Paris Climate Plan. No specific additional / associated benefits were highlighted during the interview but other

qualitative benefits include better quality school buildings resulting in a better quality learning environment for the pupils.

The project will be delivered through a planned programme of works to renovate and refurbish schools to higher energy performance standards. The actual works are being undertaken by a special purpose vehicle (SPV) comprising of the contractor and two financial partners, funded through a Private Finance Initiative (PFI) type arrangement. The main technologies being implemented are replacement windows, interior insulation, energy efficient products and appliances, energy management devices and upgraded and replacement heating systems. In terms of technology the project is relatively risk free as no innovative / untried technologies are being deployed. Six hundred schools require treatment and an initial phase of contracts for refurbishing 100 schools was signed on the 1st of December 2011.

Nationally, the French government has legally binding CO_2 emission targets and has the national "Grenelle" Environmental Agreement. Other regions and municipalities are also developing energy efficiency investment schemes within their building stock. For example the Alsace region signed one over a year ago, but few of these have utilised the PFI type "partnership contract" model.

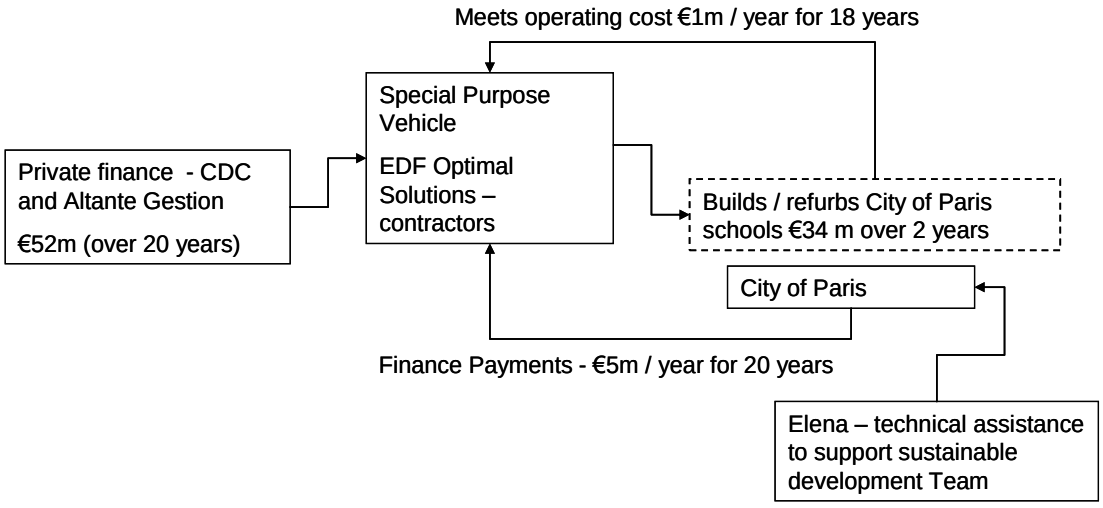
The project has taken around two years to reach the point it is at now, having recently signed the contract for the initial phase of 100 schools to be refurbished. The Cap Ex phase is planned to last for the next 2 years. Following that there is an Op-ex phase of another 18 years.

2.2 Financial Characteristics

2.2.1 Financial construction

The delivery of the project is being carried out by a Special Purpose Vehicle (SPV), set up specifically to deliver this project. The SPV has 3 main stakeholders; the works contractor (EDF Optimal Solutions) and two project financiers (CDC and Altante Gestion).

The CapEx for the project is EUR 34 million over two years and the OpEx estimated to be EUR 1 million per annum for the 18 years after this, giving a total EUR 52 million. The city of Paris will contribute EUR five million per annum, for 20 years, to service this agreement. The diagram below summarises the financial flows involved in this arrangement:



2.2.2 *Conditions & Instruments applied*

The main financial instruments and arrangements that have enabled this project to proceed are as follows:

- Private finance in the form of debt is the main source of capital for this project, estimated at EUR 52 million over the duration of the project. The Special Purpose Vehicle (SPV) has also borrowed a minor part of the project expenditure from the stakeholders within the partnership. It should be noted that the financial stakeholders within the SPV are not the same as the lending bank.

This arrangement was favoured by the City of Paris as it allowed deferral of payment for the project, which is an attractive option in the current financial climate. In order for this partnership contract to be adopted the Private Finance Initiative (PFI) type approach had to be proven to be the best available option. For this to be established they had to carry out a preliminary assessment of the programme and its cost effectiveness. This had to demonstrate a minimum of one of the following criteria to be allowed under French law; Emergency, Complexity, or Comparative analysis. This project passed this test under the complexity and comparative study analysis criteria and on this basis was then voted for by the Paris city council chamber.

- Public finance in the form of Elena funding has subsidised the cost of the three person sustainable development team and the consulting bureau that have been instrumental in setting up and delivering this project on behalf of the city council. The other long term cost to the city is in the partnership agreement repayments schedule of EUR five million per annum – to cover the operating cost and the initial capital cost - for the next 20 years. A total cost of EUR 100 million. Minus the energy savings they will benefit from, estimated to be EUR 750,000 per annum (July 2010 value).

2.2.3 *Risk profile*

The risks associated with this project were seen to be fairly limited in terms of technical innovation, as all of the measures being installed were proven existing technologies.

The most important risks identified throughout the project were of project slippage due to the complexity of the project and the short timescales that renovations have to be delivered to. The short timescales dictate extremely efficient and effective delivery of this project and any slippage could have financial repercussions. The financial partners providing the capital attached various delivery conditions and clauses that mean delays, even due to unforeseen consequences, could prove costly. This is partly a feature of banks and financiers current risk aversion and their unwillingness to accept any significant financial risk associated with the project.

As the contract has only recently been signed it is difficult to ascertain whether any of these risks will actually materialise or not. The main challenge to date has been in coordinating the various departments and public bodies to cooperate on this project, with this described as a 'full time job in itself' by the interviewee.

The only unforeseen issue that has arisen is the controversy and disagreement over how the project has been funded. Left leaning elements within the council, who unanimously voted for the original climate plan and associated activities, have questioned the value for money that this project represented.

2.3 Analysis

The attractiveness of the PFI approach was mainly due to the ability of the public sector to defer payments to a later date, hopefully when the economic situation has improved, whilst also stimulating significant rapid investment in energy efficiency projects in the short term. Interestingly, the financial arrangements and offers were made prior to the Euro zone financial crisis resulting in more preferable terms that would be available in today's current economic climate. This point was highlighted as a potential threat to using this type of instrument for similar projects in future.

The main challenges foreseen and experienced are focussed around the effective delivery of the project. When finalising the details of the contractual arrangements the city of Paris had to negotiate with not only the project funders (trying their utmost to minimise their financial exposure), but the accountants and lawyers of the contractor (experienced in maximising their value whilst minimising their risk in PFI projects). This could potentially put them at a disadvantage as of the three parties they are least well suited and experienced in this type of negotiations. For other public bodies, inexperienced in these instruments, this poses a potential risk to this approach.

The interviewee highlighted the fact that since this project was developed there have been changes to French law regulating the financing of public projects. Whilst before a "partnership contract" was deemed to be the only feasible option open to them for this type of project, these changes mean that "global public contracts" could now be used . These would allow public bodies or institutions to borrow money from banks at preferential rates and would potentially reduce the long term costs to the public purse. Whilst still under development, the option for utilising this approach was not discounted as a finance option for future project phases over the coming years.

The PFI type "partnership project" has been, and continues to be, used widely throughout France for large capital intensive building projects such as prisons, universities, stadiums and hospitals. On the city of Paris wide scale the application of this type of instrument was only deemed suitable for energy efficiency type projects. In most other circumstances it was deemed to be the option of last resort, due to the long term financial implications of PFI contracts on the public purse.

In terms of policy suggestions the interviewee highlighted the ongoing discussion around the value and utility of PFI type arrangements in the current economic climate.

2.4 Conclusion

Whilst the PFI approach is on track to deliver this project, some questions have been raised as to its general suitability. Whilst it is regularly used for large scale capital build projects other mechanisms could prove more cost effective to public bodies. Furthermore, gaining value for money from PFI projects will be increasingly difficult in the current climate: as risk adverse lenders apply tough conditions and caveats to minimise their risk, making contractual PFI arrangements even more difficult to achieve. Additionally, the level of experience of individuals negotiating these types of projects can put the public body, and by proxy the public purse, at a disadvantage. Benefiting from recent changes to French public procurement law, the project is now investigating alternative financing methods and instruments for its future phases.

Additional comments suggested that Elena funding, or a potential alternative, might be used as a means to finance projects, rather than just being targeted at project facilitation and management type activities.

3 Rebida Project Report

3.1 Introduction

Project title		Rediba
Type of building(s) or construction		Public Buildings
Overall aim/objective of project		Facilitate investment within public bodies
Type of project		ESCO development and support
Main technologies / approaches		Street lighting , solar PV, energy efficiency,
Location		Province of Barcelona, Spain
Time frame	Start date	May 2010
	(Planned) end date	May 2013
Project originator/host		Diputacio de Barcelona – Rediba Project
Key stakeholders:		Project originator / host – Diputacion de Barcelona (DIBA)

3.2 Project description

Total (projected) energy saving per year (in GWh/y)		280 GWh/year (this is total energy savings projected from the project that the Elena funding helps to facilitate).
Costs	Depreciation period (years)	
	CAPEX (total, in mEUR)	2M (Elena funding), 500M expected to be mobilised as a result of the Elena facilitation.
	CAPEX (annualised, in mEUR)	
	OPEX (in mEUR/y)	
	Other costs	
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	280 GWh
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Leverage factor of between 50 and 250 185,000 tonnes CO_2 eq. saved per annum Up to 5,000 jobs created or sustained Renewable Power generation of 114 GWh per annum

The Barcelona Provincial Council (DIBA) is the second level of local government in Spain. Its mission is to promote the progress and welfare of its citizens through improving cooperation (both technically and economically) between the 311 municipalities (population 5.4 million) that make up the province.

The project team was originally involved with Agenda 21 activities within the public administration of the Province of Barcelona. This involved promoting sustainable development policies within the region to increase the sustainability of the territory as a whole. This led to further work based on the regions Sustainable Energy action Plan (SEAP), developed within the framework set up as a result of it being a signatory of the Covenant of Mayors. The covenant of Mayors is an EU wide movement of local and regional authorities that have voluntarily committed to improving energy

efficiency and renewable energy generation within their areas. Through this commitment they aim to meet and exceed the EU's target of reducing CO_2 emissions by 20% by 2020. The Diputaicio Barcelona (DIBA) was the first covenant coordinator/supporter to start providing strategic guidance (and financial and technical support) as signatories to the covenant. Within this role they promote the covenant to municipalities and support them in drafting SEAPS (Sustainable Energy Action Plans) and can finance 100% of the SEAP drafting, then provide technical and financial support to help municipalities transform their plans into actual projects.

This activity led to them applying for ELENA funding for their current project, whereby the objective is to develop and roll out an investment programme for energy efficiency and low carbon investments within the public sector of the Province of Barcelona. As one of the most populous and therefore wealthy regions within Spain, they have led the way on this agenda nationally. In fact, they were the first ELENA project to ever be funded. Their mission includes:

- Establishing a contractual framework to ensure the effective development and delivery of investments within the region;
- Implementation of energy efficiency projects through the use of ESCOs;
- Development of a Public Private Partnership approach (PPP) to implement investments in PV and other renewable energy systems within public buildings.

The project implementation unit, funded by ELENA, was formed by existing and additional staff from within the Provincial Government to manage the investment programme. Its main tasks are to promote and analyse proposals of potential projects by municipalities and provide technical support to municipalities in the implementation of these projects. Sub-contractors are also utilised for specific studies and legal advice. The main investment programmes that have been supported to date include:

- Installation of solar PV on public buildings through "rent a roof" type schemes, the first of its kind in Spain;
- Retrofitting of street lighting and traffic lights with energy efficient technologies through Energy Supply companies (ESCOs);
- Municipal Building refurbishment contracts through the use of ESCOs. These include a wide array of measures, from biomass heating systems and PV, right through to efficient street lighting and energy efficient building management systems.

The main goal of the project is to support the public sector in their region to make energy savings and facilitate this investment. Under the Energy Efficiency Directive all European countries are required to take actions in this area, Spain was recently fined for its lack of action in this area, further highlighting the importance of this work both locally and nationally.

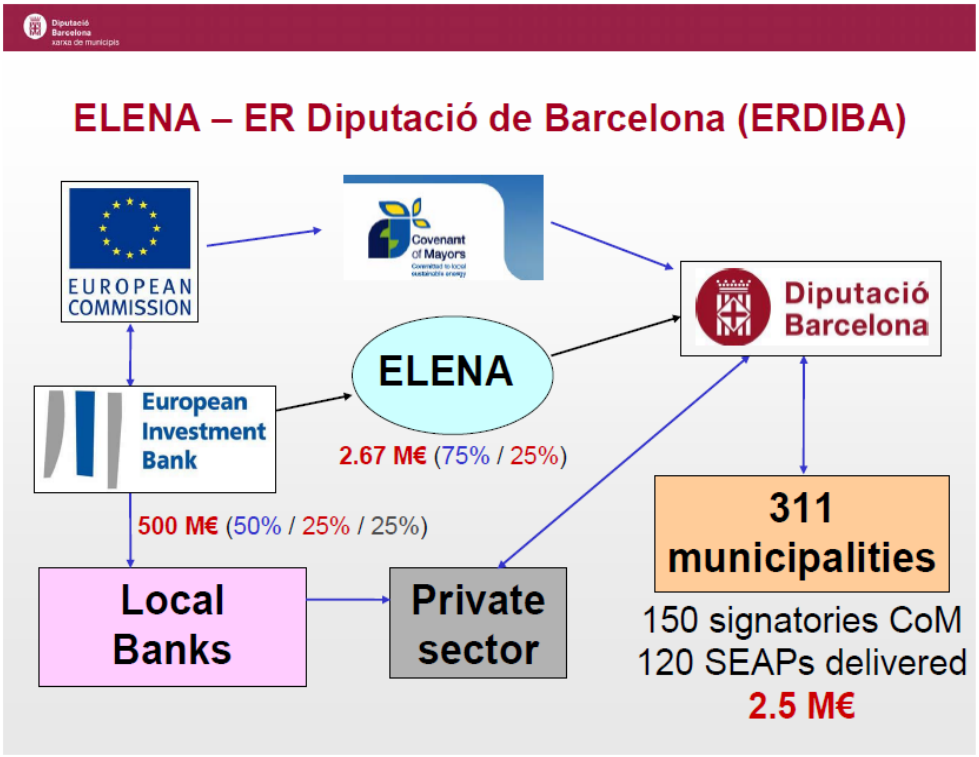
Some of the specialist advice that the project unit can provide includes:

- Advice on existing contractual model suitability;
- Advice on the potential for public service energy contracting;
- Advice on concluding energy service contracts for PV and energy efficiency;
- Advice on ESCO design;
- Advice on sustainable energy procurement;
- Technical support for administrative contracting.

The timescale for the project is between May 2010 and May 2013, however it is hoped that the project activity will be continued beyond this period.

3.3 Financial characteristics

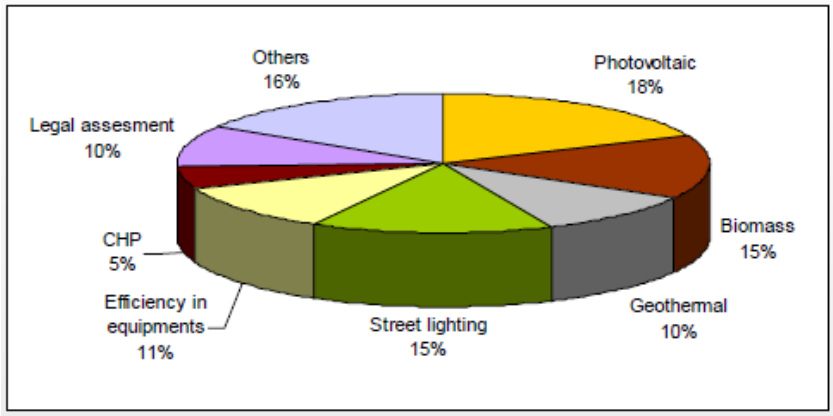
Due to the complex nature of the multiple funding programmes that Rediba is involved with, as a facilitating agent, detailed financial instruments were not discussed during the interview. The following graphic shows the relationships between the key financial stakeholders involved in the scheme.



Source – Rediba presentation May, 2011.

The following table outlines the range and proportion of different technologies that have been supported to date.

Figure 3.1 Distribution of contracts by technology



3.3.1 Financial construction

Multiple financial models were and are being developed currently. The size of investment, participating stakeholders, payback periods and investment model utilised differs on a project by

project basis. In terms of repayment period, the main ESCO projects promoted to date have had payback periods of between eight and fifteen years.

3.3.2 Conditions & Instruments applied

Whilst the funding of energy efficiency and renewable energy investments is not included on the REDIBA Project contract, the project unit is carrying out the monitoring of how the various projects are being funded.

There are different potential sources of finance for the projects that the REBIDA project has been actively supporting and promoting in preparation for investment. Some of the key potential sources of finance are:

- Own companies funds. The ESCOs awarded have used some of their own funds to start up projects.
- Private investors. The conditions of these funds are not known for us, but some companies that have been awarded with the PV renting roofs tenders, told us that they are using third private investors instead of Private Banks.
- Funding by private local banks:
  - Bank with a long term credit at an interest rate of EURIBOR + 3%. EUR 15 million for the year 2011.
- Grants from ICAEN (Catalan Energy Institute from the Regional Government). These grants pay from 15% up to a 40% of Energy investments to public administrations. These grants have specific conditions, funding just a specific kind of projects and with a funding limitation amount for each project.
- Government financial fund: “línea ICO Inversión Sostenible 2011”: The conditions are:
  - Maximum amount of loan per client is EUR 10 million;
  - Rate: EURIBOR + 1.5%;
  - Period 3 - 20 years.
- An EIB loan (via two local intermediary banks) – though no funding has been let via this source yet.

In conclusion, the project unit has identified the financial constraints from the classic private banks as one of the main barriers for implementing new projects in the short term, (it is not just a matter of the energy projects; this situation affects all economy sectors throughout Spain). Therefore the project unit is monitoring closely this part of the project process and luckily is finding alternative funding ways to keep on promoting new energy investment projects.

3.3.3 Risk profile

The main risks identified at a project level are of project delays and ensuring correct payment schedules were met between the public administration and the ESCO running the energy service. For the Rediba project itself, local elections have had a detrimental effect on the project timeline, as they were unable to progress any public sector projects whilst these were going on.

Another barrier that had to be overcome is that of regulatory uncertainty. The major downward revision of the Spanish Feed in tariff rates in August 2010 has contributed to undermining local public authority confidence in renewable energy and its long term financial viability. This poses a risk to future projects still in the initial stages of development.

3.4 Analysis

One of the main barriers to the uptake of ESCO type arrangements was private contractors concerns about the public sector's ability to pay on time. In order to overcome this barrier public bodies have been required to take out payment protection insurance with their banks, a significant cost to themselves, to appease the private contractor managing the ESCO. Basically, they are requiring financial guarantees from banks, so as to minimise their financial risk exposure, before undertaking projects.

Another risk identified was the consequences of the private company or ESCO going bankrupt, and where this would leave the public authority. This has been overcome by detailed upfront filtering during the tendering process of applicants in terms of capacity to carry out the work and long term financial stability.

An unforeseen consequence of the roll out of ESCO type arrangements within the public sector is the scope for loss of control over how services and delivered and what technologies are employed. For example under the street lighting ESCO, contractual arrangements had to be established early on as to exactly what technological parameters the ESCO had to work within. Otherwise there could be the risk of the ESCO installing specific technologies to save energy, which the public authority might have rejected due to other factors (such as quality of light, ease of maintenance etc.). There is also a natural resistance to change within the public sector and a tendency to focus on municipal ownership.

The main barrier to all projects at the moment is banks willingness, and the conditions upon which, they are willing to lend capital. There is no easy answer to this, although initial lack of experience led to excessive guarantees being requested. Also the scale upon which investments are offered can be a barrier to smaller municipalities. Whereas large cities can develop economies of scale and roll out massive investment programmes. The scale and complexity of these schemes, and those willing to fund them, do not match the scale of projects smaller towns and regions may want to pursue. As these instruments and approaches become more widespread there is a potential need for this learning to be applied at a smaller more localised scale.

In terms of what might be done differently with hindsight, the main factor was that of developing realistic timescales for project delivery throughout election years. Within this project up to six months were lost due to this factor and the paralysis it caused within the public sector throughout this period. Local elections have had a detrimental effect on various project delivery horizons and could be better anticipated in future.

The replicability of the approaches and instruments utilised within this project is high. As a trail blazing province within Spain, knowledge and best practices from this project should be transferred throughout the country. Many of the issues highlighted above could be minimised, or even eliminated, through improved interaction and knowledge transfer with other more advanced administrations. The project team already currently does this through networks, meeting with ESCO developers and other public authorities (including attending Conama – Congress of Environment in Spain), whilst recognising that it could do more. Internationally, the Barcelona province government has a Brussels office and is active within the ARCO Latino network. However, the unique administrative structures within Spain may make some of the tacit learning from the project difficult to apply in other EU countries.

3.5 Conclusion

Whilst the economic lending climate and public authority financial situation has deteriorated rapidly over recent years, this economic crisis can also be seen as an opportunity. Tough economic times require innovative financing methods and energy efficiency ESCOs are a means to do this. Investment in facilitating these projects pays for itself many times over, due to the significant leveraging effect ELENA funding can have, as demonstrated by this project. Whilst the importance and use of this funding stream was recognised, so was the need for a separate, smaller scheme that could also be used to finance behavioural change programmes. Whilst these may not have the same financial leveraging effect, they could have a significant carbon reduction leveraging effect.

4 FACILITÉ HAUTE QUALITÉ ÉNERGIE ENVIRONNEMENT

4.1 Introduction

Project title		FACILITÉ HAUTE QUALITÉ ÉNERGIE ENVIRONNEMENT (HQEE I) – first wave of such a programme
Description of programme		A tri-partite protocol was signed with the French Minister of Energy, Caisse Nationale des Caisses d'Épargne (CNCE), currently BPCE, and EIB in November 2007 to finance construction and/or refurbishment projects of public buildings, which fulfil stricter energy and environmental standards than those used at the time of application. At the end , the projects need to get certification from a certifying authority that they fulfil these stricter energy standards.
Type of buildings		Public buildings
Overall aim of programme		The facility HQEE set out to finance the construction and refurbishment of public buildings in France in accordance with higher standards as certified by label High Energy Performance (HEP) (HPE: Haute Performance Energetique), Very High Energy Performance (VHEP) (THPE: Tres Haute Performance Energetique) , low-consumption building (BBC: Batiments Basse Consommation), High Environmental Quality (HEQ) certificate (HQE: Haute Qualite Environnementale) or any other higher standard. In practice, projects were eligible when achieving an energy level of 110kWh/m²/year minus 20% (THPE). The promoters must show a proof of having obtained one of those high energy performance labels.
Main technologies / approaches		All
Location		France
Time frame	Start date	07-2007
	End date	12-2010
Programme originator		It is unclear who originated the first idea of setting up this facility. The French government, together with the Agence de l'Environnement et de la Maîtrise de l'Énergie (ADEME) discussed with EIB setting up this fund.
Key stakeholders:		Project originator: EIB + ADEME/French government
		Management of HQEE: EIB together with Groupe Caisse d'Epargne (CNCE) via its Caisse d'Épargne and Credit Foncier networks (local financing institutions).
		Applicants and sub-project managers: Local authorities, associations formed by them and their concession holders, as well as public agencies and associations
		Technical support to set up the fund: Agence de l'Environnement et de la Maîtrise de l'Énergie (ADEME) was involved to suggest which energy standards should be used as the criteria for loaning.
		Certivea – the key certifying body for these labels

4.2 Project description

Total (projected) energy saving	There are no quantified energy savings per year in GWh reported per project. However, the label requirement guarantees minimum 10% of energy savings per sub-project.
Sub-project statistics	There have been 173 sub-projects submitted by 94 beneficiaries being co-financed through this facility. Only 4 sub-project applications were rejected. The average cost of sub-projects = € 12.75 million Type of beneficiary: Municipality (48%) Regions (8%) Department (12%) Inter-municipalities (22%) Communes (4%) Other (6%) Sector: Educational and extracurricular activities (57%) Administrative buildings (13%) Sports & leisure (11%) Social (11%) Health (4%) Sundry (4%)
Conditions of loan	Offer of EIB to CNCE - Euribor -3bp (9 years) Tertiary sector projects Costing between €0.5 – 150 m Projects above € 50m: an individual appraisal is required Compliant with labels HEP, VHEP, low-consumption buildings, HEQ or higher
Total fund size	€ 350 million

The programme Facilité Haute Qualité Énergie Environnement (HQEE) was set up to accelerate the attainment of the targets laid down in the EU's Energy Performance of Buildings Directive or EPBD (EU Directive 2002/91/EC). The programme has been the first of its type in Europe for the EIB. Since this programme has been extremely successful and demanded by regional authorities, currently, there is a second wave of such a programme (HQEE II) with a total fund size of €700 million. Funding from HQEE II is even more demanded, also due to difficult access to funding. A third wave (HQEE III) is under discussion. Since the French law has changed during the programme (adoption of RT 2012, which requires an energy consumption lower than 50 kWh/m²/year), the eligibility for funding is stricter in HQEE II. Only buildings with these labels are eligible: low energy consumption buildings (LECB), positive energy buildings (PEB) and Programme of Research into and Experimentation on Energy in Buildings (PREBAT). Since low energy consumption buildings(LECB) is a rule for tertiary sector since 2012, there is a significant increase in such sub-projects and hence, a demand for funding.

The HQEE Programme funded both construction and refurbishment of public buildings. Typical beneficiaries were schools and colleges, crèches, administrative buildings, sports and leisure centres, and community centres. The goal was also to have a regional distribution of funded projects. The results of this programme show that all the applications submitted except of one concern construction or construction/refurbishment operations. This is due to the fact that the law in

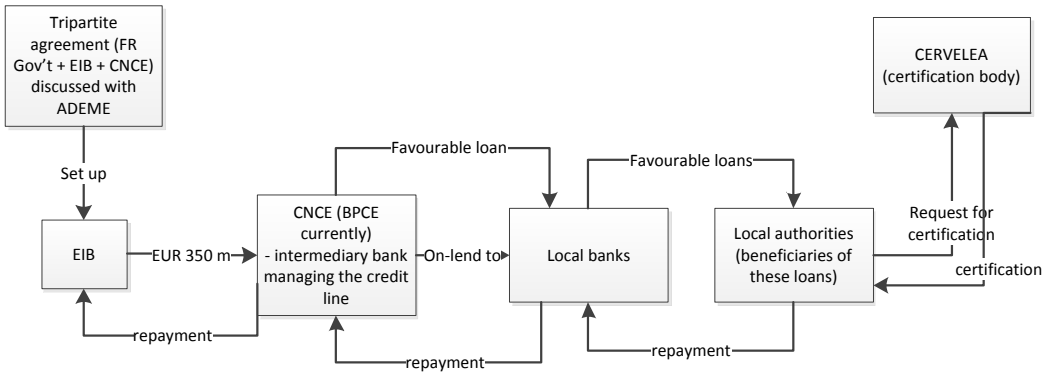
question does not apply just to refurbishment operations. To be eligible for funding, projects must meet one of the defined energy performance criteria and be within the cost range €0.5 – 150 m. There is no concern, yet, about the cost-effectiveness of these projects. Applicants must show proof of having achieved higher standards by being certified by one of the certification bodies. At the end of the project, beneficiaries of the funds must submit forms A and B with the required certification to CNCE and EIB as a verification. The process of verification has not been finished yet. In case the projects do not succeed getting this certification, the promoters will have to reimburse the EIB.

4.3 Financial characteristics

4.3.1 Financial construction

To implement the HQEE programme, CNCE used EIB resources to support the promoters of projects involving the construction or refurbishment of public buildings throughout France. Use of EIB funds enabled CNCE to offer better loan terms to local banks, which then subsequently offered better loan terms to final beneficiaries meeting more stringent energy-saving and environmental standards. The loan of max EUR 350 million has been distributed to the beneficiaries entirely through local banks, administered by the CNCE. The total size of the Facilité Haute Qualité Énergie Environnementale programme was estimated at approximately € 1 200 million.

In the flowchart below, the financial structure of the HQEE is presented to clarify all the relationships between the different stakeholders.



4.3.2 Conditions & Instruments applied

The EIB loan to CNCE (currently BPCE) has been offered for a tenure of 27 years (including up to 9 years grace period) or 18 years maximum as a one off (or bullet loan).

The EIB loan has been distributed to the beneficiaries entirely through the intermediaries, i.e. BPCE who on-lent to local banks. The operations/subprojects of the beneficiaries had to fulfil the conditions of CNCE to qualify for the loan. The criteria for qualification were specified in the financial contracts between the EIB and the CNCE. The criteria were as following:

- "The sub-projects will be entirely financed through an intermediary bank;
- The loan is addressed to local authorities and associations formed by them (final beneficiaries);
- The sub-projects should be in accordance with the following standards:
  - High energy performance (HEP): normal energy consumption at least 10% lower than the benchmark;

- Very high energy performance (VHEP): normal energy consumption at least 20% lower than the benchmark;
- Low consumption buildings: normal consumption is below a threshold of between 30 and 50 kWh/m2/annum;
- High environmental quality (HEQ): an undertaking by the building owner to achieve (i) very high performance against three or four out of 14 environmental targets (including energy at a level corresponding to the HEP label), divided into four categories (eco-construction, eco-management, comfort and health), (ii) high performance against four or five other targets, and (iii) a basic level of performance against the remaining targets; and
- any other more stringent targets than those set by existing standards, under the terms of future programmes introduced by the Government.

- For sub-projects involving investment of more than EUR 50 million, an individual appraisal will be required."

Validation:

To monitor the use made of the loan and check on the eligibility and content of the individual projects financed, summary sheets have been submitted by the partner bank in order to obtain agreement to provide finance under the programme.

These sheets contained the following information:

- details of the final beneficiary;
- details of the actual project;
- type/description of the building (schools, crèches, extensions to town hall or department offices, etc.),
- the project cost;
- the start and completion dates of the project;
- confirmation of compliance with the European procurement and environmental directives;
- details of the financing of the project (amount, date of signature of the subsidiary financing contract with CNCE);
- the type of support provided by ADEME (if applicable);
- the aims (type of energy performance sought/HEQ targets);
- an undertaking by the beneficiary to carry out the project in accordance with the desired objectives; and
- a further undertaking by the beneficiary to update the sheet on completion of the works and submit a certificate confirming that the project has achieved the more stringent standards, through the award of labels certifying HEP, VHEP, a "low-consumption building", HEQ certificate or proof of support and monitoring by ADEME for "Flagship low energy consumption building" projects, and "exemplary HEQ operations", or any other operations under programmes launched by the Government with a view to attaining higher standards than those in force.

For subprojects involving investment of more than EUR 50m, the summary sheets had to also show information required for an individual appraisal. These were submitted to the Commission for an opinion. In view of the fact that, firstly, it financed a clearly-identified category of final beneficiaries and, secondly, that it supported multiple operations all sharing the same objective, this facility has been classified as one of the EIB's "Framework Loans".

4.3.3 Risk profile

There have been no major credit risks. EIB selects the intermediary bank according to its risk assessment of candidate banks. There have been two main counterparts accepted under this project, namely the CNCE, currently the BPCE (rated A+ by Standard & Poor's at that time) as the main intermediary borrower and local authorities as the promoter and final beneficiary.

Corresponding public entities have no external credit rating but an EIB internal rating of 3+ (corresponding to A1 in Moody's terminology), defined as "good credit quality counterpart and subject to low credit risk. Capacity to repay all obligations in the normal course of business is undoubted, but operating in a cyclical sector (or not having a strong position in a non-cyclical one), and therefore potentially showing a degree of vulnerability to downturns. Long-term prospects remain, however, solid ."

CNCE has been a regular partner of the EIB and proved its ability to intermediate financing for such projects. At the time of application, CNCE was rated Aa3 by Moody's (which corresponds to internal rating of 2-, which is defined as "high credit quality counterpart and subject to very low credit risk. Considerable stability of earnings, strong position in a non-cyclical sector and moderate leverage. Long-term prospects quite solid." EIB's internal rating at the time of application was A1 (internal rating of 3+), which is defined as "good credit quality counterpart and subject to low credit risk. Capacity to repay all obligations n the normal course of business is undoubted, but operating in a cyclical sector (or not having a strong position in a non-cyclical one), and therefore potentially showing a degree of vulnerability to downturns. Long-term prospects remain, however, solid ." CNCE's rating on 20 May 2009 was equivalent to the one at the time of application. Current credit rating of BPCE as of 5 April 2011 has also stayed the same.

4.4 Analysis

Strengths:

- The loan is available at competitive rates and other sources of funding are becoming much more difficult to access;
- CNCE and other local banks are credible and proactive on this issue – EIB distributes the envelope only to CNCE, which then decides to which local banks it on-lends. Only if there has been an application for a large envelope for a single region, EIB got more involved in the decision-making to maintain maximal regional distribution;
- The change of law demands stricter energy and environmental standards, this increases the demand for such loans considerably;
- EIB was involved in approval of the projects. This process went very fast, i.e. EIB was able to offer a rapid reply (2 days to 2 weeks) to the CNCE. This is quicker than other sources.

Weaknesses:

- Certification is costly (e.g. €20 000), which becomes a problem for smaller projects – in HQEE I a window of tolerance has been applied for small projects. If bureau controle gave an approval of the project that the energy standard has been reached, the project needed no certification;
- The intermediary banks do the analysis of projects. In some cases, they also lack the know-how how to evaluate such projects;
- Energy efficiency and cost-effectiveness analysis has not been performed. This means that even extremely expensive projects whose benefits of improved energy efficiency might not outweigh these costs are still funded. The 'low-hanging fruits' are necessarily not supported;
- Moreover, quantification of the effect has not been done. Actual energy savings of projects have not been reported so far;
- The funding has been largely based on trust of beneficiaries (the certification occurs only during the project, not ex ante). This type of programme might not always be applied in other countries, where the trust in public authorities and local financial institutions is lower.

Lessons learned:

- The project reflects the importance of definitions in achieving energy efficiency, as it needs to clearly reflect an improvement over the baseline/counterfactual. All the projects funded via this programme fit this criteria as they are focussed on going clearly beyond the current (at the time) construction energy standards.
- Project also recognises that ex post evaluation is key – all individual projects are obliged to submit an installed energy survey to prove that the predicted energy savings are achieved.
- Due to the significant demand for such funding, EIB can go a step further and be even more stricter with the selection of projects (in terms of energy performance of buildings).
- Regarding promoters, a lesson learned is that if they would like to have their project financed, they need to go to that selected local bank.
- It is also important to educate end customer – in this regard a joint conference of BPCE and ADEME has been organised for local authorities;
- Start with a selected few sectors, such as administrative buildings and schools;
- Focus on more "friendly" energy standards (HQE as opposed to RT 2005);
- It is important to brand the project, i.e. HQEE should be seen as a 'label'.

4.5 Conclusion

France has undertaken to reduce the energy consumption of buildings, which are the second biggest producer of CO_2 in France, accounting for 40% of national energy consumption, 20% of CO_2 emissions (over a quarter of greenhouse gas emissions), and with an average of 400 kWh/m^2 /year of primary energy consumption in 2007. To accelerate the attainment of these targets, special labels (high energy performance labels) have been designed and developed to identify high energy performance buildings focusing on the achievement of stricter levels of building energy efficiency than those prescribed by current standards. This programme aimed to finance construction and/or refurbishment of such public buildings.

The programme had a slow start but the demand for such funding increased significantly over the course of the programme duration. This is due to the fact that access to funding became more difficult. In general, this programme has been viewed as very successful by the EIB, CNCE as well as by beneficiaries of these funds.

The success factors relate to these aspects:

- CNCE is highly experienced, highly credible and proactive financial intermediary - a leader in the sector in France, with capacity to implement the project and who poses negligible credit issues and implementation risk;
- Alternative access to funding has been more difficult to obtain and the EIB loan offered the financial intermediaries to offer competitive rates and conditions of loans;
- The programme was managed efficiently also from the side of EIB, i.e. fast response.

5 Bucharest - Sector 6 Thermal Rehabilitation

5.1 Introduction

Programme title		Bucharest - Sector 6 Thermal Rehabilitation
Type of buildings		Multi-storey residential buildings
Overall aim/objective of programme		The main objectives of the program are: reduce heat loss and energy consumption; lower maintenance costs for heating and hot water; alignment with European energy standards; improve thermal comfort and living conditions.
Type of programme		Large scale thermal rehabilitation programme, supported by EIB loan
Main technologies		The programme will focus on thermal energy efficiency improvements of the building *envelope* (wall insulation, windows, and roof and cellar insulation)
Location		Bucharest - Sector 6
Time frame	Start date	12-2010
	(Planned) end date	2014
Programme originator/host		The Municipality of Sector 6 Bucharest
Key stakeholders:		A consultancy company supports the cities administrative divisions
		European Investment Bank (EIB)
		Ministry of Regional Development and Housing

5.2 Programme description

Total projected energy saving per year	160 GWh/y
Fund characteristics	Long tenors: up to 15 year loans; A large share of the CAPEX is granted; up to 80%
Total fund size	€ 140 million, of which € 70 million is stemming from the EIB

The programme concerns an investment programme to thermally insulate 300 out of the 2 000 multi-storey residential buildings in Bucharest's Sector 6. Sector 6 (370,000 inhabitants in January 2008) is one of the six administrative sectors in Bucharest, which are in practice autonomous municipalities with their own budgets.

The Romanian government issued new legislation (emergency order no. 18/2009) to improve the energy performance of residential buildings, in order to comply with the EU's energy efficiency directives (2006/32/EC and 2010/31/EU).

According to this government ordinance, municipalities can apply for 50% state funding for energy efficiency projects in the residential sector. Sector 6 in Bucharest applied for this state grant, and decided to apply for an EIB loan to cover the remaining project costs.

The legislative act also determines eligible measures, and the minimum energy consumption threshold after renovation. The EIB demands energy audits before and certification in accordance

with the EPBD (EU Directive 2002/91/EC) after the renovation to ensure the quality of the work. A quality management system has to be implemented and report on the achieved savings to the EIB on an annual basis. The maximum energy consumption of a renovated block is set at 100kWh/m^2/y. Audits and certification are done by external consultants. The programme is expected to reduce the energy consumption of the buildings by around 50%.

The municipality of Sector 6 hosts and runs the whole programme. Home owner associations apply for the programme and allowances are granted on a first come first serve basis. Then the municipality takes over and runs the construction tenders.

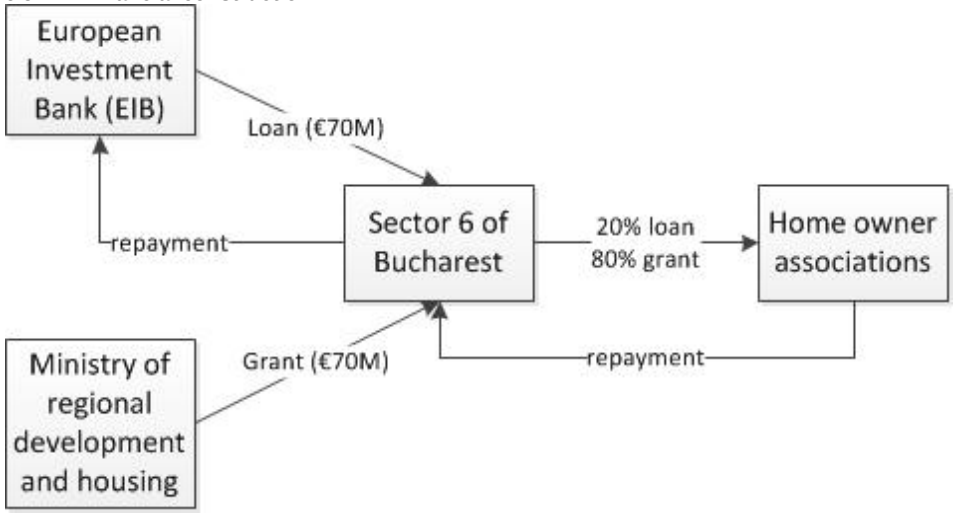
An important additional benefit of the programme is the positive effect on employment. It is estimated that the construction companies involved in the programme will create approximately 2 700 FTE. This has been an important motive for the national government to fund the programme.

The program was intended to run from 2009-2012 but may be extended to 2014-2015.

5.3 Financial characteristics

5.3.1 Financial construction

Figure 5.1 Financial construction



According to the Romanian government ordinance, 30% of the project costs have to be funded from local budgets and 20% of the costs from owner's associations. The remaining 50% is granted by the state. The 50% state grant and 30% municipal grant add up to the total 80% grant to the home owner associations. In comparison with other local programmes, a large share is granted, raising questions regarding the fund's efficiency.

The home owners can borrow their 20% contribution from the municipality. Sector 6 thus initially covers 30+20= 50% of the project investment. The EIB provides Sector 6 with a loan on commercial terms to cover this 50% share.

The loan from the EIB will be partly repaid via the home owner associations (whom covered the 20%). The remaining 30% will have to be repaid from Sector 6' own funding. This can be either income from municipality tax, or contributions from the national government. It has to be noted that

Sector 6 is a relatively prosperous area, and thereby able to repay the EIB loan. In fact, this was a prerequisite of the EIB before the loan could be issued.

The municipality decided on a total programme size of € 140 million. The 50% loan from the EIB and the 50% grant from the Romanian government (not from EU structural funds) thus both amount to € 70 million.

The average renovation cost per apartment is estimated at € 6 000.

5.3.2 Conditions & Instruments applied

- The EIB loan is provided against market interest rates for a period of up to 15 years. The EIB loan will be issued after the 50% state grant is covered;
- The municipality can pre-finance the 20% home owners contribution;
- Implemented measures are thermal energy efficiency improvements of the building envelope (wall insulation, windows, and roof and cellar insulation).

5.3.3 Risk profile

- The financial risks for the repayment of the home owner association share is for the municipality of Sector 6. However, this risk is relatively small because:
  - At least part of the repayment can be funded from the savings on the energy bill;
  - The repayment is only a fraction of the total costs of living (mortgage/ rent, energy bill, food, etc.);
  - A consortium of home owners lower the risk substantially when compared with individual applicant. So, in case of lack of finance of one of the home owners, the other owners share the burden.
- The EIB bears the financial risk for the loan to the municipality. The EIB identified the increasing debt burden of the municipality of Sector 6 as a potential financial hazard;
- Part of the debt is denominated in Romanian leu, which forms a foreign currency risk for the EIB.

5.4 Analysis

Strengths:

- The municipality coordinates the programme and takes the responsibility. This minimises the effort and administrative burden for home owners. Furthermore, home owners tend to have more trust in a local programme than in a state or city programme. These factors, in combination with the favourable conditions for applicants, have a large mobilisation effect; little marketing was needed;
- The project practice has been standardised by the Romanian government ordinance. This ensures an easy package for the municipality of Sector 6 as well. The eligible standard measures can be implemented quickly. The way the programme is set up ensures a lean and straightforward scheme. This also explains the relatively short timeframe for such a large programme;
- There is also a more politically oriented argument: the municipality runs the programme, and as the Council wishes to be re-elected, it is motivated to run it in a proper way. Naturally, grants are highly favoured by the general public;

- Prior to the programme, the municipality ran a pilot of 32 flat blocks in 2009, supported by national funds. The lessons learnt have been used as input for this programme. The pilot also increased the EIB's trust in the programme;
- A refurbishment programme on such a large scale improves the appearance of the whole sector. Urban development boosts the real estate sector and benefits property values for the local community;
- The programme is funding projects that would otherwise not be realised in absence of this support, due to the low income of the home owners. The owners benefit through are a decreased energy bill, increased property values and increased living comfort.

Weaknesses:

- The terms and conditions for home owners are favourable. This makes the programme very popular but threatens the long term viability and up scaling potential. The programme demands high contributions from state and municipality. Sector 6 is a relatively wealthy municipality. Poorer municipalities may not be able to finance the required 30% share. State budgets used to be sufficient but are currently under pressure due to the economic crisis;
- An 80% grant is unusually high and comes with a substantial risk of windfall profits and a potential lack of funding efficiency;
- The programme is limited to envelope of the building. Potential other energy efficient measures are thus omitted;
- Renovation costs are relatively high due to a lack of streamlined processes in the construction sector, and the heterogeneous nature of the apartments which hampers economies of scale;
- An initial weakness of the programme was the involvement of only one building contractor. This lead to a lack of competition and was expected to lead to problems with up scaling later on in the programme. To counter this, the programme officials shortlisted several qualified construction companies, which are allowed to bid on the projects. The list will be renewed each year.

Note: It is not straightforward to explain the high grant share of 80%. Part of the explanation may lie in the fact that a feed-in household subsidy on heating was in force during the design of the programme. The thermal rehabilitation programme leads to lower household expenses for heating, and thus lower subsidy expenses for the Romanian government. This way, the Romanian government could earn back part of their 50% grant. Another reason is the above-mentioned political incentive, making this programme popular with the general public.

5.5 Conclusion

This programme benefits the energy performance of 25 000 apartments in Bucharest Sector 6, thereby increasing property values, decreasing energy bills and increasing living standards of around 100 000 people. Since this programme grants 80% of the project costs, questions can be raised regarding the longevity, efficiency and replicability of the programme. In fact, only the more prosperous areas such as Sector 6 are able to manage such an expensive programme.

6 Residential Energy Efficiency Credit Line Bulgaria

6.1 Introduction

Programme title		Residential Energy Efficiency Credit Line (REECL) Bulgaria
Type of buildings		Residential buildings
Overall aim of project		Increasing EE in the residential built environment
Type of project		Financing facility for thermal rehabilitation of dwellings
Main technologies and approaches		Energy-saving measures funded by the credit line and through local banks include component replacing on dwelling and house level as well as complex retrofit of apartment buildings and family houses. Component replacement includes to-performing windows; insulating outdoor walls and roofs; and installing heat pumps, solar thermal collectors and high-efficiency gas and biomass boilers.
Location		Bulgaria
Time frame	Start date	2005
	Planned end date	In 2011 it was decided to extend the program up to 2014
Project originator		The European Bank for Reconstruction and Development (EBRD), the European Commission and the Bulgarian Energy Efficiency Agency
Key stakeholders:		The European Bank for Reconstruction and Development (EBRD)
		the European Commission
		the Bulgarian Energy Efficiency Agency
		Participating banks: Procredit bank Raiffeisen Bank Plus 4 other banks

6.2 Project description

Total size		€ 90 million (Oct 2005 to Dec 2014) commercial financing from EBRD, complemented with € 24.6 million from KIDSF
Total (projected) energy saving per year		163 GWh/y
Results up to date (Dec. 2011)		€ 46.5 million disbursed to residential Borrowers, complemented with € 12.4 million from KIDSF for incentives to residential Borrowers and for technical assistance
		30 600 projects (~7 000 per year)
		75 200 residents affected
Results	Financial revenue	€ 10.6 million/y (average energy tariffs for 2011)
	Energy savings	133 GWh/y
	Energy generation substitution	27 MW
	Carbon emission reduction	176 200 tonnes CO_2/y

The Residential Energy Efficiency Credit Line (REECL) was set up in 2005 by the EBRD and the Bulgarian Ministry of Economy, Energy, and Tourism to increase the take up of residential energy efficiency measures in the residential built environment by offering loans and grants.

A market study that was done prior to this programme identified significant market imperfections in the Bulgarian energy service market. These include a lack of funding, a lack of expertise and risk perceptions both at the level of sub-borrowers and banks. The REECL programme provides both financial incentives and technical assistance to address these barriers. The EBRD regarded the programme as very successful and decided to extend it in 2011 with significant adaptations aiming to reflect the progress done on up-grading housing legislation in Bulgaria. These adaptations entail an increased list of eligible technologies, inclusion of housing associations, refocus of technical assistance and preparation of conceptual design and legal assistance for housing associations willing to undertake complex whole-building refurbishment.

The REECL financing facility was initially funded by a € 50 million loan from the EBRD for the first operational period (Oct. 2005 to Dec. 2009) and a € 14.6 million grant from the Kozloduy International Decommissioning and Support Fund (KIDSF). Out of these funds the six participating local banks have disbursed € 43 million and € 10.6 million of grant funds were used for incentive to residential Borrowers and for technical assistance. The program has financed 28,102 small-size residential projects for installation of top-performing technologies and components, exceeding the level of national requirements by about 20 to 25%. The total CAPEX of the residential project financed is about € 57 million.

In 2010 the EBRD decided to extend the REECL Facility upon agreement with the Bulgarian Ministry of Economy and an additional grant of € 10 million was provided by the KIDSF. The EBRD committed additional € 40 million of commercial financing for the period July 2011 to December 2014. The extended facility refocused technical assistance aiming to provide additional assistance to newly established housing associations including legal advice and conceptual design of whole-building retrofit if the associations aims to implement it. The list of eligible measures was expanded and performance requirements revised in order to reflect the progress done at transposition of the EPBD.

The main contributor of the KIDSF fund is the European Community, together with Austria, Belgium, Denmark, France, Greece Ireland, the Netherlands, Spain, Switzerland and the United Kingdom.

Applications can be filed by individual home owners, groups of residents willing to implement one and the same measure as well as home owner associations and eligible installers. The list of eligible installers is open to any accredited construction companies implementing eligible projects on behalf of the residents and upon contractual agreement with them. Installers with negative track record or not complying with the eligibility requirements are removed from the list, which is constantly managed and up-dated by the Project Consultant.

There is a pre-defined list of EE measures that are eligible. The measures reflect Best Available Technologies (BAT) measures. When the programme started, domestic supply of these BAT was limited and the market and the programme were dependent on suppliers from abroad. However, partly due to the programme (up to 30% of the sales volume financed by REECL), there are more domestic suppliers, which resulted in a decrease of production prices. In addition, the list includes the average costs and technical specifications of the measures.

Although home owner associations are eligible as well, the lion's share of the projects that received funding were individual home owners. This is caused of course by the structure of Bulgarian housing market and insufficiencies of Bulgarian housing legislation.

The loans for the EE measures are funded by the EBRD and supplied through the participating banks (PBs). An additional grant for the applicants is funded by the KIDSF upon completion of the projects and upon verification by the Project Consultant.

The KIDSF also funds programme support by a project consultant. The role of the project consultant is to ensure the successful implementation of the programme by providing technical, administration and marketing services, by:

- Setting the criteria for the participating bank loans and verifying that these are consistently applied and updated;
- Marketing the facility to increase awareness of its existence and benefits;
- Establishing an efficient tracking, monitoring and reporting system to ensure accurate data and standard forms are utilised by the PBs, sub-borrowers and the EBRD;
- Avoiding misuse of the programme by checking that grant funding is applied consistently in line with the eligibility criteria.

The extended programme puts more emphasis on targeting home owner associations; i.e. building-level projects. To this extent, the project consultant will provide more support for home owner associations, by:

- Facilitating individual home owners in establishing home owner associations by providing legal and management advice;
- Assisting PBs in dealing with home owner associations, assessing their credit worthiness and structuring financing mechanism for them;
- Developing a process scheme for building-level projects.

The results of REECL are significant; a large contribution towards energy efficiency in Bulgaria has been made by the credit line. A more detailed overview of the market penetration of the different EE measures and the contribution of REECL can be found in**Error! Reference source not found.**:

Table 6.1 market penetration of the different EE measures and the contribution of REECL

Top performing (eligible) technologies	Bulgarian market penetration in 2004	Bulgarian market penetration in 2010	Share funded by REECL
EE Windows	~0%	4%	30%
High grade insulation	~0%	3%	18%
Efficient gas boilers and related heating systems	~45%	78%	13%
Biomass boilers and stoves	~30%	40%	6%
Solar water heaters	~8%	14%	34%
Heat pump heating (air-to-air)	~5%	25%	18%

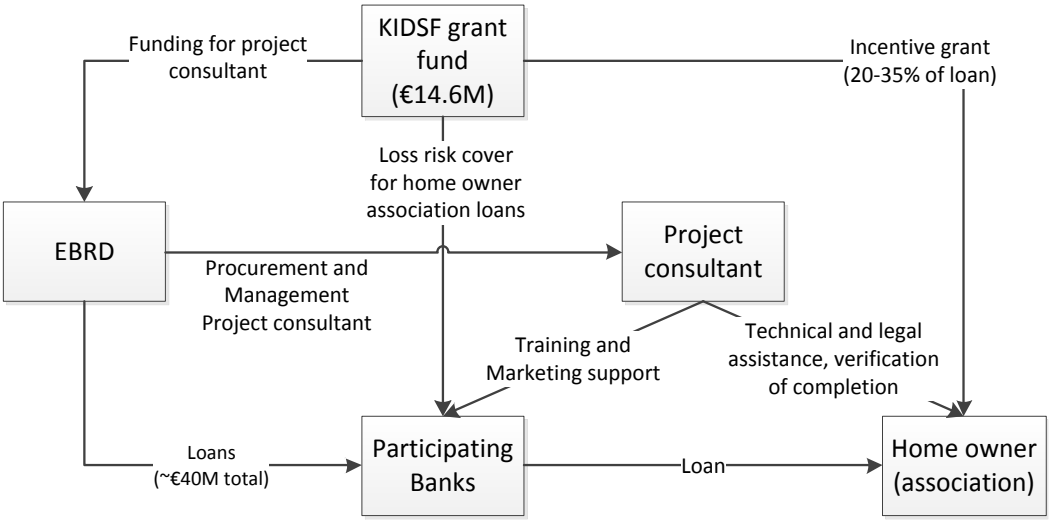
Source: EBRD, 2011

6.3 Financial characteristics

In the chart below, the financial construction of the REECL is depicted, making the relations between the different stakeholders insightful.

6.3.1 *Financial construction*

Figure 6.1 Financial structure



The EBRD provides a € 43 million loan to the Participating Banks (PBs), which on-loan the funds to the applicants; i.e. home owners or home owner associations. Both the loan from the EBRD as well as from the participating banks are on commercial terms, The participating banks are knowledgeable on the local conditions, and are managing all administrative work related to providing the loans.

Applicants will receive an incentive payment from the KIDSF fund after the successful implementation of the project is verified by the project consultant. Projects on a dwelling level are entitled to a grant of up to 20% of the loan amount (with a cap of € 9 000 per Borrower and there are individual caps for each eligible technology depending on priority and performance parameters), projects on a building level receive a grant of 30-35% of the loan (no cap).

The size of the KIDSF fund has provided € 24.6 million of support. Of this total fund, € 4.54 million is reserved for the services of the project consultant for the period from October 2005 to December 2014, € 2.45 million is allocated for the first loss cover for financing housing associations and over € 17.6 million will be granted to home owners as incentives.

Banks are reluctant to issue loans to newly established home owner associations, as they lack credit history and banks have no experience with this structure. Therefore, the KIDSF fund a first-loss cover for the loss risks for these loans. Ultimately, this should demonstrate the association's viability as a market participant.

The banks would issue more loans, but they are dependent on the contribution from the KIDSF grant fund. In other words, the limited size of KIDSF support is the limiting factor for the size of the whole programme. The Bulgarian residential sector requires about €12 to 16 billion of investments on energy efficiency, while provision of technical assistance and some limited grant support is important especially at the initial stage.

The project consultant plays a pivotal facilitating role in this programme; the consultant provides ex ante technical and legal assistance to the public servants, banks and home owners, marketing and communication services to promote the programme and ex post verification of completion of the project.

6.4 Analysis

Strengths

- Involving a project consultant in the programme streamlines the process and reduces many barriers, such as the absence of technical expertise to assess the eligibility of the projects, the lack of information about the technical risks and financial benefits of energy conservation and the additional costs in the loan appraisal process;
- The project consultant has a bridging function as they are concerned with both the suppliers and applicants for the programme;
- The amount of projects that have been financed up to date is substantial (~30 000);
- Despite the effects of the economic downturn on the Bulgarian financial sector, take-up of the credit line continued to be strong;
- The programme has helped cutting household fuel bills, making homes more comfortable and reducing Bulgaria's energy consumption;
- The REECL programme significantly increased the market penetration of EE measures (**Error! eference source not found.**);
- REECL provides business for local suppliers and retailers at a difficult time;
- The programme causes an expansion and quality impulse in the market for energy efficiency products and services;
- The participating banks have gained expertise in assessing energy projects and intend to (or are about to) integrate the financing into their business;
- Good leverage of grant support and technical assistance:
  - Grant to total EE investments: 6.5 (€ 57 million / € 8.8 million grant paid) or,
  - Grant to commercial financing provided: 4.9 (€ 43 million to € 8.8 million grant paid)
  - Technical assistance to total investments: 31.7 (€ 57 million / € 1.8 million spent on TA), or
  - Technical assistance to commercial financing: 23.9 (€ 43 million / € 1.8 million spent on TA).
- The Program allows to mobilise commercial resources from participating banks;
- The Program allows to cover entire country, through the extensive branch network of participating banks. This is important for a very fragmented and country-widely spread sector as the residential one.

Weaknesses

- The programme appeared to be sensitive to fraud and corruption. The proposed checks to counter this pose a heavy burden for the project consultant;
- The programme depends on only one project consultant, which is risky given the crucial role of this consultant.

6.5 Conclusion

The REECL is a successful scheme. In a complex sector as the residential and in complex environment as the one of Bulgaria, combining commercial financing, technical assistance and some limited grant support is a key for the success.

7 KREDEX project report

7.1 Introduction

Project title		Foundation KredEx (KREDEX)
Type of building(s) or construction		Apartment blocks
Overall aim/objective of project		Increase bank lending for energy efficiency
Type of project		Revolving fund / Loan / Guarantee / Grant
Main technologies / approaches		Energy efficiency refurbishment, district heating , heat recovery and heat pumps
Location		Estonia
Time frame	Start date	June 2009
	(Planned) end date	Revolving fund – no set end date
Project originator/host		Estonian Ministry of Economy and Communications
Key stakeholders:		Project originator / host – KREDEX
		Public funding sources – ERDF (JESSICA), Council of Europe Development Bank (CEB)
		Private funding sources – Swedbank and SEB BANK

7.2 Project description

The KREDEX Foundation originated within the Estonian Ministry of Economy and Communications. KREDEX provides long term low interest loans to improve the energy efficiency of apartment blocks in Estonia. The loans maturity is up to 20 years and low interest rates are fixed for 10 years, typically at around 4 % interest. The main goal is to drive improvements in the energy efficiency of Estonia's building stock, whilst alleviating housing related financial problems and improving the living standards for inhabitants.

Total (projected) energy saving per year (in GWh/y)		
Costs	Depreciation period (years)	10 (@ fixed rate, average 14 years total)
	CAPEX (total, in mEUR)	32 (to date)
	CAPEX (annualised, in mEUR)	12,8
	OPEX (in mEUR/y)	0.510 570
	Other costs	
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	885,000 m sq refurbished with an average energy reduction of 36%
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Speeded up energy efficiency investments in Estonia. Improved standards of living, better health, improved comfort etc. Contributing to energy efficiency targets Increased property value Supporting the construction industry

KREDEX provides a loan to banks, which they administer on behalf of the borrower, utilising the standardised loan agreements developed by KREDEX. These loan agreements are usually with housing associations, apartment block owners, or groups of homeowners who have come together to form a homeowners/residents associations (a special purpose vehicle with which to administer the loan).

Since 2009 KREDEX has provided 363 loans with a total value of EUR 32 million, or around EUR 88,000 per building. These loans may be applied for to carry out the following energy efficiency measures:

- full or partial insulation of frontages of apartment buildings;
- reconstruction and insulation of roofs of apartment buildings;
- replacement of windows and exterior doors of apartment buildings;
- insulation of cellar ceilings of apartment buildings;
- insulation of roof ceilings of apartment buildings;
- replacement, reconstruction or rebalancing of heating systems of apartment buildings;
- replacement of apartment buildings' ventilation system by new heating return system or reconstruction of ventilation system;
- mounting facilities for the use of renewable energy in apartment buildings (excl. mounting of thermal pumps in district heating areas for apartment buildings using district heating system);
- partial or complete reconstruction of the control system and actuator of the lifts of apartment buildings;
- finishing of public spaces in apartment buildings, if an integral part of reconstruction works.

In addition, since October 2010 an additional incentive grant scheme to increase the uptake of whole house measures has been introduced. In total 13,771 apartments have been upgraded through the scheme and the following breakdown of measures installed:

- 287 buildings have added interior wall insulation;
- 237 have added roof insulation;
- 183 new or refurbished heating systems (district or communal heating systems)
- 115 installed new windows;
- 54 installed new insulating doors.

Heat recovery ventilation systems and heat pumps were also funded, where appropriate, but heat pumps have limited utility within Estonia due to the climate. The main driver behind the project was the desire to improve the energy efficiency in the housing stock within Estonia whilst improving inhabitants' standard of living. Designed as a revolving fund, the scheme has no specific end date; however it is currently seeking new capital to refinance the scheme, as uptake has been better than expected.

In addition to the loan scheme KREDEX also provides a number of other related services and incentives including:

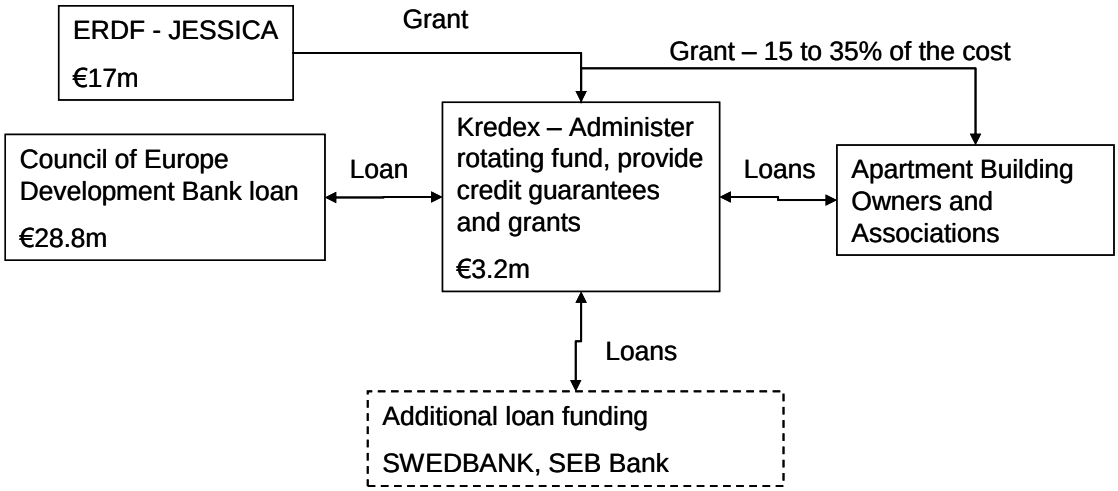
- State guarantee for the loans;
- Awareness raising campaigns to change householder behaviour;
- Government grants for part of the required investment;
- Grants for building design documents and advice;
- Grants for energy audits to establish baseline energy usage;
- Freelance consultancy service to provide support to applicants to help to make decisions at General Assemblies.

7.3 Financial characteristics

The revolving fund that KREDEX has set up is funded through the following organisations:

- ERDF (JESSICA) – EUR 17 million;
- Council of Europe Development (CEB) bank – EUR 28.8 million;
- KREDEX – EUR 3.2 million (for fund capital);
- Apartment buildings – EUR 8.6 million (since October 2010 can be covered with grant provided by KREDEX financed through Green Investment Scheme).

It administers the ERDF and CEB capital and uses this, alongside its standardised streamlined application process, to provide loans at below market prices to suitable projects. The average loan length is 14 years and the beneficiaries are apartment blocks, although the scheme is open to resident/homeowner associations representing privately owned properties. In some regions local development plans actively support and provide additional incentives for owners to upgrade the energy efficiency of their properties, in line with the Estonian Housing Policy of 2008. The scheme is further promoted through the Estonian association of housing associations. The diagram below provides a summary of the financial flows involved in the project:



7.3.1 Conditions & Instruments applied

- Private finance e.g.:

  - Debt;

  The final element of the loan is provided by the financial partners within this scheme, they are SWEDBANK and SEB Bank. Both were formerly Estonian banking institutions, before being taken over by large Swedish banks. Due to the public finances involved and the public loan guarantee these loans are seen as relatively low risk.

- Public finance e.g.:

  - Guarantees;

  The KREDEX loan project is exactly that. It is a revolving loan fund that provides preferential rates of interest on loans for energy efficiency improvements within multi-apartment buildings. As part of a wider suite of measures

- Grant Scheme

The grant scheme ran alongside the KREDEX loan provides beneficiaries with between 15-35% of the project total in the form of a grant. The allocation of this grant is based on the following project characteristics:

  - Building invests in one or some energy efficiency measures = 15% grant
  - Building invests in multiple energy efficiency measures = 25% grant
  - Building undertakes whole property energy efficiency retrofit = 35% grant

7.3.2 Risk profile

Financially the project is seen as low risk. The combination of partners and funders make for a relatively safe financial environment. In Estonia the apartment buildings, where apartment owners have formed housing association, can take a loan without any collateral. If needed the KREDEX guarantee is used. This means building owners can invest in energy efficiency measures without taking on any significant collateral risk themselves. Nevertheless, the apartment block owner is not totally without risk. If they are unable to pay back their loan they can loose their property in court.

The main risks identified that were associated with the project were the following:

- Political risk – short term-ism amongst politicians could end the project prematurely;
- Project risk – the ability of projects to meet the required energy savings and be appealing to participants;
- Banking risk – banks unwillingness to participate or lend;
- Lack of demand – communication and marketing of the scheme to ensure take-up.

Of the outlined risks above the main challenge has been that of generating demand for loans. This is likely a result of the recent economic crisis and how it has created a culture less willing to readily accept debt.

7.4 Analysis

Without the financial assistance of ERDF and CEB the loan scheme would not exist. Initially, grants were considered as a method to drive investment in this area, but their one-off short term impact was considered a barrier to their effectiveness in terms of value for money. This was the main reason a revolving fund was chosen, as it provided the opportunity to recycle capital back into projects in the long term and provided a more sustainable long term approach to investment in this sector. It also means the benefits of these investments (in terms of energy saved, fuel poverty reduced, standards of living etc.) can be multiplied many times over.

Other challenges that have emerged during the initial project development include having the necessary expert knowledge required to calculate, design and install the required building measures to a high standard. This has led to KREDEX setting up a specific consultancy service to overcome this unforeseen challenge. In addition they have developed an awareness raising campaign to promote the scheme and its benefits. KREDEX is now able to provide technical support advice to applicants through its network of ten freelance consultants.

The main challenge during the initial phases was in the setting up of the scheme. This was extremely time consuming, as it was the first of its kind in Europe at that time. The preparation phase took two years, with six months required to negotiate with the EU. KREDEX did however benefit from continuing its financial negotiations with multiple partners simultaneously (CEB, kfW,

SWEDBANK, SEB and EU) as this sped up the overall process. Recent changes to ERDF mean that many of these negotiations will be more streamlined for other countries setting up similar schemes in the future.

A suggestion for local policy in Estonia was to make buildings have minimum energy performance standards. This would not only drive uptake of the scheme, but have real benefits to low income households, often in the worst quality housing. In terms of application this type of financial approach could be utilised anywhere in Europe, particularly in countries with building stock dominated by energy inefficient apartment blocks.

7.5 Conclusion

Although time consuming and frustratingly slow in its development, the KREDEX energy efficiency loan scheme / revolving fund (and its associated support measures) are having a real benefit to the lives of Estonian people, particularly those in low income homes. With hindsight the following learning points of note have emerged:

- Single measures rarely work; incentivising investment requires a range of instruments (in this case a combination of legal framework, awareness campaigns, loan scheme, guarantees and consultancy services);
- Revolving funds are preferable to grant schemes in terms of value for money, although they are more difficult to establish;
- A good relationship with an understanding bank is important when establishing a new scheme;
- Auditing, administration and reporting can be burdensome;
- Existing experience (within the banking industry) of working with multi-apartment building investments led to the effective development of the project.

Whilst the scheme has had considerable success generating demand for loans and investment has been a struggle in the current economic climate. Any moves to introduce minimum building standards, or incentivise building owners to achieve them, would be welcomed by the KREDEX team.

8 Project report – ARBED

The following report was based on an interview with Claire Bennett, Head of the Energy Efficiency Team, part of the Department for Environment and Sustainable Development within the Welsh Government.

8.1 Introduction

Project title		Area Based Whole House Energy Improvement Programme (ARBED (Welsh translation "saving"))
Type of building(s) or construction		Energy inefficient socially deprived homes
Overall aim/objective of project		Reduce fuel poverty within regeneration areas
Type of project		Grant scheme
Main technologies / approaches		Combination of energy efficiency technologies plus PV
Location		Wales, initially only within regeneration areas
Time frame	Start date (mm-yyyy)	-2012 (began business planning mid 2010)
	(Planned) end date (mm-yyyy)	12-2015
Project originator/host		Welsh Government
Key stakeholders:		Project originator / host – Welsh Government Department for Environment and Sustainable Development
		Public funding sources - ERDF, Welsh Government funding
		Private funding sources – Utility funding including from the Community Energy Saving Programme (CESP) and Carbon Emissions Reduction Target (CERT) funding streams.
		Others (e.g. facilitators) – The Welsh Local Government Association (WLGA), Community Housing Cymru (CHC), The Energy Saving Trust (EST), The Building Research Establishment (BRE)

8.2 Project description

Total (projected) energy saving per year (in GWh/y)		11,600 tonnes CO2 saved by end of 2015
Costs	Depreciation period (years)	n/a
	CAPEX (total, in mEUR)	55.45 (£45,000,000)
	CAPEX (annualised, in mEUR)	18.47
	OPEX (in mEUR/y)	
	Other costs	
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	Save 7.7 GWh, 11.6 kilotonnes of carbon emissions by 2015
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Reduction in fuel poverty, low carbon job creation and emission reduction

The Arbed project is the Welsh Governments strategic energy performance investment programme. It has been designed from the outset to have the following three goals; help eradicate fuel poverty,

boost economic development and regeneration whilst driving reductions in carbon emissions. The initial phase of the project was funded and led solely by the Welsh government. It was the largest programme of its kind in the UK and invested £30 million in energy efficiency retrofit measures within social landlord owned properties in deprived areas of Wales. Technologies installed included solid wall insulation, solar panels and heat pumps. Phase I funded 28 schemes and managed to leverage an additional £31 million, £20 million form participating social housing providers and local authorities, with the additional £10 million was from energy companies through energy supplier obligations. The programme also benefitted from the assembly governments existing home energy efficiency and boiler scrappage (closed in July 2010) schemes. This additional investment enabled homes to receive multiple energy efficiency measures including; boiler upgrades and replacements, window upgrades, roof extensions, structural work and energy saving advice.

Phase I has funded measures in over 6,000 households in areas of multiple deprivation in Wales. All phase I measures were allocated through a bidding process and delivered by either local authorities or social housing partners. The following provides the breakdown of what the measures consisted of:

- Solid wall insulation on 3,000 private homes;
- Solar PV panels installed on 1,800 properties;
- Solar water heating for 1080 homes;
- Enabled 1,000 properties to access cheaper low carbon fuels through fuel switching;
- Heat pumps installed on over 100 off gas grid homes.

A focus of this initial phase was also on the development of the low carbon supply chain and the economic benefits that this would bring to the deprived areas where the measures were installed.

Changes to the ERDF allocation guidance in June 2010 allowed the welsh Government to apply for a second Phase to this successful project. It is Phase II of the ARBED programme that will be discussed throughout the remained of this project report. Whilst the project is still in its procurement stages, it is planned to run for 3 years between 2012 and 2015. This second phase is planned to improve the energy efficiency of at least 4,790 Welsh homes and reduce a minimum of 11,600 tonnes of green house gas emissions by the end of 2015.

8.3 Financial characteristics

As the project is still in its initial stages there is limited breakdown of the detailed costs and financial partners involved with the project, as many of these have yet to commit to the project so figures are unavailable. The basic premise behind the project is that there is a proportion of the Welsh housing stock that is energy inefficient and expensive to run, yet the occupiers are some of the least able to invest in upgrading and retrofitting these properties. For this reason this programme and the projects that it funds are in many ways similar to a grant scheme to address fuel poverty.

The total budget available for Arbed II, for both convergence and competitiveness areas in Wales, will be up to £45 million. This is made up of £33 million of ERDF with the remaining £12 million coming from the Welsh government itself. The plan is to deliver between 10 and 20 schemes throughout Wales in each project year for the next three years. All project proposals will be assessed and delivered by a private sector contractor that will manage the scheme on behalf of the welsh government. Due to the altered funding characteristics of Arbed phase II, enabled by the changes to ERDF funding requirements, the scheme is open to a wider range of properties and areas than before; including non-regeneration areas, rural areas and private sector landlords. Each

year there is a call for projects and the highest quality applications with the greatest scope for energy and fuel poverty reduction are selected for delivery. The scheme management and delivery will be carried out by a 3rd party contractor with experience in this field. They are currently in the process of being procured.

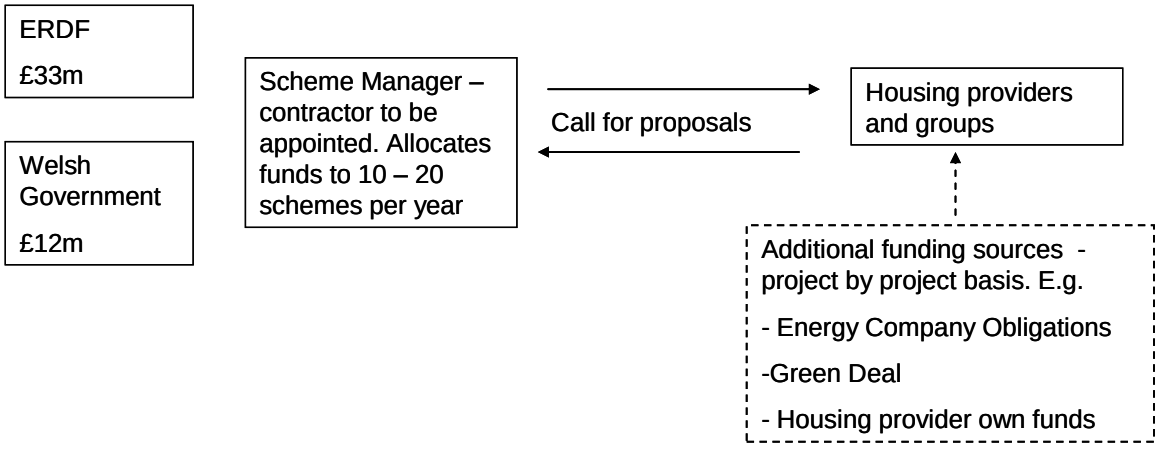
It is planned that additional funding streams will also be able to be leveraged through this investment to enhance the impact of this project. Investment in this sector over the coming years is predicted from the following sources:

- The Welsh Housing Quality Standard;
- Feed in tariffs for small scale renewable energy generation;
- Renewable Heat incentive for small scale low carbon heat usage;
- Green deal (still under development), and;
- Energy supplier obligations (currently CESP & CERT, soon to be ECO – Energy Company Obligations).

In total, it is estimated (based on a UK wide estimate of £5-15billion annually[4]) that approximately £1 billion will be invested in the energy efficiency of Welsh homes over the next 10 years. As this sector is highly labour intensive, it is hoped that this will lead to the creation of employment opportunities and skilled jobs for local people. This is one of the key aims of the Arbed programme.

8.3.1 *Financial construction*

The bulk of the funding for the Arbed programme Phase II is through ERDF awards from ERDF structural funds convergence and competitiveness strands. The match funding requirements were relatively favourable due to the high intervention rate of the proposed Arbed project. Within the Convergence strand the intervention rate was 76%, whilst for a similar application to the Competitiveness strand the intervention rate was 55%. Cumulatively these two awards amount to £33 million. The match funding has been assimilated from contributions from the Housing, Regeneration and Environment departments of the Welsh Government and amounts to £12 million. The diagram below summarises the financial flow and parties involved.



8.3.2 *Conditions & Instruments applied*

There are a number of potential additional funding sources for the projects that will be supported under the ARBED II scheme.

4 UK Committee on Climate Change 2009 report, "Meeting Carbon Budgets – the Need for a Step Change"

- Private finance e.g.:
  - Energy Company Obligations

During Phase I of the project CERT and CESP funding was leveraged into projects to increase their impact. Their replacement, the ECO, is also expected to contribute to specific projects. However, the details of how this will work and to what extent it will benefit Phase II of the scheme remain unknown. This will be channelled through the governments new Green deal programme.

- Public finance e.g.:
  - Grants

The Arbed energy efficiency investments made are similar to grants in that the most effective applicants will receive support where they have demonstrated significant impacts associated with the investment in terms of energy saved, fuel poverty measures implemented, additional finance leveraged or jobs created. They do not have any financial stipulations attached. Local authorities and other suitable housing providers will put forward bids for properties to be included in each years works. The Welsh Government will chose the best bids for measures. The Arbed procured scheme manager will be responsible for all of the schemes and procuring the services of suppliers and installers to complete the work.

  - Social Housing Provider / Local authority contributions

In the past social housing providers and local authorities have utilised their budgets to bring forward planned maintenance works and infrastructure investments to coincide with the ARBED funded works. In this way funding to achieve deep house retrofits is being leveraged through multiple sources to have the greatest possible impact upon residents with a minimum of disturbance, by doing all of the necessary upgrades at the same time.

8.3.3 Risk profile

In initial project risks identified at the initial business planning stage were as follows:

- The existence of a pipeline of suitable energy efficiency investment projects;
- The ability of the local supply chain to deliver projects;
- Technical and delivery risk associated with energy efficiency investments;
- Will predicted theoretical energy performance targets be met in practice;
- Project overrun and slippage, delivery;
- Proportion of additional leveraged investment that can be secured.

As the project is still at the procurement stage, it is difficult to ascertain whether any of these risks have occurred in practice. However, initial indications suggest that identifying a suitable pipeline of projects will not be problematic, as most Welsh local authorities are submitting their maximum allocation of two funding applications each. The main concerns at present relate to individual renovation delivery and related performance improvements. Most of these risks have been transferred to the commercial delivery partner/project manager for the scheme.

No financial risks were associated with the scheme. The main challenge is in guaranteeing quality installations that meet the predicted energy savings outlined in their funding application. The Arbed team will procure a scheme manager who will be responsible for the ensuring a high quality of work by the installers they appoint. Quality control throughout the application, assessment and delivery phases will be key to this.

8.4 Analysis

The main aim of this project is to provide an economic stimulus and associated employment /training opportunities for the local energy efficiency supply chain in Wales, whilst also catalysing energy efficiency investment programmes within domestic properties in areas of deprivation. An associated goal is to reduce fuel poverty whilst protecting inhabitants from future rises in energy costs, thereby protecting their available disposable income.

In terms of financial model and instruments applied the Arbed project is relatively simple. It is essentially an EU funded, government administered, privately delivered energy efficiency grant scheme. There are no loans, guarantees or required payback periods related to the funding. Annual applications for investment will be submitted and the top 10-20 will be selected for investment. Other funding streams may be utilised to support specific projects, but this is uncertain at this time and will be done on a project by project basis. Some of these additional project funds may come from the following sources Fits, RHI and the proposed ECO.

The project proposes to achieve a high level of engagement with the local supply chain, for example by holding ' supplier days' to assist in putting together a framework of suppliers / installers form which the scheme managers can procure services. A similar approach to energy efficiency investment could be applied elsewhere. The key features that would suit this scheme is any area of deprivation with a high proportion of energy inefficient domestic properties.

The project has benefitted considerably from the initial Welsh Government funded Phase 1 of the Arbed scheme. Throughout phase one significant time and resource was invested in raising awareness of the opportunities within the supply chain and as a result companies are now better prepared and able to engage with and deliver on energy efficiency projects in Wales. Similarly, grant applicants (from local authorities and social housing providers) have also developed a knowledge base around the awards scheme, the application process and what is required of a successful application. During the initial phase significant resource went into confirming and questioning applicants' assumptions and calculations in order to validate their claims and improve the quality of their applications.

Some of the main challenges to developing this project included:

- Lack of interest/ engagement with the scheme;
- How to treat the private rented sector; they are a particularly difficult to reach segment of the nations housing portfolio. Looking towards the Green Deal to address this group;
- Procuring an experienced project manager that can deliver the required projects to a high standard and to tight schedules;
- Managing the expectations of local installers about the opportunity available and how to engage with the procurement process. Previously the projects were delivered by the housing association and local authorities themselves. Now they will have to engage with a large private sector delivery body;
- The relationship to the applicants and the Welsh Government will also be more removed in phase II. This makes the requirement for the right delivery partner/ project manager all the more important.

Future Directions

In terms of how the scheme might develop in the future, including how things might be done differently in the future, a number of scheme design parameters would be assessed for their potential to drive forward the scheme. Some of these considerations include:

- The scope for a revolving loan fund as opposed to a grant scheme;
- Designing the scheme so that it also targets Welsh businesses, currently exempt from the scheme, most likely through a low interest loan scheme;
- Utilising a similar approach with domestic properties in deprived areas where inhabitants and landlords are unlikely to be willing to take on any debt through a loan scheme for energy efficiency upgrades;
- Procuring the scheme and its management differently i.e. through competitive dialogue as opposed to traditional tender. The traditional approach has proved difficult as they have had to specify scheme requirements that are not yet fully understood. Whilst competitive dialogue may be a more time consuming process, the benefits of having a well informed/prepared delivery partner would outweigh this feature;
- Recruiting project staff at an earlier stage would also be considered beneficial. The time taken to get suitable candidates in position was underestimated and this led to unnecessary pressures on the project initiators.

Phase I of the Arbed project benefited fro a number of additional schemes and related local, national and UK policy initiatives. In terms of the local policy mix some participants have commented that the application process for the scheme is too bureaucratic and complex. However, experience gained during the initial phase should make the process significantly easier for organisations reapplying to Phase II. The Welsh government responsible for the scheme is satisfied with the application process and its fitness for purpose. Recreating a new application process would be time consuming and resource intensive for all parties involved.

8.5 Conclusion

Whilst this project has been successful in delivering significant investment in energy efficiency projects within deprived areas of Wales, its longevity in its current guise, is limited by changes in wider UK policy related to energy efficiency i.e. the introduction of the Green Deal (scheduled for autumn 2012). Its introduction will impact upon the current Phase II scheme and its effectiveness at leveraging additional funds into energy efficiency investment. In future the Welsh Government will have to make a decision on its preferred role within the Green Deal scheme. In summary, it is felt that there is still a massive amount to be done in this area in terms of poverty reduction, improved public health, job creation and carbon reduction. Enormous financial resources are still required to address these issues in the future. The recent changes to the ERDF regulations have proved to be very beneficial, but more could be done to unlock and bring additional public funds into this area from an EU level. Energy efficiency investment provides real jobs and training opportunities in the real economy. This has a direct impact on local employment and can also act to stimulate the local low carbon supply chain. Additionally, these investments help to lift people out of fuel poverty by providing them with healthier more efficient homes and additional disposable income. These impacts are lasting and provide long term benefits that are well understood. As such, energy efficiency should be seen as a priority for driving national and EU growth plans. It offers a clear economic stimulus opportunity, now and for years to come.

9 Jessica Holding Fund Lithuania

9.1 Introduction

Programme title		Jessica Holding Fund Lithuania
Description of programme		The Lithuanian government has set-up a financial facility (revolving fund). Via this facility favourable loans are offered using ERDF grants as (part of the) funding. Loans will be provided to the beneficiaries through local banks. Local banks are selected as a result from a tender procedure for the fund's management. The facility is tailored to target a part of the market (multi-family apartment buildings) that has a large energy savings potential.
Type of buildings or construction		Apartment blocks and student dormitories
Overall aim of programme		Support renovations for energy efficiency in housing resulting in: Lower energy bills for citizens; Economic growth via jobs and increased buying power for citizens; Decrease in carbon emissions.
Target group		Home owner associations of multi family apartment buildings.
Main technologies and approaches		Eligible measures are: Heating and modernisation of hot water systems; Windows and exterior door replacements; Roof insulation; Insulation of external walls; Glazing of balconies; Alternative energy sources (sun, wind, etc.) installation.
Location		Lithuania
Time frame	Start date	06-2009
	Planned end date	2015
Programme originator		Initiated by the Lithuanian government. Involvement of the EIB as implementing agency of JESSICA from the (overarching) EU/ EC perspective as well as manager of the (national) JESSICA holding fund Lithuania. The specific (regional) urban development funds (UDF) are managed by local financing institutions selected by the Lithuanian government.
Key stakeholders:		Programme originator: Ministry of Finance and the Ministry of Environment of Lithuania
		Programme management: EIB (JESSICA EU/ EC and JESSICA holding fund); local financing institutions (UDF Lithuania)
		Loans will be provided through the local operating banks acting as UDF fund managers. These banks are Swedbank, Skandinaviska Enskilda Banken AB and Šiaulių bankas
		Technical assistance: Housing and urban development agency. Technical assistance included marketing and communication of the programme, technical feasibility study, cost estimations, and assisting the programme managers in setting the eligibility criteria and providing technical back-up.
		Applicants: Home owner associations
		Funding: ERDF and Lithuanian government

9.2 Programme description

Total projected energy saving per year	300 GWh/y
Conditions of loan	Relative low interest rates at a fixed rate of 3% (commercial Lithuanian loans are normally around 3.75%)[5]; Grace period of 2 years; Long tenors: max. 20 year loans; Lenders put in 5% of own capital; Additional tax deduction of 15% of loan amount in case energy savings are met; Low income families receive a grant instead of a loan.
Total fund size	€ 227 million

The JESSICA Holding Fund Lithuania (JHFL) is established in Lithuania in June 2009 to support renovations for energy efficiency in housing. In fact, the programme creates incentives for house owner associations to invest in the energy performance of their building envelope. Apart from the direct incentive in the form of a grant, there are favourable loans to finance the remaining 80% of the project costs. Moreover, the applicants can get technical assistance from the Housing and urban development agency.

The Lithuanian government chose to target multi-family apartment buildings because the largest energy savings were identified in this sector; around 66% of the Lithuanian population lives in multi-family buildings built before 1993. These apartment blocks are usually in poor physical condition, with a corresponding low energy efficiency. The JHFL is also part of the Lithuanian government's "Recovery Plan for the Economy" as it is expected to boost the construction sector in terms of employment. In addition, the JHFL replaces a former government grant scheme.

The programme targets apartment blocks rather than individual apartments. That means that applicants are associations, representing several home owners. The number of eligible apartment blocks in Lithuania is estimated to be 24 000. The total yearly energy saving potential is estimated on 300 GWh.

The JHFL loan can be combined with subsidies, loans and other financial products.

Technical assistance is provided by the Housing and urban development agency. This agency is a public body, with the following tasks and responsibilities:

- Provides administration;
- Provides counselling on legal, technical, financial, organizational and other issues;
- Implement marketing and communication strategies;
- Organizes training and education in the areas of management, accounting, house administration and planning;
- Prepares housing maintenance and exploitation programs and projects seeking to encourage establishment of Home Owners Associations;

The current programme is scheduled to terminate in 2015.

[5] http://www.lb.lt/eng/statistics/nsdplt.htm

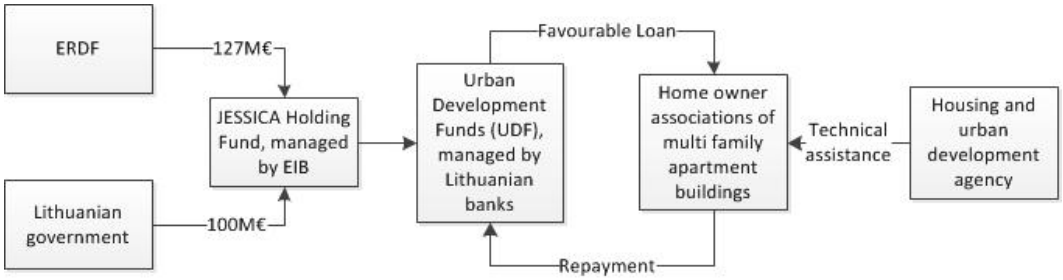
9.3 Financial characteristics

9.3.1 Financial construction

The JESSICA Holding Fund Lithuania (JHFL) is developed by the European Commission, the EIB and the Council of Europe Development Bank (CEB). The fund amounts to € 227 million, with € 127 million coming from the ERDF and EUR 100 million from public national co-financing.

Commercial banks act as a local operator and issue loans against relative low interest rates. The commercial banks are paid a fee for there administration costs, and part of the interest rate is subsidised to make them relatively low. These local banks are joined in a consortium, the co-called Urban Development Fund (UDF).

The JESSICA Holding Fund Lithuania is a revolving fund, thus allowing the Lithuanian government to recycle (part of) the financial resources. In the flowchart below, the financial structure of the JFH is presented, making the relationships between the stakeholders clear.



9.3.2 Conditions & Instruments applied

Sustainability loan characteristics:

- Loan conditions: the fund provides long-term loans, up to 20 years, with a fixed 3% interest rate for the implementation of energy efficiency measures. Loans have to be matched with 5% own capital;
- 15% of the loan can be deducted from taxes if a certain energy efficiency level has been achieved upon completion;
- No collateral is needed for the loans;
- For applicants/families with a low income, up to 100% of the loan can be converted into a grant.
- No repayment is demanded in the first two years of the loan;
- The average loan is € 5 800 per apartment, or € 290 000 for the average apartment building, the major part of investments (60.4%) for the programme implementation goes to external walls insulation and to windows replacement (10.6%);
- The JHFL covers the costs incurred in preparing technical renovation documentation.

9.3.3 Risk profile

- From the perspective of the UDF the biggest risks are:
  - Default of loan repayment by the home owner associations;
  - The risks are shared by the ERDF and national government.
- From the perspective of the home owner association the biggest risks are:
  - Default of loan repayment
- The owners of the apartments run a risk by taking the loan. Default can lead to being forced to leave the house. However, this risk is relatively small because:
  - At least part of the repayment can be funded from the savings on the energy bill;

- The repayment is only a fraction of the total costs of living (mortgage/ rent, energy bill, food, etc.);
- In case of low incomes, the loan can be converted to a grant;
- A consortium of home owners lower the risk substantially when compared with individual applicant. So, in case of lack of finance of one of the home owners, the other owners share the burden, which they are likely to be able to do so.

9.4 Analysis

Strengths

- The JHFL loan can be combined with subsidies, loans and other financial products;
- The fact that the house renting market is small in Lithuania makes it more easy/sense to implement this energy savings scheme; there is no split incentive;
- The local approach using local banks to manage the UDF's enables local knowledge, expertise and networks;
- JHFL has a positive effect on employment; it provides a boost for the construction sector, which was heavily affected by the economic crisis;
- The old government program did not work well because its resources were limited, and the budget reserved for the grants was quickly exhausted. The new JHFL scheme has a revolving nature and is thus better suited for large scale operation involving many projects. Moreover, it can easily be calculated how many projects can be funded per year in order to keep the fund healthy. For the time being, the demand can be met, meaning that all eligible requests can be approved;
- It makes sense to include the costs for the initial preparatory studies in the loan;
- Marketing and communication has helped to reach the target group.

Weaknesses

- Implementing relatively complicated programs such as the JHFL demands a culture shift from government officials. This was a barrier initially, but it appears this barrier has been overcome;
- The scope of the program was limited to the building envelope and home owner *associations*. There is a wish from the EIB and the local operators to expand the scope;
- The administrative burden (red tape) is still relatively high compared to a one-stop shop.

Opportunities

- Weaknesses often also provide opportunities: the programme has a limited scope for the time being, since it focuses on multi-apartment buildings and student dormitories and is restricted to financing mainly energy efficiency investments. Expanding the programme to include public buildings is currenlty under investigation, thereby potentially increasing the national energy saving potential;
- There is a wish to combine the JHFL with other funds and programmes in order to expand the scope and reach (even) better energy saving performances, thereby reducing CO_2 emissions. For instance, JHFL was combined with other funds for the refurbishment of the student dormitories which worked out well;
- The program officials gained a lot of experience with the implementation of the JHFL and want to use this experience to expand the scope of the programme and make it more flexible.

Threats

- As mentioned above, the previous government grant scheme quickly ran out of money, forcing the government to reinject money, or to terminate the programme. It was mentioned that this

undermined the general trust in government programmes, which is thought to have hampered the uptake of the current scheme;
- Another issue raised during the interview relates to a lack of transparency in the financial structure, making people weary. Naturally, good communication and marketing could overcome this barrier;
- The scheme was launched in a period of economic downturn. This raised the question whether the grant component of the scheme should be increased so that the own capital demand could be decreased. The Lithuanian government decided against this, as they were afraid that a change of conditions might further undermine the trust in government programmes.

9.5 Conclusion

The revolving nature of the JESSICA Holding Fund Lithuania is well suited for large scale operations such as this renovation programme. The risk of exhausting a revolving fund is smaller than for a public grant financing scheme.

Setting up the JHFL was complicated for a government with limited experience with innovative financing instruments. Technical assistance in the implementation phase helped to train the public servants and to streamline this process.

In general, the JHFL operators would like to have more flexibility in the programme. This can enable them to expand their programme to other sectors or combine it with other funds for instance, thereby further increasing energy savings.

The success of the JHFL so far originates from the fact that:
- There is a market demand amongst other because:
  - JHFL is targeting a market where most of the stakeholders directly benefit from energy savings (lower energy bills, higher quality of living, stable real estate value);
  - JHFL is flexible in the sense that stakeholders with less financial means can benefit from a grant in stead of a loan;
- The instrument is accompanied with sufficient marketing, communication and promotion. Here the Lithuanian Housing & Urban Development Agency plays an important role;
- The instrument is accompanied with sufficient technical assistance to local banks and other stakeholders on successful approaches. The Housing & Urban Development Agency also plays an important role here.

10 Exoikonomisi Kat' Oikon "energy conservation in houses"

10.1 Introduction

Programme title		Exoikonomisi Kat' Oikon "energy conservation in houses"
Type of buildings		Eligible houses should be built before 1 January 1980, be used as main residence, be located in areas with a maximum ground price of € 1 750 per m^2, and be in the energy performance class D or lower
Overall aim/objective of programme		The objectives of the initiative are: saving energy; increasing awareness among citizens about the rational use of energy and environmental protection; improving living conditions in buildings and cities; improving the urban environment; mobilizing market forces towards developing sustainable communities
Type of programme		Offering favourable loans through a revolving fund, using ERDF funding
Main technologies / approaches		Eligible energy efficiency measures are: Thermal insulation (on top of the building and walls) External aluminium frames Replacement of boilers (obligatory measure) Installation of solar water heaters
Location		Greece
Time frame	Start date	07-2010
	Planned end date	Unknown
Programme originator		Greek government
Key stakeholders:		Programme originator: Greek government
		Programme manager: TEMPME, a public financial institution
		Loans will be provided through 4 banks: Alpha Bank, EFG Eurobank – Ergasias Bank, National Bank of Greece and Piraeus Bank
		Funding: Greek government using ERDF funds
		Applicants: Home owners

10.2 Programme description

Total (projected) energy savings per year (in GWh/y)	1 500 GWh/y
Length of loan	Commercial bank conditions
Total fund size	€ 396 million

The Exoikonomisi Kat' Oikon fund is a holding fund, but it is not related to JESSICA or managed by the EIB. Instead, the fund is managed by a Greek public financial institution called TEMPME.[6] The fund was established in July 2010, in view of the New Greek Regulation for Energy Performance of Buildings.

[6] http://www.tempme.gr/

The programme was designed to address approximately 100 000 households.

Each application requires two energy inspections: one beforehand to draw up a proposal for interventions with a cost analysis, and one after the refurbishment verifying the implementation of the energy efficiency measures and the energy saving results.

10.3 Financial characteristics

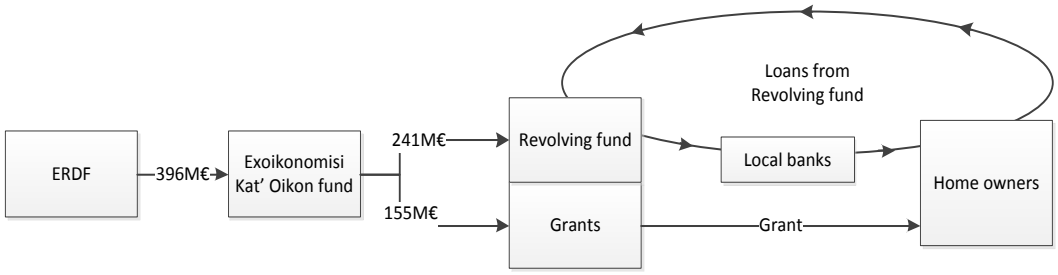
10.3.1 Financial construction

Amended European regulation allows a country to use 4% of its ERDF funds to fund energy efficiency in the housing sector (Commission Regulation (EC) 397/2009 of 6 May 2009).[7] For Greece, this 4% amounts to € 396 million, which became the budget of the Exoikonomisi Kat' Oikon fund.

This € 396 million is divided in a revolving fund, containing € 241 million, and a grant fund which contains the remaining € 155 million.

The loans will be issued by commercial banks; the Alpha Bank, EFG Eurobank – Ergasias Bank, National Bank of Greece and Piraeus Bank.

Figure 10.1 Financial construction Exoikonomisi Kat' Oikon fund



10.3.2 Conditions & Instruments applied

The loans paid out of the € 241 million in the revolving fund have to be matched by commercial loans on a 50/50 basis. The interest rate of the ERDF part of the loan and the size of the grant depend on the income of the applicant. Low-income households receive zero interest loans and a 30% grant, medium income households can apply for low interest loans and a 15% grant, while higher income households only benefit from low interest loans. A loan is thus a combination of a low or zero interest ERDF loan, and a commercial bank loan with commercial rates. The commercial banks are allowed to demand collateral.

By demanding a 50% matching with commercial bank loans, the ERDF fund has a leveraging function. Private capital is unlocked, while favourable conditions are expected to be maintained. The fees for the mandatory energy inspections will be covered by the programme, provided that the application was approved and targets were achieved.

[7] http://eustructuralfunds.gov.ie/files/Documents/397%20of%202009.pdf

10.3.3 Risk profile

The financial risks are equally shared by the Greek government and the commercial banks.

10.4 Analysis

The implementation of the programme proved to be difficult. Players had little experience with this type of instrument and found it hard to cope with the often technical nature of applications.

There is virtual no liquidity in the Greek banks due to the current financial crisis. This causes the commercial banks to demand (very) high interest rates and collateral that applicants cannot match. This results in a situation where everything is put on a hold, and no money is lent. Around 40 000 applications were received so far, but only 6 000 were approved. This small share is mainly due to the predefined condition that 50% of the loan from the revolving fund is matched by a commercial loan (or equity). Based on this analysis the target of 100 000 households is not likely to be reached.

10.5 Conclusion

Assessing the design and effectiveness of the fund in the current economic situation of Greece is difficult. The initial idea and set-up of the fund is positively judged by program officials, but it does not longer work in the current financial situation in Greece. It is hard to predict how the set up of the scheme would have worked out under normal economic conditions, but quite probably better than is nowadays the case. This hinders a detailed evaluation for this case study. Nevertheless, some useful lessons can be drawn from this programme.

Setting up a holding fund can be complicated for governments with limited experience with innovative financing instruments. Technical assistance is required to streamline this process. The implementation of the holding fund might have been easier if it was (co-)managed by the EIB.

More flexibility of the fund can make it easier to adapt to a changing economic situation. This applies not only in case of a crisis, but also in times of a cyclic economic upturn. Flexibility could thus create a sound balance between effectiveness and efficiency. On the other hand, a lack of continuity may undermine confidence and thus long-term effectiveness of such programmes. In conclusion, a combination of public and commercial loans has a leveraging effect but makes the fund vulnerable for economic fluctuations.

11 French Social Housing Energy Efficiecny Investment project report

11.1 Introduction

Project title		French Social Housing Energy Efficiency Investment
Type of building(s) or construction		Social Housing retrofit and refurbishment
Overall aim/objective of project		Energy affordability in social housing
Type of project		Loan Scheme
Main technologies / approaches		Insulation and energy efficiency
Location		France
Time frame	Start date (mm-yyyy)	June 2009
	(Planned) end date (mm-yyyy)	December 2013
Project originator/host		L'Union Sociale Pour L'habitat
Key stakeholders:		Project originator / host - L'Union Sociale Pour L'habitat
		Public funding sources - ERDF
		Others (e.g. facilitators) – Tax incentives, rental agreements

11.2 Project description

This project profile is based on a literature review and an interview with Carine Puyol, policy officer for the French Federation of Social Housing (L'Union Sociale Pour L'habitat).

Total (projected) energy saving per year (in GWh/y)		1,013
Costs	Depreciation period (years)	
	CAPEX (total, in mEUR)	320
	CAPEX (annualised, in mEUR)	n/a
	OPEX (in mEUR/y)	n/a
	Other costs	
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	n/a – project by project basis
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	40% reduction in heating costs 15,000 local jobs created 50,000 low income householders better off

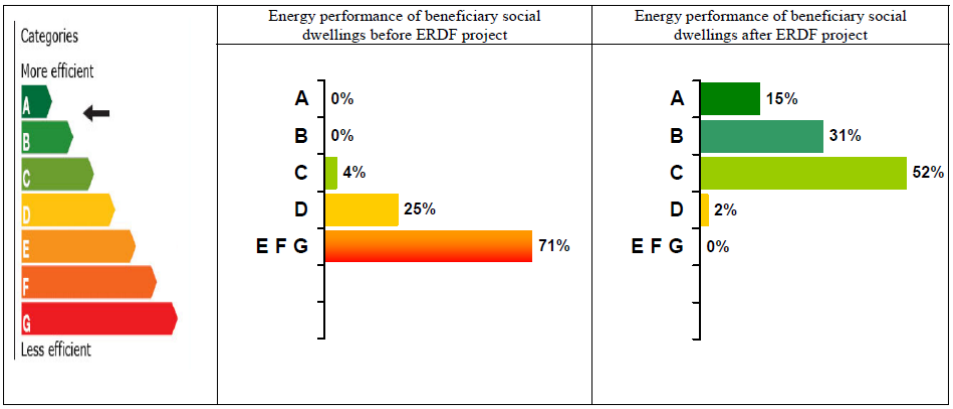
The French Federation of Social Housing, is an umbrella body for around 800 social housing providers, and has been instrumental in setting up the Eco-loan scheme to drive investment in energy efficiency in the social housing sector. The initiative came about due to the revised ERDF regulations, which increased the maximum funding envelope to EUR 320 million and created the ability to invest structural funds in social housing thermal renovation projects. This represented a huge opportunity to utilise ERDF capital for social housing refurbishment. It also coincided with a new energy policy and associated targets for the French social housing sector. The federation has played an important advisory role in the development of the Eco-loan scheme, representing and advising their members throughout the country whilst lobbying nationally for an Eco-loan scheme to drive investment in the social housing sector.

The programme has largely been driven by the three associated drivers of carbon emission reductions, climate change concerns and energy affordability. Of these the energy savings and associated affordability were the most important drivers. The programme has been facilitated and funded by the Caisse des Depots et Consignations (French Social Housing Bank) and the French Environment and Energy Management Agency (ADEME).

The main focus of the project has been on energy efficiency investments, but it has also been used to fund renewable energy and district heating schemes where appropriate, as part of larger schemes. The Eco-loan scheme is provided by the Caisse des Depots et Consignations and is able to provide low interest rates of 1.9 %. This rate is partly subsidised by the French Government. Properties that have undergone renovations also benefit from the added incentive of reduced council tax rates.

The project is a relatively recent development, and has only been operational since mid 2009. There are many projects being funded by the loan scheme at different stages of the project cycle e.g. pre application, application, current, funded, finalised etc. The following graphic outlines the estimated energy performance, of the housing stock that will be improved, before and after the ERDF funded renovations.

Figure 11.1 ***Calculated Energy Performance, before and after investment***



Source –Improving Energy Efficiency in Buildings Reprogramming regional structural fund operational programmes to prioritise social housing, 2009-2011 Mid term assessment – France, 2011

A fact of key importance for the associations involved, is that householder's energy costs were reduced by up to 40%. In low income households, where energy costs can account for a large share of household income, this can have a dramatic effect on resident purchasing power and disposable income levels. Based on an average reduction in heating costs of between EUR 30-90 per month, this equates to a total increase in purchasing power of between EUR 18-54 million per year. The ERDF and joint financing initiatives employed so successfully in France, could, if extrapolated across Europe, have the following estimated impacts[8]:

- EUR 8 billion ERDF invested
- Investment generated of 55 billion
- 783,000 jobs created, and;
- 2.76 million Households renovated.

[8] Based on the average ratios observed in the French regions, the above forecasts the potential across the EU-27, were the measures to be applied across all member states. L'Union Sociale Pour L'habitat – report for Jose Manual Durao Barosso, 2011

11.3 Financial characteristics

Whilst the French Federation of Social Housing has been instrumental in the development and promotion of this investment programme, they do not have a financial stake in its operation. Therefore the following information outlines their views from a policy perspective.

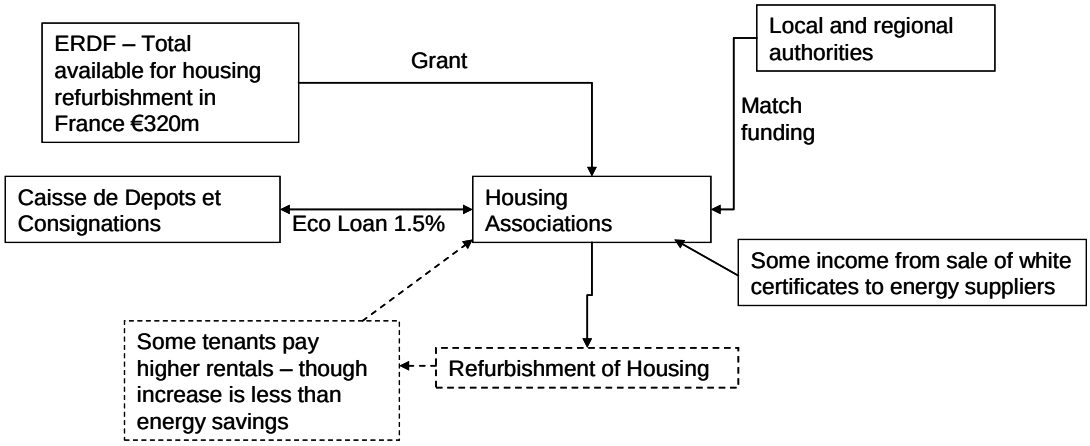
11.3.1 Financial construction

It is difficult to generalise about the financial characteristics of how the ERDF has been allocated throughout France as it differs between different regions and Housing Associations. There is no overarching model that applies everywhere. In its most basic form Housing Associations have been able to apply to their local public administrative body for refurbishment projects through a simple allocation process. The remainder of the finance comes from the Social Housing Bank, reserves, or loans.

However, different approaches were also utilised. In areas with limited ERDF allocations they used specific targeted project calls/competitions to try and improve the quality and level of innovation within projects, in order to gain maximum value for money from their ERDF allocation.

In the Champagne region, where the Eco-loan has been developed, the Social housing association takes out the loan and acts as the bank for the project. This tool simplifies the application process, meaning there is just one application process as opposed to up to five funding applications for the same project.

As of March 2011, 22 months after this change was announced, EUR 208.5 million (97% of the maximum ERDF envelope) had been allocated to energy efficiency investment projects within the social housing building stock of France. Of this total, EUR 146 million has definitely been allocated, the remainder still being under appraisal. This equates to, on average, EUR 2,886 per dwelling or 14% of the investment required for the project. The remainder of the funding is from the Social Housing Banks Eco-loan, the French Environment and Energy Management Agency, plus contributions from local and regional authorities, mainly local councils. The following diagram attempts to summarise some of the key financial flows involved:



11.3.2 Conditions & Instruments applied

- Private finance

Private finance was not a significant element of most of the projects funded through this scheme. Beneficial lending rates from the French Social Housing Bank were such that they were the lender of choice.

- Public finance:
  - Subsidies

In some situations the inhabitants have agreed to pay increased levels of rent (within predefined acceptable limits) to subsidise the repayment of the Eco-loan. The increases have been calculated so that the increase in rent shall always be less than the decrease in energy costs so the inhabitants will not be worse off financially. However, this approach has had limited uptake as it has been complex, time consuming and generally difficult to establish in practice. Convincing residents of the social acceptance of paying more rent has been the main challenge.

- Other instruments, e.g.:
  - Tax reductions;

In some circumstances regions have agreed that properties which have undergone renovations are eligible for reduced taxes (council tax payments) as a further incentive for landlords. However, the adoption of this approach has varied across the country.

  - Energy Certificates

Social Housing providers that undergo refurbishment projects are allowed to self certificate their energy efficiency improvements. These energy certificates (representing the carbon emissions saved through the investment) have a value to energy suppliers (who need to demonstrate their certified carbon emission reductions). In this way, social housing providers can auction and sell their energy certificates (white certificate) to energy suppliers.

11.3.3 Risk profile

The financial risk associated with this project was deemed minimal as all investments were limited by public guarantee. The main risk identified was that of actually achieving the carbon emissions predicted. There is considerable risk that low income households whose energy consumption is limited by disposable income, may in fact, increase their energy consumption as their disposable income grows. This behavioural change risk is still thought to be important. The ongoing monitoring of household energy usage patterns is required to ascertain whether this risk is real. Initial indications suggest that a greater role for behavioural change initiatives may be required to minimise its impact.

Unforeseen issues that have materialised are the need for improved marketing and communication of the project to residents in order to increase uptake. Also, the supply chain posed various challenges such as; unexpectedly high costs, quality of workmanship and co-ordination of multiple tradesmen within a single project. The issue of effective project management and project coordination was also identified as an area that proved more challenging than initial predictions suggested.

11.4 Analysis

The development of the Eco-loan was precipitated by a number of contributing factors such as;

- The existing well established social housing sector in France;
- The existing French Social Housing Bank facility;

- The setting of national targets relating to energy efficiency in social housing, and;
- Last, but not least, the changes to the ERDF funding regulations in 2009.

Whilst the simple allocation process has had significant successes, the financial crisis is making public authorities and lenders seek out more innovative ways to reduce project risk and fund sound projects. This is particularly the case in the area of social housing energy efficiency investments, where the project benefits are multiple and the investments leveraging potential significant. In terms of improvement the allocation process, there are also moves to do so based on “quality” of energy saving project and innovative financing methods.

One of the main barriers to establishing the initiative at the outset was the lack of formalised partnership working. National, regional and city wide bodies and associations all had similar overall objectives, but very different approaches and mechanisms with which to achieve these objectives. The “prize” offered by the recently available ERDF funding had a “mobilising role” and brought the relevant parties involved in social housing throughout France around the same table for the first time. The other major challenge for this project has been the scale and complexity of the project and the limited financial window within which much of the preparatory activity has had to be undertaken.

The overarching ERDF funding schemes is applicable to a range of investment types, but in itself, has not demonstrated much innovation. This has happened on a local and regional scale and this should be learnt from for future funding rounds.

After careful consideration and first hand experience the French Federation of Social Housing made the following suggestions for how the financing of this type of programme could be improved in the future. These suggestions and comments were as follows:

- Prevent a break in ERDF programme funding between the end of this period and the beginning of the next (2012-2013). This funding gap will have a detrimental impact upon local job creation and the sustainable, organic growth of the energy efficiency sector.
- To bring the experimental period whereby the cap is set at 4% of the national ERDF envelope to a close, thereby unlocking its full potential. By removing this cap it could unlock significant local job creation potential, help leverage significant additional funds, fight fuel poverty, and improve the purchasing power of residents, whilst also improving the energy performance of buildings.
- Provide and facilitate suitable flexible energy efficiency funding tools to effectively mobilise finance throughout all EU regions and MSs. This could be in the form of financial engineering tools such as interest subsidies, dedicated guarantee funds or revolving investment funds (working alongside existing subsidy–type elements) dependant upon the regional requirements.
- Support regional coordination and communication programmes, including customer behavioural change, communication and support initiatives.
- Reduce the administrative and regulatory charges levied upon energy investment project initiators. The costs of appraisal, control and state aid are significant and can deter potential project initiators, the simplification of these processes should be a focus for reform within the EU's cohesion policies. This could be achieved through a single request dossier (ERDF and national contributions) and a unification of energy performance criteria, within future regulations.
- The creation of a European fund devoted to energy efficiency in housing.

11.5 Conclusion

Overall, the change to the ERDF allocation process and eligibility has led to massive investment in social housing energy efficiency investments throughout France. It has provided multiple benefits including reduced fuel poverty, protection from future fuel price volatility, increased local employment, supply chain development, carbon emission reductions and improved standards of living. Whilst this is an impressive achievement, the process by which this has happened could be improved.

It was thought that there was potential for the EU to support its ambitious commitments to reduce carbon emissions with a dedicated fund specifically for social housing. The increased focus on resource efficiency and suggested targets of 3% per year refurbishment of public building stock are seen to be ambitious. At a time when public expenditure is under considerable pressure the potential for funding is limited, therefore a dedicated fund could be used to target specific sectors, such as social housing. This fund would facilitate energy efficiency improvements within buildings, whilst creating local jobs and improving the disposable income of the least well-off households. The fund could work alongside and in synergy with ERDF and possibly be funded through the European Investment Bank.

In summary there are a number of regulatory suggestions (outlined above) that should be considered, but the two main points of note for the future were; the importance of educating residents about energy efficiency in tandem with any renovation works carried out, and the potential for a dedicated fund that could facilitate and fund these energy efficiency investments throughout the EU.

12 SlovSEFF - Slovak Energy Efficiency Financing Framework

12.1 Introduction

Programme title		SlovSEFF - Slovak Energy Efficiency Financing Framework
Type of building(s) or construction		Blocks of flats
Overall aim of programme		Reducing emissions
Type of project		Financing facility for thermal rehabilitation of blocks of flats.
Main technologies and approaches		Eligible sub-projects within the residential sector are thermal rehabilitation projects of blocks of flats.
Location		Slovakia
Time frame	Start date	09-2007
	End date	On-going
Programme originator		EBRD and Slovak ministry of Economy
Key stakeholders:		EBRD
		Slovak ministry of Economy
		Five participating banks (PBs): • UniCredit Bank Slovakia • Slovenská sporiteľňa, • Tatra banka, • Všeobecná úverová banka, • Ceskoslovenska obchodna banka
		Projects consultants: Enviros Ecofys

12.2 Project description

Total projected energy saving per year	472 GWh/y
Total programme size	€ 90 million

The Slovak Energy Efficiency and Renewable Energy Finance Facility (SlovSEFF) was set up in 2007 by the EBRD and the Slovak ministry of economy to support energy efficiency investments in the industrial and residential sector by offering loans and grants. This analysis focuses on the residential projects, which are confined to blocks of flats.

Applications can only be filed by home owner associations, which is enabled by Slovak legislation that allows home owner associations to apply for a loan. This is inherent of course to the structure of the Slovak housing market, which has a relative large share of housing blocks and flats.

When applications are filled by associations, instead of individual home owners, a few advantages are present, including:

- Less red tape per saved unit of energy;
- Economies of scale;

- Less risk for the financial institutions, since the risk of default is shared among the different individual home owners constituting the association;
- Common property such as staircases and rooftops can now be refurbished as well.

The project consultants Enviros and Ecofys provide technical assistance for applicants, in the form of preparing Rational Energy Utilisation Plans (REUPs), Simple Energy Audits (SEAs) and assisting with the formulation of loan applications to Participating Banks. They also provide the participating banks with training and marketing support as they are not very familiar with financing energy efficiency investments.

Home owner associations receive a grant after the project consultants have verified the successful implementation of the project. The minimum level of energy savings to be achieved after the investment should be 15%, as decided by the project donors.

The comprehensive package of loans, grants and technical assistance is a so-called one-stop shop.

The initial SlovSEFF programme was funded by a € 60 million loan from the EBRD and a € 15 million grant from the Bohunice International Decommissioning and Support Fund (BIDSF). The main contributor of the BIDSF fund is the European Community, together with Austria, Denmark, France, Ireland, the Netherlands, Spain, Switzerland and the United Kingdom. The EBRD loan is managed by five participating banks.

In response to the high demand for the SlovSEFF loans, the facility is recently extended as SlovSEFF II with 90mEUR from the EBRD and another 15mEUR from the BIDSF fund, increasing the loan budget to 150mEUR and the grant fund to 30mEUR. It was decided that 20% of the budget under the extended programme should go to projects in the commercial sector.

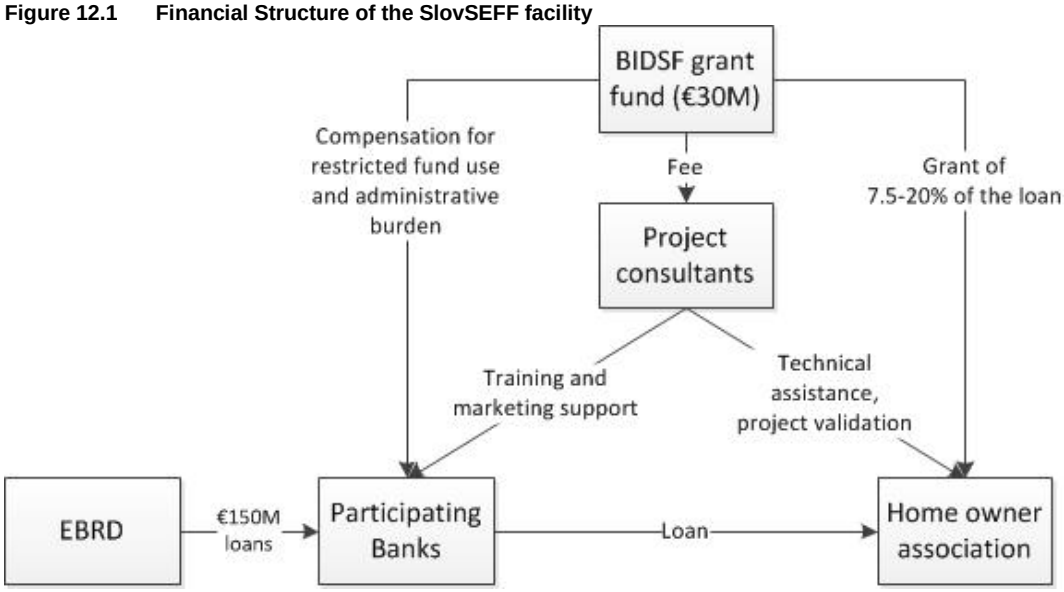
In 2010, the budget of SlovSEFF one was depleted. At the moment of writing, half of the additional € 90 million loan is disbursed. 485 Projects have been funded in the residential sector with € 88 million of loans.

The demand for the loan and grant is higher than the current supply. The amount of allocated BIDSF funds is the limiting factor for expansion of the programme; the banks would like to expand the programme.

12.3 Financial characteristics

12.3.1 Financial construction

Figure 12.1 Financial Structure of the SlovSEFF facility



The EBRD provides a € 60 million loan to five local banks, which on-lend the funds to home owner associations on commercial terms. Over 80% of the BIDSF grant budget goes to the incentive payment for home owner associations, which is granted. The remaining <20% of BIDSF funds cover the compensation for participating banks for the restricted use of their funds and the administrative burden, and the costs for the technical assistance from the project consultants.

12.3.2 Conditions & Instruments applied

- Both the EBRD and home owner loans are provided at competitive market interest rates;
- Loans range from € 20 000 to € 2 million;
- The grant from the BIDSF fund amounted to 20% of the loan under the initial programme. Because of the high demand, the program officials decided to downscale the grant a little. Grants are now between 7,5 and 20% of the loan sum, depending on the actual realised energy savings;
- Eligible measures in the residential sector include: Insulation of the building envelope, new double-glazed windows, new radiators, hydraulic adjustment of heating system and urban renewable energy systems.

12.3.3 Risk profile

The home owners are together responsible for the repayment of the loan. The risk for the loan is thus shared among the home owners that have joined in the home owner association. This makes the risk for the participating banks and the EBRD relatively low.

12.4 Analysis

Strengths

- The comprehensive package, i.e. the one-stop shop concept, that SlovSEFF offers reduces financial as well as administrative barriers, making the programme popular;

- Using local banks as intermediaries makes effective use of their local expertise;
- The combination of a loan and a grant is effective. The loan provides an incentive to create a viable project and the grant provides an incentive to apply for the loan;
- By targeting home owner associations, the programme made efficient use of the favourable Slovak legislation, that enables home owner associations to apply for a loan;
- Home owners benefit from economies of scale by applying through home owner associations. This enables the implementation of energy efficiency measures on a building level;
- Buildings are redecorated when undergoing renovation. This improves the image of the neighbourhood, and also creates peer pressure for home owners that did not apply because residences that were not renovated will stand out;
- Due to an elaborate communication programme by the project consultant, the programme has become a well-known 'brand' in Slovakia;
- The renovation of an apartment building cannot be blocked by one resident, because home owner associations are given the power to make decisions through a majority vote;
- Involving a project consultant in the programme streamlines the process and reduces many barriers, such as the absence of technical expertise to assess the eligibility of the projects, the lack of information about the technical risks and financial benefits of energy conservation and the additional costs in the loan appraisal process.

Weaknesses

- The programme depends on one single donor, the BIDSF fund;
- This BIDSF is the limiting factor for the size of the programme;
- Home owners can find themselves borrowing against their will, as application for the programme is decided by a majority vote.
- This programme set-up naturally only works well in regions with a similar housing market, viz. many housing block and flats.

12.5 Conclusion

The SlovSEFF facility can be considered a success story. Much energy can be saved in an efficient fashion, both from a financial and administrative point of view as well as from a technical perspective. Key components are the project consultants and the one-stop shop concept. However, this programme will only work when the correct legislation is in place and home owner associations make sense.

13 EPC project municipalities, Norway

13.1 Introduction

Project title		EPC Eiker municipalities Norway
Type of building(s) or construction		36 buildings (mainly schools, health care, sports and administration buildings)
Overall aim/objective of project		Cost-effective energy savings using financing through Energy Performance Contracting (EPC). The municipalities had worked with energy efficiency for a number of years and implemented energy monitoring and several measures – but wanted to do more and had difficulty in getting internal funding
Type of project		Building project with EPC
Main technologies / approaches		Heating, ventilation, lighting, etc. (broader spectre)
Location		Øvre and Nedre Eiker (two municipalities in Buskerud county, south-east of Norway)
Time frame	Start date (mm-yyyy)	2003 (initiated) - 2006 (start of operation)
	(Planned) end date (mm-yyyy)	2014 (contract period: 8 years)
Project originator/host		Norsk Enøk og Energi AS (NEE), an Energy Service Company (ESCO)
Key stakeholders:		Norsk Enøk og Energi AS (NEE)
		Øvre Eiker municipality
		Nedre Eiker municipality
		Enova SF (National energy agency), providing subsidies to energy savings measures

13.2 Project description

Total (projected) energy saving per year (in GWh/y)		7.8 GWh/y
Costs	Depreciation period (years)	8 years
	CAPEX (total, in mEUR)	Øvre Eiker: 3.1 mill Euro Nedre Eiker: 1.5 mill Euro
	CAPEX (annualised, in mEUR)	Not available
	OPEX (in mEUR/y)	Not available
	Other costs	250,000 Euro (subsidies by Enova SF)
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	Øvre Eiker: 4.9 GWh/y Nedre Eiker: 2.9 GWh/y (49 kWh/m^2)
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Demonstration of possible energy savings, 1st large EPC project in Norway – a pilot, development of an implementation model for using EPC construction anywhere in Norway; lessons learned on cooperation with involved parties like building owners and technical personnel

In this EPC project, the NEE (an ESCO) carried out the complete implementation of the EPC project in Nedre and Øvre Eiker municipalities, including the identification of profitable measures and the implementation of these measures, and guaranteed that the actions taken result in the estimated energy savings. NEE has been a project manager and responsible for building analysis, identification of energy saving measures, engineering, construction management and implementation.

The Eiker project is an Energy Performance Contracting (EPC) project. Energy Performance Contracting is a proven and cost-efficient instrument for tapping existing energy saving potentials in the buildings sector. An Energy Service Company (ESCO) implements a customized energy service package, consisting of planning, building, operation and maintenance, optimization, fuel purchase, (co-) financing and addressing user behaviour in the field of saving energy consumption

The contract between ESCO and building owner contains guarantees for cost savings and takes over financial and technical risks of implementation and operation for the entire project duration of typically 5 to 15 years. The EPC services - or main parts of them - are paid by realized energy cost savings.

The measures in the Eiker project focused on general audits regarding all aspects of energy use in buildings, heating, ventilation, lighting and insulation of building envelope. Further, energy monitoring system (EOS), central operation control and power load limitation control have been installed. The technical personnel followed operation and maintenance training.

Regarding the building envelope, additional insulation, replacement of windows and doors, and sealing of leaks have been realised. Heating measures included insulation of pipes and valves, replacement of oil boilers and burners, replacement of heating control systems, and installation of heat pumps and solar collectors. In some buildings, the energy carrier was changed. As for ventilation, installation of sealed closings, new ventilation system with heat recovery, new heat recovery units in existing facilities, and new automatic and optimal supply of fresh air have been realized.

Further, water-saving shower heads have been installed and hot water piping has been insulated. Tap water controls, heat recovery from waste water, installation of thermostatic mixer and timer in showers and other measures have been taken. Moreover, to save energy for lighting, replacement of incandescent light bulbs, personal detector lighting control and automation for constant brightness have been applied. In addition, sequence control of heating and cooling has been used to save energy for cooling. Finally, photocells on outdoor lighting have been installed.

The project in Nedre Eiker also included an annual “Energy efficiency price” to the best building. This has been used successfully in dissemination both internally and externally.

The main overall objective of the project was to save energy. In addition, involved municipalities and building owners also had their own, specific objectives within the project. The municipalities had worked with energy efficiency for a number of years and implemented energy monitoring and several measures, but wanted to do more and had difficulty in getting internal funding. Another goal was to perform general audits. It was essential that audits focused on all aspects of energy use in the building (not just control systems, lighting etc.). Maintenance and legal environmental obligations such as ventilation or **Polychlorinated Biphenyls (PCB)** in lighting - could be done in parallel.

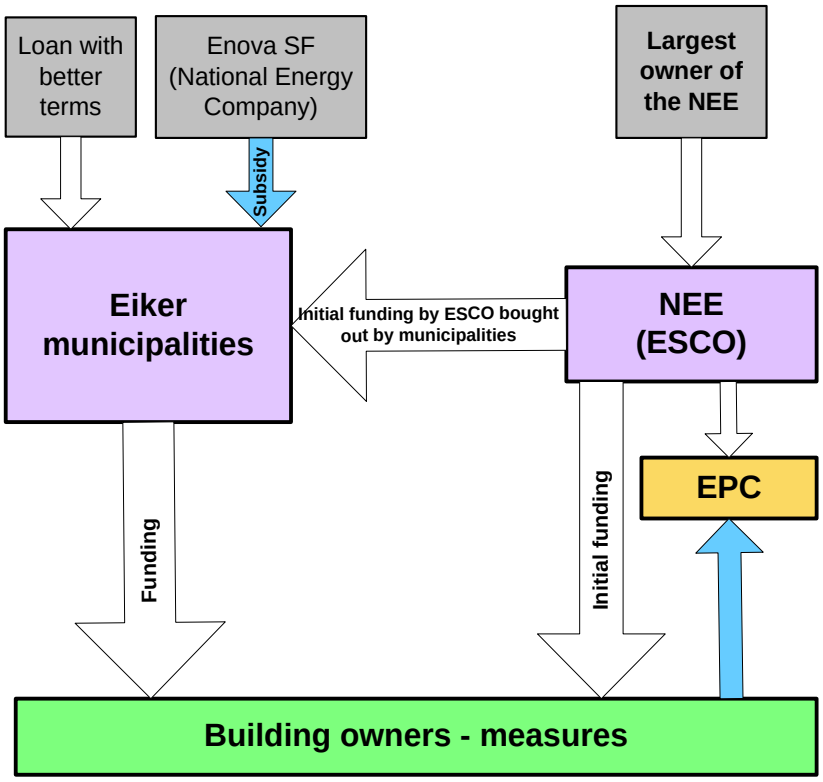
This project is one of a few large EPC projects in Norway. When the project was initiated there were no national or local policies or projects to encourage EPC.

The project was initiated in 2003. The audits were carried out in 2004, investments done in 2005. In 2006, the operation of the EPC project (measures, contracts…) was started. The EPC contracts are closed for a duration of 8 years, which means that the project will be finalized in 2014.

13.3 Financial characteristics

13.3.1 Financial construction

The financial construction and the role of parties involved are explained in the diagram below. The blue arrows show financial benefits for municipalities and building owners.



Initially, the ESCO accounts for the financing of the project, provided by the largest owner of the NEE at that time. Later, the Eiker municipalities decided to buy their way out, as they found alternative national funding opportunities with more attractive interest rates and could get VAT compensated directly after having taken the project over.

Investment in energy saving measures was supported by Enova SF (National energy agency) with 250,000 Euro. At Enova SF, any building owner can apply for non-returnable subsidies for implementation of energy saving measures.

The financial needs of the project were as follows:

- Øvre Eiker: 3.1 mill Euro;
- Nedre Eiker: 1.5 mill. Euro.

With less money fewer buildings would have been analysed and/or less measures would be implemented and hence less energy saved. To go through the general building stock and look at measures in general was an important aspect of the project.

The energy savings are used to pay the investments over the contract period of 8 years. Building owners do not pay lower energy bills over this period, only after 8 years. If there are higher savings achieved than agreed, according to the contract, the profit is divided between the building owner and the NEE.

New EPC projects have been funded by banks through the building owner. The NEE is working on establishing a way of offering its own funding to clients.

13.3.2 Conditions & Instruments applied

The main instrument applied is the EPC (Energy Performance Contracting). EPC has proved to be cost-efficient even in such a large project.

Municipalities would basically get the project financed by the ESCO. The savings would cover all investments. In principle, municipalities should not need capital, i.e. the whole project would be self-financing. This was a very important condition for launching the project.

The instruments and approaches applied were very specific to this project, as it was a first large EPC project in Norway.

NEE has developed a model for implementation of this kind of projects (EPC). The model describes all phases of such a project and gives instructions and recommendations. The developed model has been shown to work well in similar projects. This model is universal and can be used wherever there is a savings potential of energy.

13.3.3 Risk profile

The largest barrier towards EPC projects is lack of knowledge about the concept. Some building owners see EPC as outsourcing of building control and are hence reluctant.

For the NEE (ESCO), the obvious risk is that the savings it guarantees are not achieved. This could happen due to the fact that this project was a pilot. The NEE had to elaborate the implementation model, which was not tested before and could not work well for some parts of the project. Poor quality assurance and lack of time in the different phases played a role as well. Other elements include poor communication among the parties, lack of involvement of building operational personnel and lack of systems to support energy measures and the project.

In this project, there were no significant problems encountered. Agreed savings have been achieved and both parties are satisfied with the results.

13.4 Analysis

This project is one of a very few large EPC projects in Norway, at that time a pilot. The project has been very successful as the agreed savings were reached and the investments in energy saving measures were paid back. Nevertheless, there are many lessons learned from this project, which have been used in the following EPC projects.

The main instrument used is the EPC, which is, in fact, a well-known financial construction. In Norway, it was in this project applied for the first time on such a large scale. At that time, there was not much experience with EPC in Norway.

The ESCO (NEE) was the initial investor in the project. The municipalities welcomed this as they had initially problems getting the internal funding. An interesting fact is that later, the municipalities were able to get a loan with a better interest rate and the VAT could be directly compensated. So they decided to buy their way out.

The NEE, also possibly as a response to this and due to the successful project results, has developed a model for implementation of EPC projects, which has shown to work well in similar projects. This model is universal and can be used wherever there is a savings potential of energy.

The project has encountered several important barriers as well. For example lack of competence among building owners regarding the EPC and energy measures in general. In general, building owners do not like external interference. EPC can be complicated for public building owners, e.g. because of public tender legislation. Further, project initiation is time consuming if there are no templates or standards, and procurement legislation is a challenge.

Another barrier to be mentioned is the traditionally low focus on energy use in Norway due to low electricity prices. Furthermore, there can be organisational challenges for public building owners such as long distance from operating personnel to managers, separate budgets for maintenance and operation, etc. Lack of incentives is also a barrier– there is no economical reward systems for individuals or building user organisations (schools etc.) for achieving the savings.

Attempts to overcome some of these barriers include training in the EPC concept and focus on training and involvement of operating personnel.

A useful lesson learned is that it is important to focus on the fact that EPC requires cooperation between ESCO and building owner on all levels. In order to guarantee the agreed savings, the ESCO is dependent on the local personnel. Hence training and motivation is essential. This is an important selling point for most building owners.

Since the Eiker project, EPC has been the focus of two EU projects (Intelligent Energy Europe) that have developed templates for project announcement and contracts as well as guidelines, training, helpdesk and pilot projects. This has helped to overcome the lack of knowledge and project initiation barriers.

There are many advantages for a building owner using EPC, which can be used as unique selling propositions:

- Reduced energy costs with no strain on the investment budgets;
- Predefined concepts for contracts and implementation (EU project templates);
- Realization of objectives in climate plans (or labelling);
- Training of operating personnel and control of building installations;
- Optimized buildings and installations;
- Improved maintenance of buildings (done in combination with saving measures), improved indoor climate, fulfilment of legal obligations (energy labelling, ventilation/lighting requirements etc.);
- Correct tariffs;
- Time to focus on core activities.

As for recommendations for changes in local or national policy, it is important that the central government provides favourable financing options for this type of projects. It is also important that the national grant schemes for energy measures are so good that it makes a difference if the customer decides to implement the project or not.

As the project was successful there are no big changes suggested and the NEE would realize the next project in a similar way.

It should be realized that EPC is an important tool both for public and private building owners. It reduces the risk for the building owner (saving guarantee) and provides financial means. Increased knowledge about the concept and project initiation and control is needed.

Other relevant issues and lessons learned from several EPC (pilot) projects can be summarized as below:

- Public building owners most often wants to provide their own capital (state municipal bank has good loan terms for energy and EPC projects).
- Main challenges:
  - Capacity – time and knowledge (energy and procurement);
  - Necessary building information and data (for baseline/tender) is often not available;
  - The municipalities are positive towards EPC as a concept;
  - EPC is a cost effective instrument;
  - Focus on energy savings and guaranteed revenues is important;
  - One contract party is seen as very positive;
  - There are currently few professional ESCOs in Norway (3-5).

Furthermore, there is an interesting development on-going in Norway. The country works on developing national standards for EPC contracts. This will reduce the barriers for building owners as it ensures uniform implementation, conformity to public procurement legislation and reduces the risk of (unprofessional) ESCOs taking advantage of the lack of knowledge among building owners.

Over the last years a significant increase in announced EPC bids in Norway can be seen. The EU projects focusing on information and dissemination in combination with a national project lead by KS[9] (Green Energy Municipalities) have contributed to this development. In addition, the general focus on climate issues has increased in Norway. All municipalities were obliged to make energy and climate plans and hence focus on measures in public buildings has increased.

13.5 Conclusion

The large EPC project with two municipalities in Norway is seen as very successful with satisfied parties. The savings agreed have been reached within a relatively short contract period of 8 years. The EPC financial construction proved to be cost-efficient even in this large project.

EPC is an attractive solution for e.g. municipalities which can encounter initial problems with internal funding. When EPC is used, the municipalities should not need any own initial capital.

The two municipalities in this project got a loan for initial investments from the NEE (ESCO), but saw later an opportunity to get a loan with a better interest and bought their way out. They also got directly the VAT compensated when taking over the project.

[9] The Norwegian Association of Local and Regional Authorities (KS).

As this project is one of the first large EPC projects in Norway, it has resulted in many lessons learned. The project has been very successful and the initiator (the NEE) would realize it in a similar way next time. One contract partner is a large advantage for the building owner. Training of operating personnel is vital and has been very positive. This can be used as one of the unique selling propositions for the building owners as potential clients for EPC projects.

When the project was initiated there were no national or local policies or projects to encourage EPC. The project has set a trend in Norway as, at present, national standards for EPC contracts are being developed. This will reduce the barriers for building owners. Over the last years a significant increase in announced EPC bids in Norway can be seen.

References:

Helgesen, Terje: Good practice examples, Eiker municipalities, Norway; Norwegian Energy Efficiency Inc. (NEE); April 2010; presentation

http://www.european-energy-service-initiative.net/eu/project.html

14 KfW's "Energy-Efficient Refurbishment" programme, Germany

14.1 Introduction

Project title		KfW programme "Energy- Efficient Refurbishment / Rehabilitation" (KfW programmes "Energieeffizient Sanieren – Kredit" (151), „Energieeffizient Sanieren - Kredit, Einzelmaßnahmen" (152), „Energieeffizient Sanieren – Investitionszuschuss" (430))[10]
Type of building(s) or construction		Residential buildings, including single and multi-family dwellings
Overall aim/objective of project		Support Germany's targets of climate protection and reductions to energy use, specifically the Energy Conservation Act (EnEV); job creation; support economic growth
Type of project		Soft loans & grants
Main technologies / approaches		Various measures which improve the energy efficiency of buildings such as improving insulation, modernization of heating system, renewal of windows and exterior doors, solar thermal installations, installation of ventilation systems with heat recovery
Location		Germany
Time frame	Start date (mm-yyyy)	2010 (previous programme "CO_2 Building Refurbishment" ("CO_2-Gebäudesanierungsprogramm") from 2005 to 2009, before that KfW CO_2 Reduction Programme since 1996)
	(Planned) end date (mm-yyyy)	Ongoing
Project originator/host		KfW bank
Key stakeholders:		KfW bank: Programme host, refinancing loans at favourable interest rates:
		German government: Programme originator, oversight, commitment of federal budget
		Local commercial banks (e.g. private banks, cooperative banks): Processing of application, disbursement of loans/grants:
		Project applicants: private homeowners, homeowners' associations, housing companies

14.2 Project description

Total (projected) energy saving per year (in GWh/y)		2'450 GWh/y (energy savings for heating and warm water resulting from 2010 investments),
Costs	Depreciation period (years)	depends on measures taken
	CAPEX (total, in mEUR)	6'900 mEUR (total investment costs in 2010)
	CAPEX (annualised, in mEUR)	n/a
	OPEX (in mEUR/y)	n/a
	Other costs	n/a
(Projected)	Energy savings (in EUR/y and/or in	214 m EUR/year (energy savings for heating and

[10] For detailed programme descriptions, please see http://www.kfw.de/kfw/de/Inlandsfoerderung/Programmuebersicht/index.jsp

Total (projected) energy saving per year (in GWh/y)		2'450 GWh/y (energy savings for heating and warm water resulting from 2010 investments),
benefits	GWh/y)	warm water resulting from 2010 investments), 2'450 GWh/y
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Emission reductions: 847'000 tons of CO_2eq per year; Job creation: 92'500 person years

[Note that various evaluations have been undertaken of the previous, comparable KfW programmes since the earliest programme started in 1996. The above figures are for 2010 based on the programme evaluation by 'Institut Wohnen und Umwelt' and 'Bremer Energie Institut' (IWU & BEI, 2011).

Out of the total projected 2.450 GWh/y energy savings resulting from the 2010 investments, about 1.950 GWh/y (79%) result from cases where loans were disbursed, about 500 GWh/y (21 %) result from the disbursement of grants (IWU & BEI, 2011)

In 2010, the measures undertaken under the program led to emission reductions of 847.000 tons of CO2eq per year. This value includes direct emission reductions as well as indirect reductions related to the production of the used energy carriers and the impact of non CO2 greenhouse gases (IWU & BEI, 2011).]

Energy use in buildings plays an important role in Germany's climate mitigation targets as about 40% of energy end-use and a third of CO_2 emissions are related to the built environment. As Germany's promotional bank, which was founded to support the reconstruction efforts after the Second World War, KfW has grown into an important player in supporting Germany's efforts in this area. Between 2005 and 2008, KfW has for example been involved (for the most part in collaboration with local banks) in almost 80% of the investments into improving insulation in residential houses in Germany (Klinckenberg Consultants, 2010). KfW runs a number of programmes in the broad area of energy use in buildings, including programmes for newly built houses. The following analysis focuses on programmes for the "energy-efficient refurbishment" of buildings (programme numbers 151, 152 and 430)[11], which provide a combination of soft loans and grants to building owners for renovation measures. These programmes give preference to a comprehensive approach to improving energy performance, undertaking a number of parallel measures such as the renewal of heating systems, thermal insulation, replacement of windows and exterior doors, solar thermal installations and installation of ventilation systems with heat recovery.

KfW's programmes in this area are not separate efforts but part of and closely aligned with the broader strategy of the German government to improve energy performance in buildings. The KfW programmes "Energy-Efficient Refurbishment" for example directly build on the energy performance standards set by the German EnEV (Energy Conservation Ordinance), the programmes are supported by the German Energy Agency (DENA) with information campaigns and technical know-how, are financed by German tax revenues, and conditions are negotiated with the German government. Apart from climate goals, the programmes also have the explicit targets to create jobs and support economic growth.

KfW's earliest efforts in the area of energy efficient modernization of Germany's building stock date back to 1996 when the "KfW CO_2 Reduction Programme" was introduced. Compared to today's approach, this programme supported mostly individual measures or a package of measures rather

[11] For detailed programme descriptions, please see http://www.kfw.de/kfw/de/Inlandsfoerderung/Programmuebersicht/index.jsp

than taking a more comprehensive approach and started with a sole focus on the former West German states. Since then, there have been various adjustments to the approach, with the current version of the programme ongoing since 2010 (Schröder et al., 2011).

14.3 Financial characteristics

14.3.1 Conditions & Instruments applied

The “Energy- Efficient Refurbishment” programmes apply a mixture of soft loans and grants. The more efficient the house becomes after refurbishment, the less of the loan the building owner has to repay.

Home owners who either want to invest to make an older residential building more energy-efficient or plan to purchase a newly refurbished home can apply for a KfW loan if the house after refurbishment does not exceed a specific energy requirement for a comparable new house. The respective energy standards for new houses are laid out in the German Energy Conservation Ordinance (Energiesparverordnung/EnEV). The level of support by the KfW programs depends on how the performance of the house compares with the energy requirements specified by the EnEV. Currently, the following five levels of support for a "KfW Efficiency House" are defined:

- KfW Efficiency House 55;
- KfW Efficiency House 70;
- KfW Efficiency House 85;
- KfW Efficiency House 100;
- KfW Efficiency House 115 (KfW, 2012).

The figures indicate how much of the maximum primary energy requirement, as specified in the EnEV, the house consumes. In this case, the best standard is KfW Efficiency House 55, which implies that this house uses only 55% of the maximum allowable energy use of a new house (KfW, 2012).

As of February 2012, interest rates for an 8 year loan were 1.1%, for a 30 year loan rates were 1.5%[12]. The table below shows how much debt relief KfW grants to borrowers depending on the energy performance level achieved through the renovation (KfW, 2012):

Energy performance Standard based on EnEV	Debt relief in percent of loan
KfW Efficiency House 115	2,5 %
KfW Efficiency House 100	5,0 %
KfW Efficiency House 85	7,5 %
KfW Efficiency House 70	10,0 %
KfW Efficiency House 55	12,5 %

Debt relief is granted after an authorized expert has confirmed that the renovation has been undertaken according to specification. It’s possible to finance 100% of the investment costs for the refurbishment including extra expenses e.g. for architects and other advises through the KfW loan. The maximum credit per housing unit is 75‘000 EUR (KfW, 2012).

Access to (affordable) credit can be a major barrier for undertaken comprehensive renovation measures. Thus the provision of loans in combination with grant elements (through subsidized

[12] See http://www.kfw.de/kfw/de/Inlandsfoerderung/Programmuebersicht/Energieeffizient_Sanieren_-_Kredit/Konditionen.jsp

interest rates and debt relief) was chosen as the preferred instrument by KfW / the German government for the large scale support for improving the energy performance of the building stock. If it is not possible to undertake a complete refurbishment with reasonable costs and effort, it is also possible to get financing for individual measures e.g.

- thermal insulation of walls, roof and floor space;
- renewal of windows and exterior doors;
- installation of a ventilation system.

However, available financing for individual measures is lower.

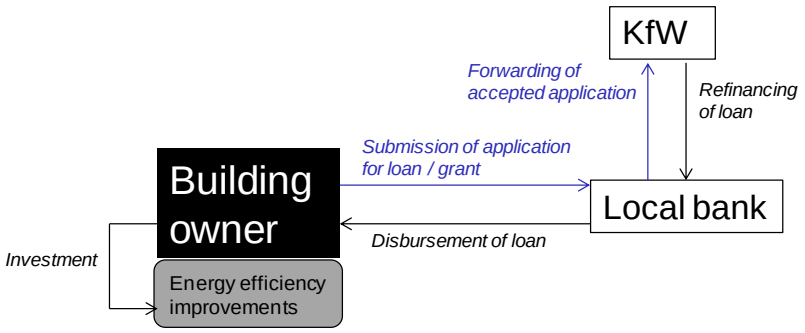
For home owners who do not require a loan to undertake the investments into energy efficiency, but finance them with their own capital, it is possible to receive a direct grant (Programme number 430)

14.3.2 Financial construction

Figure 14.1 demonstrates how the financial construction of the KfW programmes issuing loans works: Homeowners apply for the programs at their local banks. With their application, they have to submit an energy performance certificate from a certified energy adviser. Once the local bank approves the application and loans are disbursed, the bank gets this loan refinanced from the KfW (see also Figure 14.2).

Applications for subsidies are made directly to KfW, unlike loans which go via local banks. Subsidies are available independently of an applicant's income.

Figure 14.1 ***Flowchart of financial and service relationships within the KfW programme 'Energy-Efficient Refurbishment' (based on: Schroeder et al., 2011)***

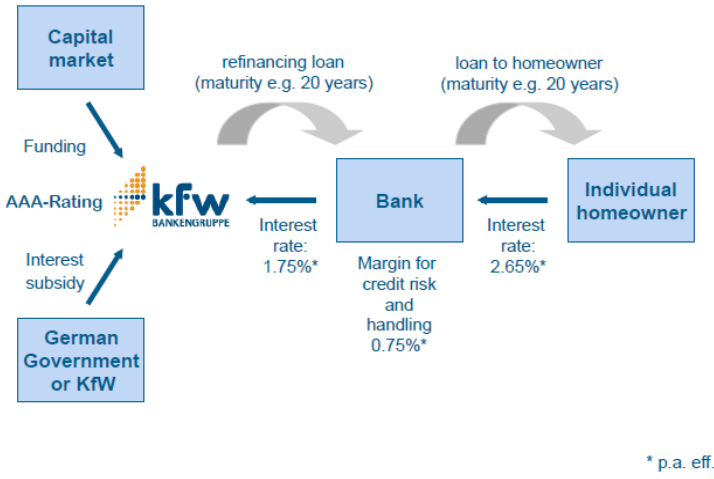


14.3.3 Risk profile

In refurbishment projects undertaken under the "Energy-efficient refurbishment" programme, two types of risks can be identified. One is related to the environmental integrity of the project, i.e. will the expected energy efficiency gains for which the home owner receives interest rate subsidies and grants really materialize? Secondly, the transaction bears the same credit risks for the underwriting local bank as any conventional loan for the renovation of a building. The latter risk stays with the local bank, not with KfW.

Figure 2 gives an example of the interest rates charged by the local bank to home owners for a KfW loan and by KfW to the local bank. In this example, the bank keeps a margin of 0.75% to compensate for the credit risk and handling of the project application process.

Figure 14.2 ***KfW's on-lending principle (source: KfW, 2010)***



KfW aims at mitigating the risk related to the energy performance of the project by mandating an energy performance certificate issued by a certified energy adviser. In the case of renovations, energy performance of the planned measures is assessed ex-ante estimating expected energy performance relative to the "KfW Efficiency-House" standard (KfW, 2012). KfW commissions regular external evaluations of its programmes; however, the evaluation of the "Energy-Efficient Renovation" programme is also based on expected energy performance based on the energy performance certificate (see IWU & BEI, 2011). Additional evaluations of how reliable energy performance certificates prove to be in accurately forecasting energy performance after renovation will allow for a more reliable evaluation of environmental integrity of the programme.

14.4 Analysis

Overall, the KfW programme "Energy- Efficient Refurbishment" and its predecessors have been remarkably successful: Evaluation reports demonstrate positive effects of the programmes in terms of investment stimuli, energy savings, CO2 reduction and the impact on employment, as well as positive impacts on public budgets (Forschungszentrum Jülich, 2011). The KfW's programmes for existing buildings are described as "a big success" (IEA, 2007). Boonekamp and Eichhammer (2007) state that the German programmes are one of the few examples in Europe, where "long term financial [policy] efforts (...) had considerable impacts in terms of energy savings and CO2 emissions reductions".

Out of Germany's total building stock of about 40m residential units, 29m were constructed before 1979. Of these, about a third, i.e. almost 10m had been refurbished leading to improved energy efficiency performance by 2010 (KfW, 2010b). This figure is substantially higher than in other European countries (Schröder et al., 2011)

A number of factors have been identified as reasons for this success:

- The fact that comprehensive energy efficiency improvements are mandatory at every significant renovation provides a strong driver for the uptake of KfW loans and grants.
- The KfW programmes are part of a broader approach taken by Germany to improve the energy performance of buildings. This approach consists of three pillars, i.e. a clear legal framework; strong subsidy and loan programmes; and promotional information, advice, and support (Menzer, 2010, cited in Schröder et al., 2011). For the latter, the German Energy Agency (DENA) plays a central role in providing information, expertise, and practical know-how, but not directly giving project advice or delivering projects itself.

- There is a clear link between the amount of subsidies and size of loans with the ambitions of the energy-efficiency retrofit, which incentivized home owners to undertake more ambitious measures (KfW, 2010c, cited in Schröder et al., 2011).
- The shift towards preferably supporting comprehensive refurbishment of whole buildings rather than single measures has increased investments per building and overall efficiency improvements (Schröder et al., 2011).
- Germany's approach to the refurbishment of buildings is comprehensive in the sense that a wide range of actors and buildings are eligible for support, i.e. almost all domestic buildings, including ones owned by landlords, tenants and publicly owned buildings. Only applicants who are not credit-worthy or who suggest too pricey measures are not eligible (KfW, 2010c, cited in Schröder et al., 2011).
- The fact that KfW is a publicly supported investment bank and the way how loans are disbursed through local banks across all regions of Germany greatly increases confidence in the approach by private sector players and the general public and leads to high efficiency and leverage. The approach also reduces marketing costs for KfW as its local banks are responsible for the transactions and earn an interest margin for the handling of the process (KfW, 2010c, cited in Schröder et al., 2011).
- A broader study (Klinckenberg Consultants, 2010) which analyzed a range of financial support schemes to improve energy performance of buildings including the KfW programmes suggests that schemes which are not directly delivered by governments but by third parties generally seem to be effective.

Although the total numbers of buildings for which energy efficiency performance has been improved are impressive, the current rate of refurbishment is not fast enough to reach the German government's climate targets. It's estimated that a doubling of the current rate of refurbishments would be required (Kwapich, 2010b, cited in Schröder et al., 2011).

On the one hand, a faster pace of refurbishment is constrained by the availability of public funds to finance the interest rate subsidies and direct grants, especially as energy efficiency requirements become more stringent and thus the required investments for refurbishments more expensive. On the other hand, there are also structural characteristics of the German housing market which may slow down the rate of refurbishment: Compared to other European countries, Germany has a relatively high rate of rented buildings / apartments. In Germany, about 40% of households are owner occupied buildings or apartments (KfW, 2010). In rental buildings, due to split incentives, fewer incentives for efficiency improvements exist than in owner-occupied buildings In addition, there are regulations which limit annual rent increases even after significant energy efficiency improvements. This may disincentivize property owners to undertake ambitious renovations. Moreover, in some regions of Germany, especially in the former Eastern states, the rental market is demand-driven and the willingness to pay for premium features in living space is low, thus driving rental prices down and limiting ambitions for energy efficiency improvements (Schröder et al., 2011).

KfW's programmes for "Energy-efficient renovation" can certainly guide approaches in other countries. However, it's important to keep in mind that KfW is a relatively unique institution with its history in the reconstruction period following the Second World War (Schröder et al., 2011). Moreover, KfW does not operate independently of its context, but is part of a complex system including the rules and regulations around energy performance in buildings, support through the German Energy Agency etc. These aspects would make it challenging to closely replicate the approach in other countries.

14.5 Conclusion

KfW's "Energy- Efficient Refurbishment" programme and its predecessor programmes have been remarkably successful. Important features are the focus of the programme on a comprehensive approach to refurbishing buildings, thus allowing for optimal energy efficiency improvements, the use of a combination of grants and soft loans for up to 100% of required investment costs, which fully overcomes the barrier of 'access to capital' for building owners, the requirement to improve energy efficiency whenever a building owner plans to undertake substantial renovation measures, and the fact that the KfW programmes are closely aligned with Germany's broader strategy on energy performance of buildings and economic targets such as job creation and economic growth. However, due to the specific German context and the fact that KfW is quite a unique institution, it's probably difficult to closely replicate KfW's programmes in other countries.

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15 National building support programme, Switzerland

15.1 Introduction

Project title		Buildings Programme
Type of building(s) or construction		Existing buildings (all types)
Overall aim/objective of project		Energy renovation of existing buildings' envelopes leading to CO_2 emission reduction
Type of project		Policy programme
Main technologies / approaches		The Buildings Programme of the Climate Cent Foundation is funded by a charge levied on all petrol and diesel imports at a rate of 1.5 cent per litre. Support is for renovation of existing buildings' envelope. The Climate Cent Foundation is a voluntary measure of Swiss industry aimed at effective and sustainable climate protection, in accordance with the Swiss Carbon Law.
Location		Switzerland
Time frame	Start date (mm-yyyy)	2006 (applications can be submitted)
	(Planned) end date (mm-yyyy)	2012 (planned) – 2011 (finalized)
Project originator/host		The Climate Cent Foundation
Key stakeholders:		The Buildings Programme
		TNC Consulting AG
		Provinces

15.2 Project description

Total (projected) energy saving per year (in GWh/y)		58,000 tonnes of CO_2/year (total: 232,000)
Costs	Depreciation period (years)	4
	CAPEX (total, in mEUR)	175 million Swiss Francs (app. 130 million Euro)
	CAPEX (annualised, in mEUR)	Not available
	OPEX (in mEUR/y)	Not available
	Other costs	42 million Swiss Francs (app. 30 million Euro) contributed by the Provinces
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	58,000 tonnes of CO_2/year (total: 232,000) av. 935 Francs/tonne Co_2 (697 Euro)
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Contribution to overall CO_2-emission reduction goal of the Swiss Confederation

The Buildings Programme project is focusing on energy renovation of existing buildings' envelopes, in particular roofs, façades and windows, which goes beyond the requirements of the Building Law. The renovation has to be comprehensive, it means all windows, or all façades, etc. Even the older building stock in Switzerland is energetically relative good. Most of the buildings from before 2000 are insulated with 6-8 cm of insulation. With the renovation now, 15 cm of insulation is placed and windows with triple glazing of U<1.0 W/(m^2K) are installed.

Until the end of 2009, 8,219 projects have been contracted, out of which, 43% has renovated the entire building envelop.

One of the most important motives of the Buildings Programme was to encourage people to take energy saving measures. As existing buildings have a large potential of CO_2 reduction, the Buildings Programme intended to contribute in considerable way to national goals of the Swiss Confederation regarding the CO_2 reduction. The Climate Cent Foundation entered into an agreement with the Swiss government on the amount of CO_2 reduction to be delivered.

One of the goals was to reach maximal impact with the given money. The estimated impact can multiply be by a factor 10 if compared with impacts of similar policy programmes in Germany. One of the reasons for this high impact seems to be a very sophisticated support scheme (Fördermodell). For example, the support scheme categorizes the buildings to be renovated to the detail of a part of the building envelope, construction year, feasible energy savings etc. and assigns different support amounts accordingly.

Another reason concerns rising of people's awareness of the fact that a lot of energy can be saved by insulating the building envelop. As this measure is not as obvious as for example placing solar collectors or photovoltaics onto the roof, people are not aware of the high energy and cost-effectiveness of the building envelop renovation.

The goal was not to switch to another (renewable) energy source, but rather to insulate buildings, which the Buildings programme team believes is the first logical step.

The Climate Cent Foundation is a private organization. There is an arrangement with the government in order not to promote certain energy saving measures double. Climate Cent Foundation is in charge of the building envelope, local governments of new technologies, installations and renewable energy technologies. This is important for the knowledge of the public so that it does not get confused.

In 2006, the project was launched and first applications for financial support could be submitted. At the end of 2009, the call for applications was closed as the contracted financial means were exhausted. All projects (8,219 in total) shall be finished by the end of 2011. The support will be paid of only after the projects have been finished and the proof of contracted energy saving measures can be delivered.

The project will officially be finished in 2012, when the CO_2 measurements will be finalized.

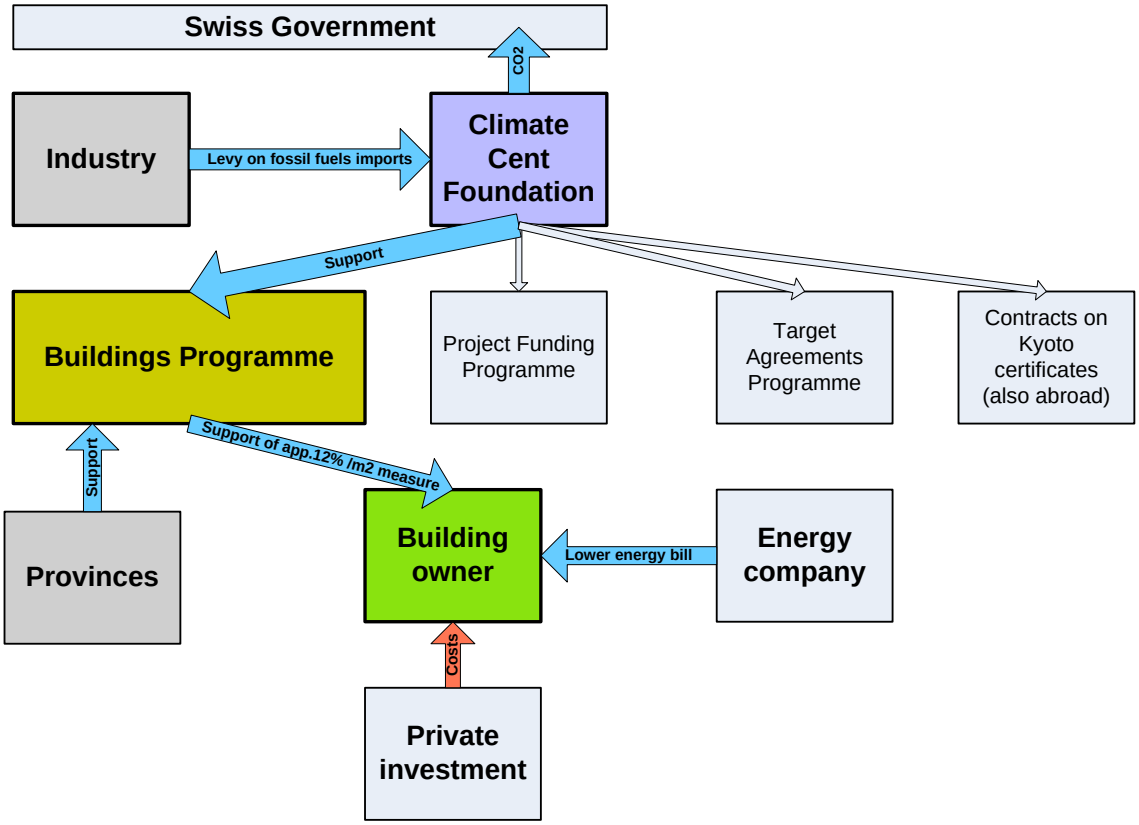
15.3 Financial characteristics

15.3.1 Financial construction

The financial characteristics and roles of the involved parties are shown in the scheme below. The Swiss industry pays a levy of 1.5 cent for each litre of imported oil to the Climate Cent Foundation. The Climate Cent Foundation has agreements with the government on investing the levies in energy saving programs and projects. The direct benefit for the government is the CO_2 reduction.

As the scheme shows, the Climate Cent Foundation runs several CO_2-reducing programmes. Besides the Buildings Programme, which is described here, the following programmes are partly financed by the funds collected by the Climate Cent Foundation: the Project Funding Programme, the Target Agreements programme and the Contracts on Kyoto Certificates.

The Buildings Programme supports measures by flat rates in Swiss Francs/m^2 of renovated building envelop. The building owners are supposed to contribute by a major part of the investments themselves. Due to flat rates, the building owners who manage to purchase and apply measures in a more economical way receive a contribution that is higher than the average 12% on the total investments. The investments will be paid back due to a lower energy bill for the rest of the life time of measures.



The Climate Cent Foundation wanted to find out at which support rate the building owners can be motivated to renovate and the renovation stays cost-effective. That's why it started with a lower flat rate, which has been increased to average of 12% of the total investment. The contributions are given in amount per square meter of the renovated construction. For example, the financial contribution for triple glazing is 17 Swiss Francs per square meter (app. 13 Euro/m_2). This way, the applicants are invited to apply cost-effective products.

Climate Cent Foundation contributed 175 million Swiss Francs (app. 130 million Euro), while Provinces contributed 42 million Swiss Francs (app. 30 million Euro). These amounts have been agreed in advance. The goal was to reach maximal impact with these amounts, thus the highest possible cost-effectiveness.

Most of the projects have received a contribution of 4,000 to 7,000 Swiss Francs (app. 3,000 to 5,000 Euro), with an average of 21,300 Swiss Francs (app. 16,000 Euro). Most investments ranges from 50,000 to 70,000 Swiss Francs (app. 38,000 to 53,000 Euro); with an average of 189,000 Swiss Francs (app. 144,000 Euro).

There are (les than 50) large projects that have received support of more than 250,000 Swiss Francs (app. 190,000 Euro).

From the overall 175 million Swiss Francs (app. 130 million Euro), maximal 5% was allowed to be used as indirect costs.

15.3.2 Conditions & Instruments applied

The conditions for financial contributions to energy saving measures, going beyond the Building Law, are stipulated in Fördermodell (Promoting model of the support scheme) and can be seen in detail in Nordmann (2011, to be downloaded from: www.stiftungklimarappen.ch).

As mentioned above, a very important objective of the Building programme was its high cost-effectiveness. This has been reached by among others a very sophisticated support scheme (Fördermodell). For example, the support scheme categorizes the buildings to be renovated to the detail of a part of the building envelope, construction year, feasible energy savings etc. and assigns different support amounts accordingly. Also, reference buildings have been elaborated and quality energy performance calculations made.

Further, the support amount was lower at the beginning, in order to find the optimal rate. As the number of applications was low, the support rate had been increased steadily until it reached average of 12% of the total investment.

From the overall 175 million Swiss Francs (app. 130 million Euro), maximal 5% was allowed to be used as indirect costs (expertise, logistic, evaluation, administration…). As the Building Programme is a large investment programme, it is easier to comply with this requirement than it would be with less extensive programmes.

The Buildings Programme has facilitated the understanding among building owners that renovation of building envelopes going further than the Building Law is energy and cost-efficient.

Below, an example of a multi-family building in Ostermundigen renovated with the support of the Building programme (credit: Markus Hammer).

15.3.3 Risk profile

The response of the market was a point of concern. Because of this, the offered support amount was low at the beginning, increasing slowly to find out at which support rate people are willing to change their behaviour. The response was eventually very good and the possibility to submit applications for contribution stopped at the end of 2009 due to exhausted support amount.

The support was paid out only after the renovation had been finished and it could be proved that contracted measures had been realized.

From the overall 175 million Swiss Francs (app. 130 million Euro), maximal 5% was allowed to be used as indirect costs (expertise, logistic, evaluation, administration…). If higher, the projects would not be cost-efficient. That's why it was crucial that the whole amount of 175 million Swiss Francs could be contracted. This goal is succeeded.

15.4 Analysis

The Climate Cent Foundation is a private organization. There is an arrangement with the government in order not to promote certain energy saving measures double. Climate Cent Foundation is in charge of the building envelope, local governments of new technologies, installations and renewable energy technologies.

The instruments employed are straightforward and well working. The Swiss industry pays a levy of 1.5 cent per each litre imported oil. The levies are collected in the fund of the Climate Cent Foundation. Some Provinces give financial contribution. The Climate Cent Foundation supports projects reducing CO_2, like the Buildings Programme. The Buildings Programme gives flat rates support in Swiss Francs/m^2 of renovated building envelop, but according to a fine-tuned categorization of buildings.

The sophisticated support scheme (Fördermodell), as mentioned above in more detail seems to be the key in the success of the Building Programme. Some recommendations have been done when evaluating the Building Programme, e.g.: the quality and accurate calculations of support amounts are important, target groups must be segmented, the support scheme can be ideally the same for the whole Switzerland, but not at any price, clearly defined rules are essential, a supervisor for large projects makes sense, the remuneration of the leaders who promote the programme should be increased, at long term programmes, regular checks are necessary during renovations.

Cost-effectiveness of a renovation depends on many factors like the building type and size, year of construction, synergy effect at profound renovation, kind of implementation, types of materials used, feasible energy savings, etc. Further, there are differences among municipalities and among countryside and town within the municipalities. Private owners proved to be able to renovate more cost-effective than when the building owner was a company. Cost-effectiveness is as well strongly subject to parameters like prices and interests.

Low energy renovation appears to be generally cost-effective when compared with a common renovation. The long-term benefits of a low energy renovation must be taken into account.

From the overall 175 million Swiss Francs (app. 130 million Euro), maximal 5% was allowed to be used as indirect costs (expertise, logistic, evaluation, administration…). As the Building Programme is a large investment programme, it is easier to comply with this requirement than it would be with less extensive programmes. This strong requirement has contributed to the high cost-effectiveness of the Building Programme.

The instruments have had the desired effect. The main goals have been achieved earlier than expected.

The Buildings Programme in the exact form would be difficult to apply on the European level with general rules for all Member States. The situation of the building stock and actors can be rather different in European countries.

The Climate Cent Foundation supports other CO_2 reduction programmes in Switzerland and abroad as well, such as the Project Funding Programme, the Target Agreements Programme and the Kyoto Certificates Programme (for more details, see www.stiftungklimarappen.ch). So it seems that the instrument can be used in a wider context. Raising funds for renovation of buildings, implementation of innovative and renewable energy technologies by levy on petrol products imports seems in principle possible in any Member State.

The main project barrier was the initial low response among the building owners. This has been solved by increasing the rate of support until the optimum was found. Too low response would make the project not cost-effective.

15.5 Conclusion

The Buildings Programme project has been very successful with all parties being happy with the results achieved in this clear win-win situation. The programme is a good example of partnership among governmental, industrial and private parties, which contributes to the CO_2 reduction goal of Switzerland and is highly cost-effective.

One of the most important features that contributed to the high cost-effectiveness of the Building programme is the sophisticated support scheme (Fördermodell). Quality of implementation and accuracy when determining the optimal support amount for various types of buildings and measures are a crucial part of it. Also a steady increase of the support amounts, in order to find the optimal support rates, has contributed to the cost-effectiveness.

The large extent of the programme made it possible to reach the requirement of maximal 5% of the indirect costs on the total investments. The Building programme is national-wide, but it proved that it does not have to be necessarily the same in all regions. To implement this kind of programs Europe-wide would not work, as every country has too many specific features, which should be respected.

Finally, a major achievement of the project is that it has raised awareness among building owners on the importance and cost-effectiveness of energy efficiency renovations of the building envelope.

16 Energy saving obligations in the United Kingdom

16.1 Introduction

Project title		Energy supplier obligations in the UK
Type of building(s) or construction		The residential sector in the UK. The programme has a specific sub-target for priority groups of low income households, and elderly private homeowners of age 70 or older. Suppliers must achieve at least 40% of their overall target in the priority groups.
Overall aim/objective of project		Energy supplier obligations in the UK are currently enforced with the Carbon Emission Reduction Target (CERT) policy programme. It obliges all large domestic energy suppliers to realise energy savings in households. CERT is implemented in several phases, in April 2011 the fourth phase started.[13] Energy saving obligation schemes first began in 2002 in the UK, by the name of the Energy Efficiency Commitment (EEC) programme (2002-2008). As of 2013, the current CERT and CESP programmes will be replaced by one obligation programme: the Energy Company Obligation (ECO). This will integrate with the wider Green Deal programme that begins at the same time.
Type of project		Policy programme
Main technologies / approaches		Insulation (majority of the savings, mainly cavity and loft), efficient lighting, efficient heating (heat pumps), efficient appliances.
Location		United Kingdom
Time frame	Start date (mm-yyyy)	April 2002 (EEC scheme).
	(Planned) end date (mm-yyyy)	The current CERT programme ends in December 2012, but will be continued by the ECO obligation.
Project originator/host		UK government
Key stakeholders:		UK government: Department of Energy & Climate Change (DECC)
		Six large energy suppliers operating in the UK
		Households: main target group of the programme
		OFGEM (energy market regulator): administrator of the CERT programme and monitors and evaluates its results.
		Installers: Some energy suppliers have become installers themselves, others have hired installers.
		Energy Saving Trust (facilitator): non-profit, private but government funded organisation that provides free energy saving advice to households. Households can reach their free advice service desk on their own initiative, or their energy supplier can point them towards it.
		Insulation and product manufacturers

[13] Besides CERT the UK has another much smaller scale obligation policy, the Community Energy Saving Programme (CESP). It follows from UK fuel poverty policy targets, and obliges suppliers to achieve 40% of their saving target with low income households. It has a similar scope and running period as CERT and helps to realise the CERT goals (CESP, 2011). It is more of a pilot project, mainly providing knowledge and experiences that are informing the development of future programmes.

16.2 Project description

Total (projected) energy saving per year (in GWh/y)		
Costs	Depreciation period (years)	Unknown.
	CAPEX (total, in mEUR)	*Energy suppliers:* Over the period of April 2008 to December 2011, CERT estimated the installation costs of measures at almost 3.2 billion pounds, or roughly 1 billion per year. Over the whole period running until 2012, expected supplier costs are 5.5 billion pounds. These costs are expected to be largely passed on to households by raising energy prices. *Ofgem:* A few hundred thousand pounds for setting up required systems. Expected to be fully passed on to energy suppliers via their supplier licenses. *Households:* Installation costs and other 'hidden costs' of taking measures (e.g. time, renovation) are estimated to be a few billion pounds over 2008-2011.
	CAPEX (annualised, in mEUR)	See above.
	OPEX (in mEUR/y)	*Ofgem:* Administrator costs are estimated to be 1.7 million pounds per year. Expected to be financed by energy suppliers through their supplier license.
	Other costs	No.
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	Over the period April 2008 up until September 2011 (end of the quarter), CERT realised around 181 Mt CO2 emissions reductions to be achieved over the lifetime of the measures (this excludes savings carryover from the earlier EEC2 scheme, otherwise total savings are 218.7 Mt CO2). Insulation accounts for 62% and lighting for 24% of total cumulative savings of CERT so far. The CERT update provides detailed information on the cumulative volumes of the measures installed. When only the share of natural gas savings (estimated at ¾ of total emissions reduction) in the 181 Mton CO2 reduction is considered, and looking at the current fuel mix for space heating in the UK (80% of space heating comes from natural gas), it is estimated that natural gas savings of the programme amount to more than 583 TWh over the lifetime of the measures. The assumed lifetime in CERT evaluations is unknown.
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	The government has quantified billions of pounds of overall societal benefits from the programme. These follow from saved energy costs, improved

Total (projected) energy saving per year (in GWh/y)		
		air quality and comfort, and avoided purchase of emissions allowances. A growth rate of jobs at insulation manufacturing and installation has been experienced as of 2002, that is larger than the government expected it to be without the EEC and CERT in place. In the insulation industry, 27,000 new jobs are estimated to have been created.

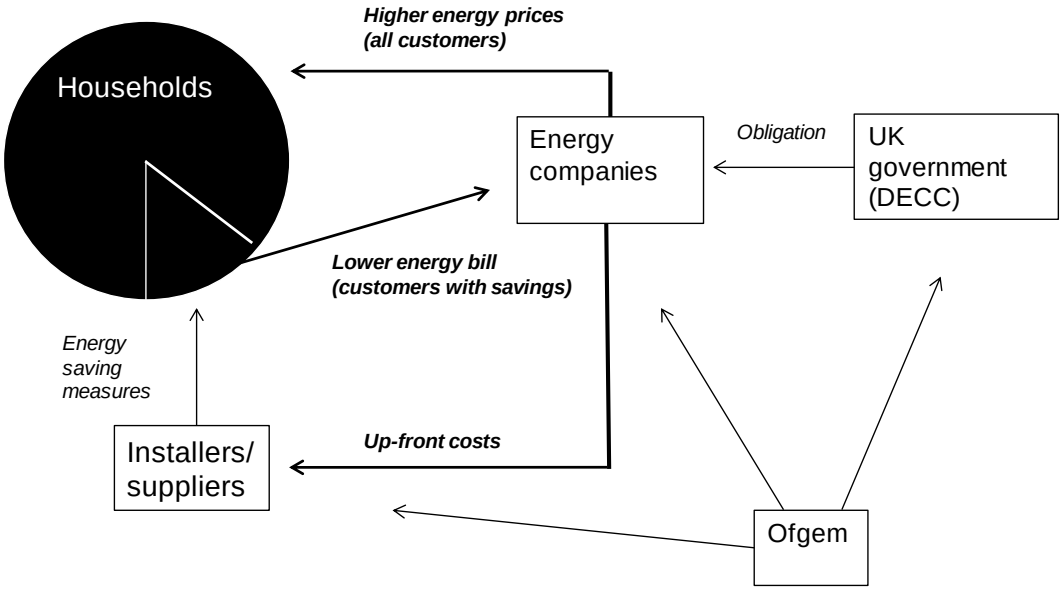
Other aspects of the CERT programme are:

- The CERT website clearly mentions the main aims of the programme: "The primary aim of CERT is to make a contribution to the UK's legally binding target under the Kyoto protocol (to cut greenhouse gas emissions by 12.5% below 1990 levels by 2008-2012) and the Climate Change Act 2008 requirement (to cut emissions of greenhouse gas emissions by 80% below 1990 levels by 2050). However, CERT will also help: reduce energy demand; enhance the UK's security of supply; reduce energy bills for those receiving measures; reduce fuel poverty; and, secure jobs in energy efficiency industries." (CERT, 2011). Greenhouse gas emissions reduction is the primary aim, whereas positive social-economic impacts, especially reducing energy poverty, are important side goals.
- The programme incentivises measures, such as insulation which has a high saving potential. But it also restricts certain measures. Lighting products were excluded from the scheme as of April 2011 (for example, cfl's have already been massively provided by the UK obligation scheme).
- No EU funds have been used for the saving obligations programme.

16.3 Financial characteristics

16.3.1 Financial construction

The basic organisational and financial structure is that energy suppliers are obliged to meet CO2 reduction targets. They have to encourage households to voluntary take-up energy saving measures. Suppliers therefore invest in measures, such as insulation, to be able to offer it to any household – it does not need to be their own customers. Below the basic structure is illustrated:



16.3.2 Conditions & Instruments applied

Energy suppliers are free to decide how to achieve their targets, but will typically promote the most cost-effective measures (cavity wall insulation, loft insulation) using subsidy. Energy suppliers pay the costs (or part of it) of the saving measures, either to homeowners or to suppliers like manufacturers and retailers. This happens in various ways depending on the measures. Energy suppliers provide measures to priority groups usually for free such as insulation and cfl's, fund promotion and installation by social housing providers, fund price reductions at retailers, and subsidise part of the price (for example half of it) or fund promotion of efficient appliances by manufacturers. Apparently this is sufficient to persuade enough households, as the current programme seems to be on track and all previous targets have been achieved. Information is confidential on where and how energy suppliers get the financial means to meet the obligations. They are expected to have benefits from the programme, because they offer a new product which can retain or increase their customers' base.

Energy suppliers are allowed to pass on their costs to any customer (in theory, also those outside the UK), not only those who install measures. They are assumed not to pass on all costs, but to carry part of it themselves. Besides the operational costs for performing the scheme, the government does not provide funding for CERT. Also, no special local policies or legal arrangements have been required for executing the CERT scheme.

In the current scheme, households do not finance any costs themselves. Average installation costs per household are only in the order of 500 euros (usually one cavity or loft wall insulation measure is installed, possibly combined with other small measures). The new ECO scheme, which replaces CERT, will not focus on the same low-cost measures, such as cavity wall insulation. It will instead focus on solid wall insulation for older (e.g. pre-1930s homes). Whereas cavity wall insulation costs in the order of 500 euros per home, solid wall insulation can cost in the range of 7000 – 15000 per home. Of the 26 million UK homes, about 7 million need solid wall insulation. To reduce energy supplier costs, it is likely that these costs will be met with a combination of ECO subsidy from suppliers and financing by homeowners. Green deal finance (e.g. on bill financing) will be developed, which the householder repays over time (possibly up to 25 years) through charges on their energy bill. When a household moves, the green deal finance is left to the new owner. The condition of green deal financing is that the energy savings offset the financing costs.
Energy suppliers hire installers to deliver measures. Furthermore, energy suppliers have partnerships with several parties (housing corporations, municipalities, manufacturers, etc.) who also promote and realise measures at the target group.

Energy suppliers will get a penalty from Ofgem, if they do not reach their target. This fine can be substantial (up to 10% of their global turnover), but will depend on the nature of their short-fall.

The government had the choice of having the market (suppliers) perform and pay for savings, or having the government perform and taxpayers pay for savings. The current system was chosen as suppliers operate in a liberalised and competitive market and have a direct relationship with every household. The government assumes that the pressure of competition drives delivery costs down to realise the carbon reduction target more efficiently than a centralised Government programme would be able to.

16.3.3 Risk profile

A risk for energy suppliers is that customers may switch to another (maybe non-obliged) supplier because they are charged with higher energy prices. Energy suppliers therefore have the incentive to limit energy price increases. However this risk may be limited, as customers are probably not

very energy price sensitive and do not have many alternatives to make this switch. Also, non obliged small suppliers can only hold a small part of the market.

The UK government runs the risk of not realising the expected carbon emission reduction targets, for example if measure delivery methods of suppliers don't work. So far, these risks seem not to materialise as up to 2011 around three-quarters of the CERT target of 293 Mt set by December 2012 has been realised. However, as energy saving potentials diminish and become more costly as the programme accumulates over time, this risk may become greater in the future.

Another risk in the energy saving market may be the lack of capacity and knowledge that can arise (are there enough manufacturers, technology suppliers, and advisors?).

Despite some asset risk of measures installed and owned, households hardly run any financial risks as measures are financed by the suppliers.

16.4 Analysis

Strengths

- The main strength of the programme lies in the fact that energy suppliers are obliged to save energy, which tackles many barriers to energy savings.
- All households eventually pay for the suppliers' investments via higher energy prices, so all have an incentive to undertake measures.
- The CERT is very attractive to homeowners, as energy saving measures are largely sponsored by energy suppliers and installation is taken care of.
- The CERT stimulates the development of an energy saving market, creating benefits in terms of employment, knowledge building, etc.
- The programme has a suitable organizational structure. Energy suppliers are suitable parties to realize large scale energy savings (suppliers collectively have customer relationships with every UK household and they have finance, administrative, promotion and knowledge capacity). The energy market regulator, a national and separate government organisation (Ofgem), administrates the programme.
- The priority group focus on low income households ensures the benefits of the scheme are distributed equitably to all consumers, not just the ones with better disposable incomes. Furthermore, it reduces the chance of free riding, as lower income households are less likely to have taken saving measures anyway.
- Homeowners get the opportunity to not only decrease their living expenses, but also increase the value of their home. This means an additional economic benefit. Poorer families who currently cannot afford to keep their homes to suitable temperatures, can keep their homes warmer and healthier, thus saving costs.

Weaknesses

- Energy suppliers face short term capital expenditures while receiving the benefits from higher energy bills only on the longer term. This may decrease their financial solvency.
- The method of supplying certain measures for free or at low charge can reduce the effectiveness of the programme. An example is cfl's, which were actually oversupplied. These may end up unused, which implies unnecessary supplier costs but no saving impact.
- Consumers tend not to trust energy supply companies, and often don't understand why they would want to help them to actually save energy.

- The government does not have information on how much the scheme costs suppliers to deliver, so all cost figures are estimates. They seek for ways to get better information in future schemes (i.e. ECO).

Opportunities

- The energy (and energy cost) saving potential can be considered high. The target segment are existing homes with high saving potential, and common cost effective measures like insulation are eligible in the scheme and even incentivized.
- Energy suppliers get the opportunity to build up a new service, by which they can increase and maintain their customer base.

Threats

- A serious threat to the programme is its own success. Less expensive saving measures are realized first, so the remaining saving potential has to be realized by more expensive measures. This can endanger realising the programme's targets.
- The development of an energy saving market requires that the supply side of this market is timely available. Potential threats are a lack of installers, available materials, or knowledge.

16.5 Conclusion

The major success factor of the energy savings obligation programme is the mandatory nature. Energy companies are enforced and have no choice but to realise investments, and they are capable of doing so. The programme is further able to realise savings in the existing housing stock where it is very difficult to realise energy savings by voluntary policies or commercial activities. Barriers are the large up front investments the energy suppliers need to make.

The business model helps to make the programme cost effective for stakeholders involved and reduce financial risks for homeowners. It enables suppliers to charge higher energy prices to customers to earn back their investments, whereas customers do not have to make an up-front investment.

An opportunity in the programme is the large energy saving potential in existing dwellings. A serious threat to the programme is that the remaining energy saving potential becomes more and more expensive to realise.

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17 Green loans for social housing, France

17.1 Introduction

Project title		Green loans for social housing
Type of building(s) or construction		Residential
Overall aim/objective of project		Improvement of the energy performance of social housing
Type of project		Preferential loan, capacity building
Main technologies / approaches		Incentive/subsidy scheme, legislation and capacity building
Location		France
Time frame	Start date (mm-yyyy)	2009
	(Planned) end date (mm-yyyy)	2020
Project originator/host		Caisse des Dépôts (CDC)
Key stakeholders:		*Caisse des Dépôts (CDC): project operator*
		Groupe SNI: operating agent of CDC
		Construction and building sector
		Social housing bodies (HLM, OPHLM)

17.2 Project description

The main operator of the 'green loans for social housing programme' is the Caisse des Depots, which consists of a main public institution and subsidiary companies, e.g. SNI group. The public institution brings together the functional activities (general secretariat, communication, etc) and operational activities (banking departments, savings funds). The subsidiary companies, carry out market activities and contribute to the group's long term social objective:

- directly through their activities: business development, real estate, services to public authorities (e.g. transport operators such as Veolia);
- indirectly: contributing to CDC profits; which finance its general interest projects.

CDC finances all its activities itself, without contributions from the State budget or taxes. Its profits come from diversified resources, in equal shares from the public institution section of CDC (activities as an investor) and its subsidiary companies and strategic holdings. Its profits, after tax are distributed as follows: one third to the State budget, one third to general interest investments and one third to increasing its equity capital. The direct investments focus on SMEs, the housing sector, universities and sustainable development.

In the housing sector CDC's ambition is to finance the deficit of almost one million homes by:

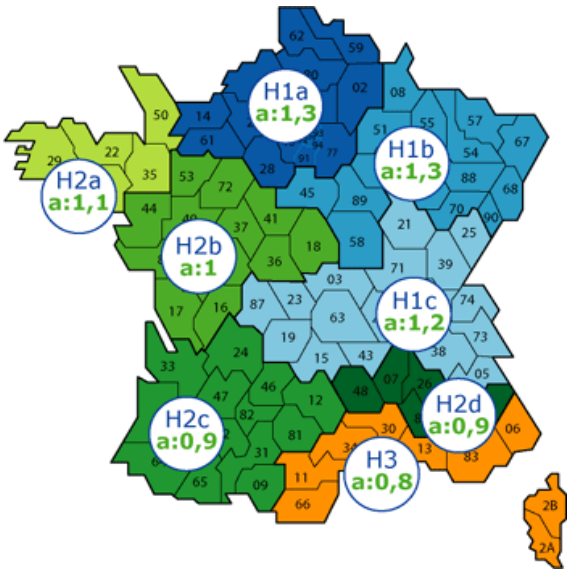
- Annually financing the creation of 90,000 homes (compared with 64,000 in 2009, i.e. an increase of 40%);
- Building 6,000 homes as a direct operator;
- Rehabilitating 18,000 homes in its own housing portfolio through the SNI group, according to the high quality environmental standards (HQE);
- Providing a large range of loans distributed to social housing bodies (HLM, OPHLM, etc.);
- Facilitating equity capital investments in housing and land.

CDC will support these activities through its subsidiary company SNI, the leading operator in social and intermediary housing and other social housing cooperatives and companies. Regulation set out by the Ministry of Environment, Sustainable Development, Transport and Housing dictates that:

- After December 2010 any new office / public building will have to consume less than 50 kwh/m²/year;
- After December 2012 all new dwellings in the social rented sector will have to consume less than 50 kwh/m²/year and are expected to become net energy contributors by 2020;
- 60 million m² of the buildings owned by the State will be renovated by 2020;
- 800 000 dwellings (100 000 in 2009 and 2010 and 70 000 every year after 2010) from the social rented sector consuming more than 230;kwh/m²/year will have to be renovated by 2020 and to consume less than 150;kwh/m²/year after the works;
- The energy consumption of the social rented stock has to be reduced by 38% by;2020.

The value of 50 kWh/m²/year is multiplied by a coefficient of climate harshness (EFFINERGIE, 2008). It means that the consumption value varies according to climate regions (cf. Figure 1). Several climactic types prevail in France. A temperate maritime climate is found in the west, while a continental climate prevails in the interior of the country. The Mediterranean coast is characterized by hot, dry summers, mild and humid winters, and a small number of rainy days during the year. This differentiation throughout France demands the participation of regional and local authorities and social housing corporations.

Figure 17.1 Climate regions in France



Source: EFFINERGIE, 2008

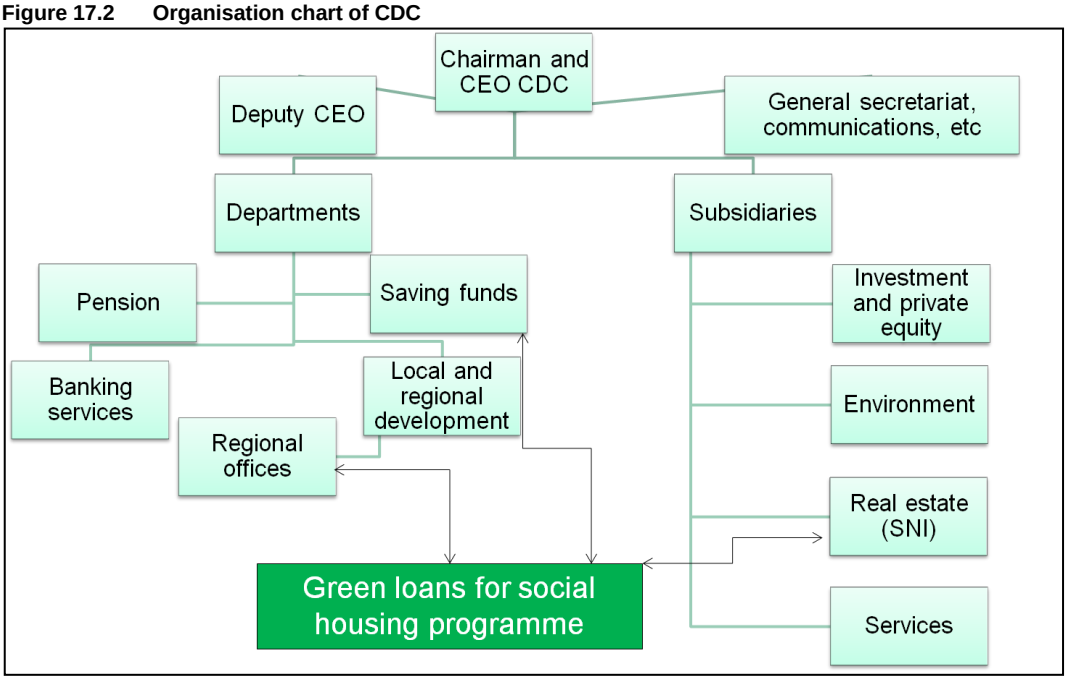
17.3 Financial characteristics

The ‘green loan for social housing’ programme is a component of CDC’s national housing programme, and seeks to finance the improvement of the energy performance of social housing. Specifically the green loan for social housing programme will facilitate the renovation of 100,000 social housing units in 2009 and 2010, as part of a larger programme to renovate 800,000 social housing units consuming most energy from 2009 to 2020. The priority units are social housing units with class F or G of the energy performance assessment, i.e. more than 230 kWh/m²/year. CDC aims to achieve this by making 1.2 billion euros available to be used for loans with a fixed rate of 1.9% for 15 years finance the renovation of the first 100,000 social housing units.

17.3.1 Financial construction

The funds necessary to provide the low interest loans are provided by CDC through its saving fund. These savings funds come from regulated savings schemes that are granted tax benefits, i.e. the interest earned by savers is exempt from tax, and is state-guaranteed. Part of the money deposited is therefore, in return, used to finance sectors which provide social or public services. This is the purpose behind centralizing deposited sums with CDC. The primary role of CDC is to ensure the security and liquidity of this large quantity of savings. However, requests to withdraw funds made by savings account holders must be honoured at any time. CDC also remunerates savers, and pays commissions owed to the banking networks. The CDC must therefore balance between two priorities: on the one hand, the security and remuneration of savings; and on the other hand, the best-price financing of programmes which benefit the country as a whole.

Figure 17.2 Organisation chart of CDC



Source: www.caissedesdepots.fr

17.3.2 Conditions & Instruments applied

The main beneficiaries of the loans for green housing are private social housing companies and CDCs subsidiary SNI group. CDC provides “Energy Performance” loans for social housing companies (SHCs) accessible through its 25 regional management bodies to facilitate loans for the financing of social housing. The loans have a fixed rate of 1.9% per year for a maximum period of 15 years. The amount of the loan granted for each dwelling will vary according to energy savings (Table 17.1).

Table 17.1 Amount of loans granted by CDC (for dwellings built after 1948)

Gain (kWh/m²/year)	<80	80-89	90-99	100-109	110-129	130-149	150-169	170-189	190-209	210-229	230-249	250-270	>270
Amount granted per dwelling (K€)	0	9	10	11	12	12.5	13	13.5	14	14.5	15	15.5	16

For renovations social housing companies can also benefit from a tax rebate up to 25% of the cost of the renovation work aiming at saving energy consumption. Other subsidies coming from the National Agency for Urban Renewal, the French Environment and Energy Management Agency

(ADEME) are also available. Subsidies from ADEME mainly concern feasibility studies that are carried out before the renovation activities. They enable social housing companies to deploy more efficient energy solutions. The increased energy performance can lead to over-compliance of saving goals by social housing companies, creating additional income through the trading of white certificates. .

17.3.3 Risk profile

It can be assumed that renovation works are financed by three resources (Amzallag and Taffin, 2010):"Caisse des Dépôts" covers 75% of the costs of the operation and ADEME subsidies 15%, while the remaining share is paid by the SHCs using its own resources. According to Bougrain (2010) in this case the refunding of the loan and the debt service will represent the largest part of the charges supported by social landlords (59%) in the future. Day-to-day maintenance and management costs will account for 24% of the expenditures and major renovation 10%. Taxes (4%) and unpaid rents and vacancies (3%) make up the sum. The motivation of SHCs to develop dwellings with low energy consumption is to lower the vacancy rates, to reduce the level of unpaid rent and to improve their financial position. However tenants should also participate to the financing of major renovation, but rents are subject to regulations by the State. This common problem tends to slow down actions that reduce energy consumptions. As owners and actors in charge of maintenance and operating activities of a building, it was not allowed to increase the level of the rents to compensate for investments in energy efficient solutions.

The government has foreseen this risk and since March 2009 social landlords can invest and charge a higher rent to their tenants if three conditions are respected (Des Lyons, 2010):

1. Tenants have to be the main beneficiary of the investments;
2. Social housing organizations have to inform tenants about the works (the nature of the renovation, how it will be done, the expected advantage of the renovation in terms of energy consumption and the way the tenant is going to pay part of the renovation in the future). The communication has to be directed towards tenants associations;
3. The dwelling after renovation has to reach a certain minimum level of energy efficiency.

The contribution of the tenant is limited to fifteen years and can amount up to half of the energy savings. However, energy savings are estimated before the renovation works and theoretical of nature. It is not possible to examine the savings after the renovation because no owner has the ability to check tenants' energy behaviour. However, studies have found that actual energy consumption can be double the amount predicted (personal communication Bougrain).

17.4 Analysis

The advantage of targeting social housing is that the stakeholder involved are private institutions which allow policies that can lead to further profits to be adopted more easily. If private owners were to be engaged it is far more complex as income levels and other social circumstances have to be taken into account. SHCs can also renovate collective houses, i.e. flats or apartment complexes, which present technical solutions that can significantly lower costs when judged per household. As a result of this focus SHCs have become very involved, pro-active and willing to invest. However, more feedback and involvements from tenants is necessary. Current standards only concern the physical building element, and not the number of people in the building or their energy behaviour. Assumed comfortable living temperatures are also not realistic and thus in reality energy savings are far from projected values.

Furthermore, it is surprising to see that there is no regulation regarding older privately owned homes. This program targets the dwellings of lower income groups but does not include home owners. Home owners interested in improving the energy performance of their homes could learn from the best practices and approaches of SHCs. The current program also only targets F or G labelled houses while more opportunities for savings may exist. The program is on track and meeting its goals which also indicates that the choice for this sector has its benefits.

17.5 Conclusion

The green loans for social housing programme provides valuable lessons. The CDC as an institution is very capable and its regional departments represent an easily accessible party for stakeholders. The program is said to be on track mainly because of the availability of funds, confirming that easily accessible funds are a crucial element. The anticipated friction between the benefactor of the savings, the tenant, and the investor for energy savings, the SHCs, has also provided new insights into ways to pass on energy savings to tenants, but it has also proven to still be problematic. The assessments are purely based on theoretical savings and the absence of a feedback loop and/or performance assessment of the implemented savings favours the landlords. This shows that implementing energy efficiency renovations by landlords or social housing corporations without training or capacity building in topics related to energy efficiency for tenants, especially lower income households in social housing, can exacerbate the principal-agent problem.

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18 Incentives for low-energy housing, Norway

18.1 Introduction

Project title		Incentives for low-energy housing
Type of building(s) or construction		New residential buildings, renovations
Overall aim/objective of project		Improve energy efficiency in the building sector
Type of project		Financial and fiscal incentive programme
Main technologies / approaches		Incentive/subsidy scheme, legislation and capacity building
Location		Norway
Time frame	Start date	01-2002
	(Planned) end date	12-2012
Project originator/host		Norway
Key stakeholders:		Ministry of Local Government and Regional Development
		Norwegian State Housing Bank
		Ministry of Environment
		Ministry of Petroleum and Energy
		Norwegian Energy Agency (ENOVA)
		Various research centres (e.g. SINTEF, Nordland Research Inst.)
		Various representatives from the Building, Construction and Property Industry

18.2 Project description

Total (projected) energy saving per year (in GWh/y)		
Costs	Depreciation period (years)	
	CAPEX (total, in mEUR)	12 million NOK (2006), i.e. about 1.7 million Euro
	CAPEX (annualised, in mEUR)	
	OPEX (in mEUR/y)	
	Other costs	
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	Reduce the total amount of energy used in new buildings by 25%
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Demonstrate new energy efficient building techniques Set examples through green public procurement for public buildings

The 'Incentives for Low-energy Housing' programme in Norway is one of the elements outlined in the 'Environmental Action Plan for the Housing and Building Sector' by the Ministry of Local Government and Regional Development (KRD), for the periods 2001-2004, 2005-2008 and 2009-2012. It is explained that the building sector is responsible for 40% of all deposited waste, uses 40% of all energy and comprises around 40% of all material flows, making the case for increased environmental efforts. The focus areas are:

- Reduce greenhouse gas emissions;
- Reduce the need for energy in buildings;
- Chart and minimise use of hazardous substances in buildings;
- Ensure good indoor climate in buildings;

- Prevent waste generation and increase reuse and recycling of building materials.

The 'Incentive for Low-energy Housing' programme is carried out by the Norwegian State Housing Bank (NSHB), and aims to contribute to these focus areas. Summarised, the aims of the project are to overcome existing financial and capacity barriers and to stimulate the uptake of low-energy practices in the household sector. NSHB collaborates with local authorities and stakeholders in the housing and building sector, and also attaches importance to supporting projects that have benefits that may only materialise in the long run. For example, experimental pilot projects that seek to use unproven and expensive technologies or building methods, may be further subsidised in addition to being granted a loan for up to 90% of the costs. The main activities that fall under the programme are:

- Development of low-energy homes and passive houses;
- Development of eco-friendly technology for homes and buildings;
- Environmentally sound management, operation and maintenance;
- Using lifecycle costs, including production of components and materials to operation and demolition of the building, to assess the environmental consequences of renovation versus demolition ;
- Development of a user-friendly online database to make it easier to choose environment-friendly materials and components;
- Database of good environmental projects;
- Reuse and recycling of building materials and products.

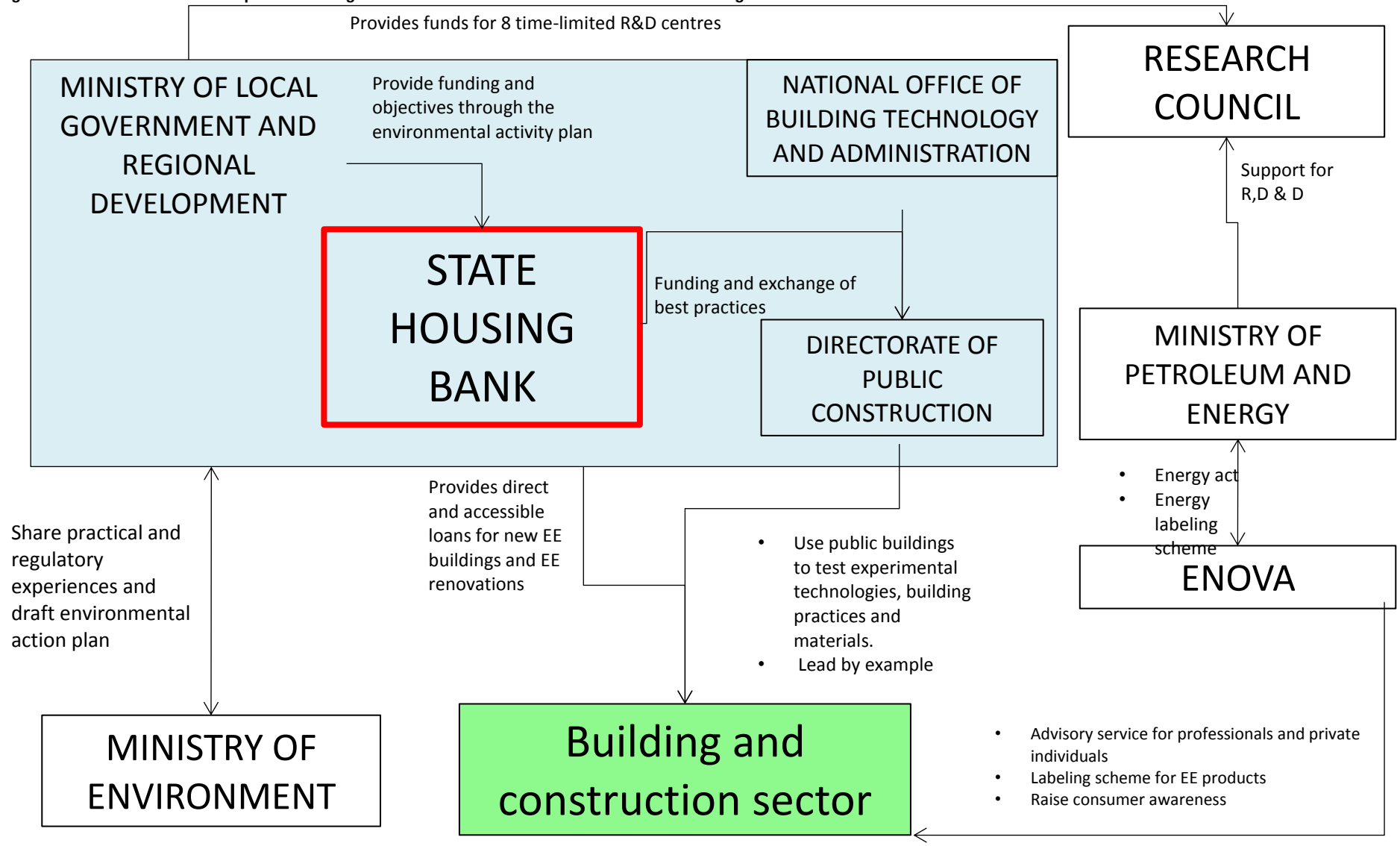
The 'Incentive for Low-energy Housing' programme is part of a larger inter-ministerial effort national strategy. KRD emphasizes that other agencies and ministries are involved by, for example, having public buildings lead by example by using experimental low-energy technologies and building practices that limit the use of hazardous materials. To realise this cooperation between other ministries and agencies it is explicitly mentioned in the energy action plan.

18.3 Financial characteristics

18.3.1 Financial construction

A number of ministries and government agencies have tasks, instruments and measures that affect the environmental status of the housing and building sector in Norway. The main ones are (i) the Ministry of Local Government and Regional Development (KRD), which manages the Norwegian State Housing Bank (NSHB) and the National Office of Building Technology and Administration, (ii) the Ministry of the Environment, which is in charge of the environmental agencies such as the Norwegian Pollution Control Authority, the Directorate for Cultural Heritage in Norway and the Directorate for Nature Management, and (iii) the Ministry of Petroleum and Energy, which owns ENOVA. Other important ministries are (iv) the Ministry of Government Administration and Reform and (v) the Ministry of Defence, which are responsible for construction and management of state-owned property through their subordinate agencies, Statsbygg and the Norwegian Defence Estates Agency respectively. In some specific areas, other ministries and agencies perform important tasks in relation to the housing and building sector that affect the environmental drive.

Figure 18.1 Ministerial and departmental organisational scheme for EE initiatives in the building sector



Source: Environmental action plan 2009-2012.

With regard to this specific programme the main actors are KRD and NSHB. KRD is responsible for the housing and building policy and administers the Government's goal of encouraging sustainable and lasting quality in housing, buildings and built environments. It has laid the foundations for the environmental focus in the housing and building sector in Report no. 28 (1997–98) and in the last housing report – Report no. 23 (2003–2004) on housing policy. This has been followed up through the environmental action plan for the period 2001–2004, and later 2005–2009. KRD administers the building part of the Planning and Building Act and establishes the regulations for this part of the Act, including the Technical Regulations (TEK), with input from the National Office of Building Technology and Administration. KRD is also responsible for designing the loans and subsidies administered by the NSHB.

The NSHB oversees the grants and loan schemes that affect the attainment of the environmental goals. It encourages construction of housing with higher environmental qualities than are currently required in the Technical Regulations to the Planning and Building Act (TEK) 2007, where new buildings must realise reductions of 25% of energy demand compared with the former requirements. In order to meet the ambitious environmental goals that have been set, the Norwegian State Housing Bank encourages construction of exemplary projects that can demonstrate how the goals can be implemented in practice.

18.3.2 Conditions & Instruments applied

The NSHB has numerous tools to realise the environmental goals set out in the environmental action plans. Together with the National Office of Building Technology and Administration it works closely with the Low-Energy Programme and the Zero Emission Buildings research programme. The purpose of this collaboration is to gather experiences that can be used in the development of regulations, information and capacity building in the construction and building sector. Furthermore, when awarding basic loans, the Norwegian State Housing Bank will give priority to projects with high ambitions in the areas environment, energy and a concept called ‘universal design’, i.e., making sure design practices consider inhabitant movement abilities, orientation and indoor climate in buildings.

As of 2005, the State Housing Bank’s loans for new construction and for upgrading have been integrated into one basic mortgage. A considerable part of the Bank’s total annual loan framework of around 13.5 billion NOK (1.8 billion Euros) will be given in the form of basic mortgages. This mortgage shall contribute to promoting key housing qualities such as environmental quality and universal design in both new and existing buildings, as well as providing housing for disadvantaged groups and housing in outlying districts. The mortgage may be used to finance new housing, upgrading, conversion of other buildings to housing, and the purchase of new or unused rental housing by social housing companies.

It shall contribute towards housing policy goals that would not otherwise be achievable. The mortgage is conditional on projects having high overall quality and in particular fulfilling environmental and universal design criteria. Special design guides are to be developed by the State Housing Bank. The following shall be stressed in particular:

- *Universal design*: housing and housing areas with universal design, including provision of lifts and other accessibility qualities;
- *Environment*: energy requirements lower than current regulations, improved indoor climate, measures to reduce radon emissions, recycling/ reused materials, accounting for environmental costs throughout the entire lifecycle of a building.

The NSHB also provides grants for capacity building, with a budget of NOK 56.7 million in 2005. These grants were used to stimulate environmental measures in housing and construction. The Bank collaborates with municipalities and others in the construction sector. Priority was given to projects that have a high degree of relevance for others and which can, over time, contribute to achieving national environmental goals. Particularly ambitious experimental and pilot projects may be given grants in addition to mortgages, up to 90% of costs. Amongst other themes, the Bank has provided support to:

- development of low energy housing;
- massive wood construction applied in “passive” houses;
- development of environmental technology for housing and buildings;
- develop systems for energy-branding;
- environmentally friendly maintenance and management;
- life cycle costing and durability;
- user-friendly internet databases for selection of ecological materials and building components;
- a database of best practice sustainable buildings;
- recycling / re-use of building materials and products;
- international cooperation.

18.4 Analysis

The instruments used in this programme are very general and common, and mainly seek to reduce the financial and capacity barriers related to the use of low-energy technologies in the housing sector in Norway. These are soft loans that can be used to renovate existing buildings, or proven additional measures taken in the development of new buildings that lead to better energy performances. In addition, projects that aim to use more experimental technologies that serve as exemplary test cases that can provide useful experience can receive grants up to 90%, and stakeholder involvement is also promoted through capacity training events.

The differentiating factor in this programme is that since the environmental action plan of 2005-2008 this has been an effort involving many ministries, ranging from the Ministry of Defence to the Directorate for Cultural Heritage. The notion is very strong that embedding the importance of increased effort to reduce the environmental effects in the sector through all possibly connected ministries will have a large ‘snowball effect’ throughout the country.

This approach has its strengths and weaknesses. It is strongly recommended that ministries have both the awareness and capacity to manage the energy use in their buildings, and aided by KRD and NSHB it could lead to larger potential energy savings. Especially in a country like Norway - which globally ranks amongst the highest energy users per capita in this sector - where the sector amounts for 40% of final energy demand - reaching as many stakeholders as possible is advised. In addition, the Norwegian climate and high heat demand can benefit largely from increased research, development and deployment (RD&D) in architectural designs that use passive heating. Combined with a green public procurement policy that promotes the use of these experimental designs, many valuable experiences can be learnt and the government is actively leading by example. As this is embedded in other ministries they will also be stimulated to consider these methods.

The drawback is that this approach does not clearly show any prioritization. It is unclear where the largest energy demands lie, but it is stated that the largest inefficiencies lie in older buildings, built under lower technical performance standards. Focussing on promoting renovations and retro-fitting of modern low-energy technologies into older buildings would be expected to lead to more energy

savings in the sector, especially in the short term. With the high energy prices and demand in Norway, it is assumed that these measures would pay themselves back rapidly and that perhaps the largest barriers exist in the sometimes high investment costs, not the rate of returns. This does not negate that focussing on long term objectives through increased RD&D will have substantial benefits in the future, but as can be seen from the table below the reductions in energy use have been minimal since the start of the programme.

TABLE 1. ENERGY CONSUMPTION IN NORWEGIAN BUILDINGS IN 2002 AND 2006 IN TWH
(SOURCE: ENOVA'S BUILDING STATISTICS)

	Total energy consumption		Of which total energy consumption for heating		Of which heating using electricity	
	2002	2006	2002	2006	2002	2006
Housing	47	44	29.5	27	20.5	19
Business	35	30	18	15	12.5	10
Total	82	74	47.5	43	33	29

There is also little to no information regarding actual national goals or plans. There is mention of the EU directives that affect the environmental performance in the building and housing sector, such as energy labelling on household appliances and boiler efficiency directives, but concrete national directives or plans are absent. Combined with the lack of prioritization it does give the programme a more ad hoc impression.

18.5 Conclusion

The Norwegian programme to incentivise low-energy housing has a very typical approach. It focuses on longer term objectives by integrating the efforts through many involved ministries and particularly focussing on exemplary projects through the provision of grants up to 90%. It does not use strict goals or targets for its energy levels in the sector, as opposed to its environmental targets. These features may be due to the fact that Norway is an oil and gas exporter, and it sees its priorities for energy savings not in the short to medium term but rather in the long term. A focus on capacity building and more ad hoc measures stimulating efficient building practices also seem to point at a desire not to pass on these costs to consumers through strict legislation and standards.

This is rather counter intuitive with the residential energy sector of Norway, whose climate puts Norway as one of the highest energy users globally. There is, however, little evidence of the results so far and perhaps the effects of slowly integrating the notion of energy efficiency in households will bear its fruit at a later stage. From a financial perspective this raises many questions regarding the effectiveness of the programme. There is little information to be found regarding a cost-benefit analysis of the approach, but the voluntary nature of the programme suggests that stakeholders in the housing and building sector will use the loans for energy efficiency investments that provide rapid payback periods.

19 Berlin Energy Saving Partnership

19.1 Introduction

Project title		Berlin Energy Saving Partnership (Berliner Energiesparpartnerschaften)
Type of building(s) or construction		Public buildings, including town halls, schools, day nurseries, hospitals etc.
Overall aim/objective of project		Reaching ambitious objectives for climate protection and reducing energy costs in the face of a tight budgetary position.
Type of project		Energy Performance Contracting
Main technologies / approaches		Various energy saving including efficient lamps, optimizing boilers, optimizing heating and ventilation systems, fuel switch, building automotization, motivating behavioural change
Location		Berlin
Time frame	Start date (mm-yyyy)	2001 (first contract signed)
	(Planned) end date (mm-yyyy)	After 2020 (most recent pool of buildings contracted in 2011, contracting periods run on average >10 years)
Project originator/host		Berlin's Senate Department for Urban Development
Key stakeholders:		Project originator / host: Berlin's Senate Department for Urban Development
		Project management: Berlin Energy Agency (Berliner Energieagentur)
		Project implementation: ESCOs such as Johnson Controls; HEW Contract; Arge ESP – Bewag; ESB, Energiespar- und Betreibergesellschaft mbH and others

19.2 Project description

Note that the numbers below are averages of all 26 pools of buildings contracted so far (as of May 2011).

Total (projected) energy saving per year (in GWh/y)		219 GWh/y
Costs	Depreciation period (years)	(depends on measures taken)
	CAPEX (total, in mEUR)	At least 51.6 mEUR (guaranteed minimum investment)
	CAPEX (annualised, in mEUR)	(depending on cost of capital of ESCO)
	OPEX (in mEUR/y)	n/a
	Other costs	n/a
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	11.7 mEUR/y, 219 GWh/y
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Achieving climate targets

The Berlin Energy Saving Partnership was jointly developed by the Berlin Energy Agency (Berliner Energieagentur) and the Berlin's Senate Department for Urban Development in 1996. It's a model for achieving energy savings through Energy Performance Contracting (EPC), tapping into the potential for energy savings in a pool of buildings with different properties.

Examples of public buildings upgraded in the frame of the project in Berlin include town halls, schools, day nurseries etc.. The Berlin Energy Agency acts as the independent project manager, who moderates and manages the process, e.g. the negotiations on the baseline and the contract, and puts the building pools out for contracting. The EPC contracts are implemented by private energy service providers, so called ESCOs (Energy Service Companies) which finance investments into energy savings. The ESCO is also responsible for the planning, implementation and management of the energy savings measures and bears all the operational and economic risk of the project. The ESCO recovers the investments cost through the resulting energy cost savings by the ESCO. Additional cost savings are shared between the ESCO and the building owner, thus both parties profit from the contract. In the frame of the project, public buildings are 'pooled' in a way that less profitable buildings can be combined with more profitable ones and transaction costs are thereby reduced.

For the building owners, the advantage of the model is that they do not bear any investment costs, can outsource the implementation of the energy saving measures, and realize energy cost savings.

Typical energy saving measures applied are insulation, CHP, efficient lighting, heating control systems, and energy consumption regulators.

Since 1996, within the Berlin Energy Saving Partnership, 26 energy partnerships were launched, comprising of more than 500 properties in Berlin which include more than 1,300 public buildings. The model has also been replicated in other regions of Germany and the project is ongoing. The latest building pool in Berlin was contracted in mid 2011.

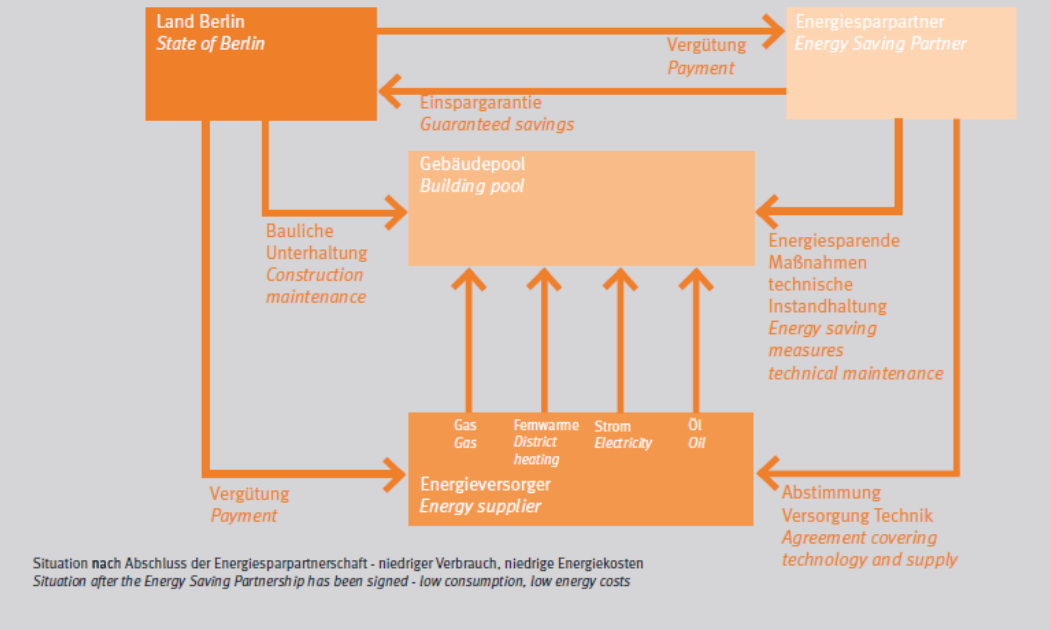
19.3 Financial characteristics

19.3.1 Financial construction

Building pools that participate in the Berlin Energy Saving Partnership must have a minimum annual energy bill of approximately €200,000. The ESCO undertakes the upfront investment into energy saving measures and recovers these initial costs through energy cost savings over the contract period, which is on average around 12 years (see Figure 1). Building owners generally do not take part in the upfront investment into the saving measures. Additional cost savings are shared by the ESCO and the building owner, forming the profit margin of the ESCO and an incentive for the building owner to participate (see Figure 2). Once the contract period ends, the full energy cost savings accrue to the building owner. Average payback periods of the investments undertaken are between 8 to 12 years (New York City Global Partners, 2011).

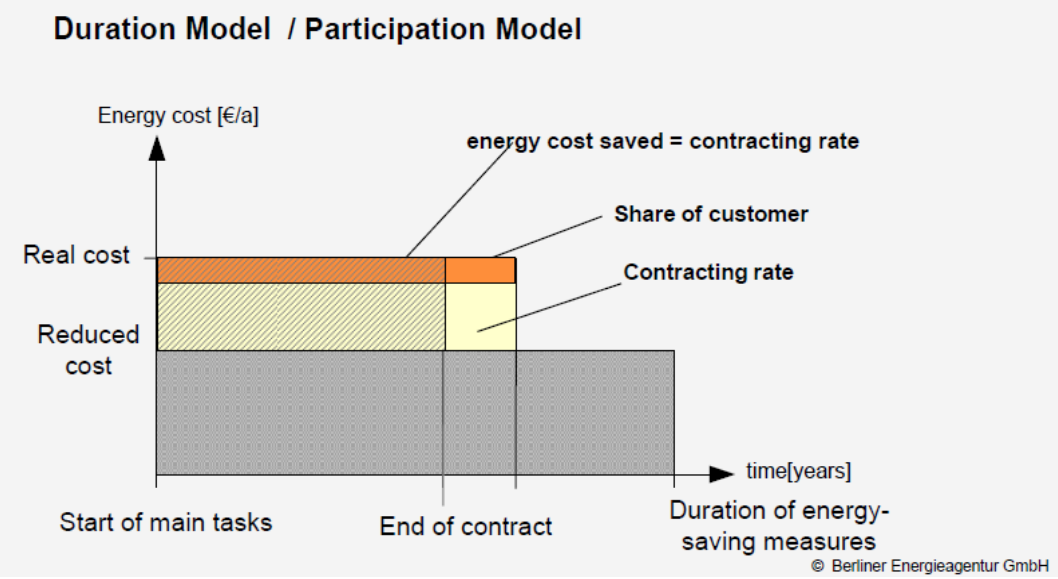
The 26 building pools which are currently contracted lead to overall 2.7 m€ of annual cost savings for the government of Berlin.

Figure 19.1 Flowchart of financial relationships within the Berlin Energy Saving Partnership



(source: Berliner Energieagentur, 2006)

Figure 19.2 Distribution of energy cost savings between the contractors (i.e. the ESCO) and the customer (i.e. the building owner) (source: Berger, 2011)



19.3.2 Conditions & Instruments applied

The energy efficiency investment undertaken as part of the Berlin Energy Saving Partnership are financed by the contractor, i.e. the ESCO. At least in the first six building pools, the building owners did contribute to the initial investment costs (Öko-Institut, no date). The contracts for the 26 building pools covered under the Berlin Energy Saving Partnership as of May 2011 have been awarded to a number of different contractors, each of which is expected to have its own financing structure for the investments undertaken. The contractors provide a guarantee to the building owners on the energy savings to be achieved under the contract.

The local government in Berlin subsidizes the project development costs by 50% (New York City Global Partners, 2011).

19.3.3 Risk profile

In Energy Performance Contracting project as they are undertaken as part of the Berlin Energy Saving Partnership, the risks related to the energy efficiency investments are born by the contractor, i.e. the ESCO. The contractor bears the responsibility for the operational performance of the technical systems, including any risks caused by a breakdown of the systems. Moreover, the ESCO is responsible for the full economic risk. It finances the investments, and legally guarantees a minimum level of energy savings. This implies that if the targeted energy savings are not achieved, the ESCO will still compensate the building owner for them (Berliner Energieagentur, 2006).

The building owner bears the energy price risk, i.e. with rising prices the ESCO is protected and the building owner profits from decreasing energy prices. Moreover, the risk of use stays with the building owner, i.e. if the usage pattern of the building changes, the savings guarantee is modified (Arce, 2010).

19.4 Analysis

The following have been identified as barriers to Energy Performance Contracting:

- The technical baseline is often difficult to determine as building owners tend to have only limited availability of energy consumption data.
- Within the administrative structure of the public sector, there tends to be a lack of political willingness, know-how, information and responsibility, which prevents public sector actors from pursuing EPC contracts for their buildings.
- There are also frequently legal limitations on commercial funding for municipalities, as well as rigid procurement and budgeting policies
- In addition, ESCOs are frequently small companies with a weak equity basis, and banks tend to be reluctant to provide project financing to EPC projects, especially if financing goes through a small ESCO (Arce, 2010).

Taking these barriers into consideration, a number of criteria and conditions of success have been derived based on the experience of the Berlin Energy Saving Partnership:

- There needs to be a driving force, i.e. decision makers who takes the responsibility for initializing and supporting the programme.
- There needs to be a reliable legal framework, including clear information that public authorities are indeed allowed to enter into EPC contracts.
- Standardized procedures and contracts improve the time and cost effectiveness in the planning and implementation phase and contribute to the reliability of the programme.
- It is desirable to have a large enough ESCO market in order to allow for real competition among companies when bidding for EPC contracts.
- Moreover, neutral process managements (as done by the Berliner Energieagentur) increase the trustworthiness of the programme. The neutral process manager can also function as a potential mediator in conflict situations. Process management should be done by an organization that has both technical as well as economic know-how regarding energy contracting (Arce, 2010)

For an EPC project to be successfully tendered, it needs to fulfill a number of criteria: The building needs to be expected to be in existence (and similar use) for at least another 10 years. In order to be able to determine the energy baseline, there should have been a consistent development in energy consumption over the last few years. Moreover, the minimum project size (see above) needs to be met and it should be technically feasible to undertake interventions in the central

heating system. If the building is rented out, there needs to be an approach to incentivize both landlord and tenant to take part in and support the EPC programme (Berger, 2011).

Additional lessons learned include:

- It is crucial that project development is undertaken by people with local knowledge of the current infrastructure and energy system in the region.
- Building owners require support during the start-up process, especially in negotiating the contract with the ESCO. In Berlin, the local government provides financial support of 50% of the project development costs. This support is critical as otherwise most building owners would not be willing to engage in the EPC project.
- Especially when the approach was transferred to other regions in Germany, it was found that there can be problems related to a lack of clarity in the contract approval process. Therefore, involved government agencies and other actors need to very thoroughly communicate on the contract approval process in order to keep building owners engaged.
- As the project progresses – it exists since 15 years now – involved subcontractors which are mostly regional SMEs have been gaining experience and capabilities which lead to increases in the overall effectiveness of the program.
- Other countries that plan to implement a similar approach should have a strong legal framework for tenders. It is also recommended that local private firms carry out the implementation of the energy savings measures. (Berliner Energieagentur, 2007)

The approach can well be replicated. It is already being implemented outside of Berlin in other German regions, but also in Bulgaria, Slovenia, Romania and Chile. Moreover, know-how has been transferred to help initiate similar initiatives in Central, Eastern and Western Europe.

19.5 Conclusion

Energy Performance Contracting as undertaken by the Berlin Energy Saving Partnership is a well replicable concept which can lead to significant energy cost savings in public buildings without the need to up-front capital investments by the involved public building owners. However, it does require a functioning market of ESCOs which have sufficient access to capital to bear the significant up-front investment costs.

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20 Sustainability loans in the Netherlands

20.1 Introduction

Project title		Local government 'sustainability loan' programmes (*duurzaamheidsleningen*).
Type of building(s) or construction		Privately owned dwellings
Overall aim/objective of project		Offering private homeowners attractive (soft) loans for taking energy improvement measures in their dwellings.
Type of project		Government programme executed by municipalities in the Netherlands, who can set up a fund to finance sustainability loans. These are soft loans for private homeowners to realise energy improvements.
Main technologies / approaches		Energy efficiency measures: insulation, condensing boilers, heat pumps, renewable technologies like solar boilers and panels.
Location		Around 50 municipalities and 2 provinces have set up a fund and offer the loans.
Time frame	Start date (mm-yyyy)	2008
	(Planned) end date (mm-yyyy)	The policy programme has no foreseen ending date.
Project originator/host		SVn in cooperation with municipalities
Key stakeholders		*SVn:* Private (independent) non-profit foundation that stimulates national housing. Municipalities can join the programme by setting up a fund managed by the SVn, who governs the loans that municipalities offer. This includes checking creditworthiness, paying out and managing payments and administration of loans. SVn works in close cooperation with private banks.
		Municipalities: Can initiate setting up a fund at SVn and decide on the terms of the loans provided.
		Dwelling owners: Target group. Liable for the sustainability loan (mortgage or personal loan) they take and charged with administrative work needed to acquire a sustainability loan.
		Installers: hired by dwelling owner or other party
		Meer met Minder: Government organisation promoting and facilitating energy improvements in the existing building stock, including financing such as the sustainability loans.
		Central government: Provided the funding for Stichting WEW, but further does not play a real role in the sustainability loans programme.
		Stichting WEW (Waarborgfonds Eigen Woningen): National foundation that managed the closed government guarantee regulation 'Garantie energiebesparingskrediet', which supported the sustainability loans programme and other funds for the housing market.

20.2 Project description

Total (projected) energy saving per year (in GWh/y)		
Costs	Depreciation period (years)	Loan period: 10 years (loan if below 7.500 Euros) or 15 years (if above 7500 Euros)
	CAPEX (total, in mEUR)	2008-2011: 8.4 million of loans provided for 623 sustainability loans, including loans to apartment associations (which are multiple houses). The investments are taken by the municipalities. The average investment per dwelling is estimated by SVn to be around 10,000 Euros.
	CAPEX (annualised, in mEUR)	-
	OPEX (in mEUR/y)	SVn charges (once-only) settlement costs to homeowners of 2% of the amount of the loan, and yearly charges 0.5% of the amount of debt outstanding to participating local governments for administrating the loans (as of 2011).
	Other costs	Unknown
(Projected) benefits	Energy savings (in EUR/y and/or in GWh/y)	Unknown, due to the lack of a central evaluation system of municipalities' results. When only natural gas savings (not total savings) are considered, ECN estimates an amount of around 8 GWh of natural gas savings per year of all loans together (8.4 million investments). Assumed is a payback time of 15 years and ¾ of the investments lead to natural gas savings. Considering an assumed lifetime of insulation measures of 30 years, total lifetime natural gas savings of the loans would then be 225 GWh.
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Knowledge sharing between municipalities, for example on how to set up the municipal regulation for a sustainability loan.

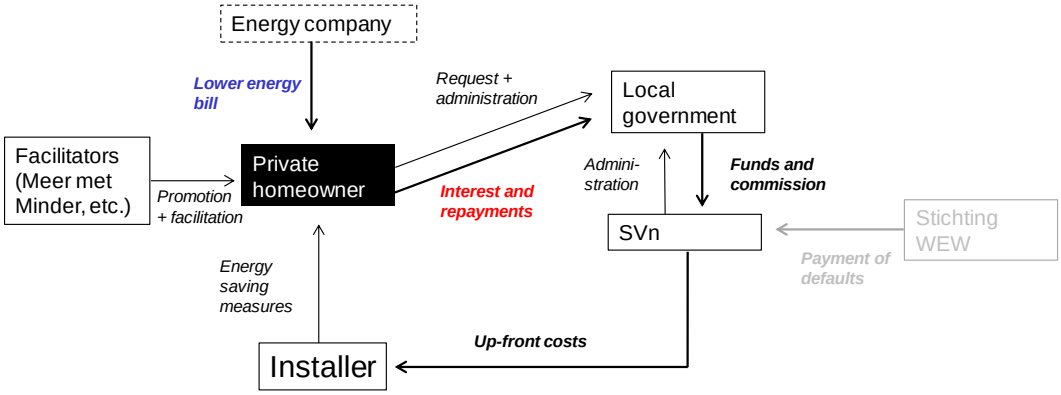
The main purpose is to save energy in privately owned dwellings. This follows ultimately from EU and (translated) national energy and climate change policy and targets. There is a large gap between the need for investments for the large saving potentials in the built environment, and available financing options. Particularly, at private homeowners. Non-energy benefits do not have the focus, but these are for example increased comfort for the dwelling owner.

To offer a sustainability loan, a municipality itself has two legal arrangements to make. First it should set up an agreement with SVn to settle the cooperation between both parties, and second it has to set up a subsidy regulation. SVn supports municipalities with both activities. The programme has not been created by national regulation. However, national policy initiatives support the sustainability loans such as the Stichting WEW and Meer met Minder (see summary table in Section 1.1).

20.3 Financial characteristics

20.3.1 Financial construction

The picture below shows the organisational and financial structure of the sustainability loans programme:



Municipalities bear most of the costs and risks of the programme, which are the funds for the loans and commission to SVn that passes on its managing costs. Municipalities in turn earn the benefits from the instalments and interest received from homeowners.

SVn is a foundation that only services its members, public sector organisations like municipalities and provinces. Furthermore, SVn owns permits to be engaged in financial services (offering financing, collecting payments) that are required by law, and has knowledge of assessing creditworthiness. These are reasons for the organisational structure as it is.

Until December 2011, the guarantee regulation '*Garantieregeling Energiebesparingskrediet'* which was managed by Stichting WEW, offered guarantees to municipalities for the financing they offer. In this way municipalities run a lower risk and can ask lower interest rates. SVn, as provider of sustainability loans, had the right to claim for their municipalities a maximum of 1.5 million Euros from Stichting WEW for loans not repaid by homeowners. Municipalities will now have to cover the risks and possible costs of defaults themselves. This does not count for loans already provided, which will remain covered by the Stichting WEW. It depends on the willingness of the municipalities if they want to continue to offer, or start offering, the sustainability loan at a 3%-point interest rate reduction. The guarantee regulation by WEW was fully funded by the ministry of Internal Affairs. SVn regards the regulation as not really expensive to the government. As the risk of defaults are not high, expected costs (actual payments by WEW) were assumed to be limited.

SVn can manage to cover the costs of the administration of sustainability loans (it achieves positive financial results), which is its goal as a non profit organisation. Furthermore, the risk of significant losses are probably small, as sustainability loans make up a small part of the total funds portfolio of SVn.

The sustainability loans programme is hardly funded by European funds, except for a few examples (e.g. fund of the province of Drenthe). As municipalities provide the funding, they should take the initiative to attract such funds.

20.3.2 Conditions & Instruments applied

Key characteristics of the sustainability loans are:

- Loan conditions: interest rate is the market interest rate (depending on the loan period) which is always deducted by 3%-points. Minimum loan is 2.500 Euros, maximum loan is 15,000 Euros. Loan periods can be 10 years (below 7,500 Euros) or 15 years (above). This is optimal for both homeowners (expected monthly financing costs) and municipalities (financial risks over the lifetime).
- Details of loans actually provided: the average loan provided has a depreciation period of 15 years. The average investment per dwelling (not per loan) is estimated at 10,000 Euros. The majority of measures implemented are insulation, followed by condensing gas boilers, solar panels, etc.
- Private homeowners only pay interest in the first three years of the loan period, after that they pay interest and repayments of the loan.
- Sustainability loans between a municipality and a homeowner are always private, in the sense that homeowners do not need to attend (and pay for) a notary. They are not mortgages.
- A sustainability loan can be legally combined with other financial support for homeowners, such as subsidies.

20.3.3 Risk profile

An important risk in the sustainability loans programme is the credit risks run by the loan providers, the municipalities. SVn indicates that no municipality so far needed to address the guarantee regulation from defaults, so this risk is assumed to be modest.

Another risk is that the programme does not realise the energy savings expected. The demand for the programme, from homeowners willing to finance but also from local governments willing to initiate a sustainability loan, may not be realised.

Private homeowners run a financial risk with the sustainability loan, which adds to the financial risk of their existing loans. Another financial risk is that energy (cost) savings realised are lower than expected. Finally, the homeowner owns the assets financed (i.e. saving measures) and thus runs some asset risk.

20.4 Analysis

Barriers at the start of the programme were the search for early adopters, the first municipalities willing to offer the loans. Also, the political, governmental and official process to get the programme in operations took quite some time. At the moment, municipalities need to improve efforts and funding in communication and active support to homeowners. Municipalities very active in this respect reach the best results. Cooperation between market parties and municipalities is also important in this respect.

Strengths:

- The sustainability loans are very attractive for private homeowners, because of the large interest deduction.
- The loans are no mortgages, but private loans. A mortgage would be more complex, as it requires a home and its saving measures to become collateral for the loan and administration costs and financing costs (from longer mortgage periods) would be higher. These drawbacks hold for private homeowners as well as for financers.

- The loans are provided by municipalities, who are already in contact with their inhabitants and are considered to have the required capacity (organisation, financial means). Potentially all municipalities together can have a large scale impact.
- The administration of the loans is done by a separate organisation (SVn). Administration required from homeowners and municipalities seems acceptable. For example, it is assumed most municipalities do not require homeowners to perform an extensive energy performance advice in order to get a loan. SVn indicates that energy performance advices are not favoured and even impose an additional barrier to homeowners, as it costs money and delivers a lot of hassle.

Weaknesses:

- An inevitable disadvantage of sustainable financing is the increased financial risk private homeowners take.
- Another important barrier seems to be the willingness and ability of municipalities to provide funding, for which no financial guarantees by the government are provided anymore.

Opportunities:

- The saving potential of the programme can be considered high. Potentially, all local governments (provided enough capacity at SVn) can offer sustainability loans, and every Dutch homeowner (provided their creditworthiness) can get this loan. Moreover, the sustainability loans are available for many common and cost effective saving measures and renewable options. The target segment primarily is existing dwellings with high saving potential. Furthermore, energy costs are expected to become a larger share of total living expenses, which keeps the need to lower energy use.
- The programme should be easily replicable in other countries, if municipalities are assumed to be able to make the legal arrangements and a foundation like SVn can be set up and funded (by private or public parties) according to the Dutch example.
- There is no on-bill financing construction available for the sustainability loan. SVn explored the option but experienced difficulties to realize this via energy companies. However, in the future this remains an opportunity.

Threats:

- The willingness of private homeowners and local governments is crucial for the impact the programme can have in terms of energy savings in the built environment. Up to 2011, only roughly 10% of all Dutch municipalities (50) offer sustainability loans. The most important barrier is that homeowners need to become aware of the sustainability loan. The loan has attractive conditions so SVn hopes increased awareness will increase demand. Also more municipalities or provinces need to be willing to offer the loan, as this determines the reach of the policy programme.
- The lack of a stable energy policy of the central government is regarded a barrier. Stopping the guarantee regulation '*Garantie energiebesparingskrediet'* illustrates this. This seriously threatens the attractiveness and future demand for sustainability loans.
- In case many more Dutch municipalities join the programme, the promotion and administrative tasks for SVn and other involved parties get much larger.
- A contemporary barrier is the low trust of consumers following the economic downturn.
- A possible threat is the lack of capacity in the market to meet the demand for energy savings in dwellings, in case the programme gets very successful. This for example may require much more installation companies offering energy services and materials, than currently available.

20.5 Conclusion

The financial conditions of the sustainability loans are rather favourable and make the loan attractive for households. Further the sustainability loan programme is organised efficiently and effectively, respectively because it is centrally managed by a national foundation and it has a high local reach as municipalities offer the loans to their inhabitants. Willingness of homeowners and municipalities, mainly due to investment and financing risks, are main barriers.

The programme has many opportunities in terms of potential energy savings and potential reach. The main challenge for SVn is to raise the demand for the loan from both homeowners and municipalities. A threat in this respect is the lack of stable policy that supported the programme. This in particular regards the cancellation of the government guarantee regulation that supported the offer of sustainability loans.

References

For this case study information was collected via a few telephone interviews and by mail from Mr. Veldmand and Mr. Luigjes of the Stimuleringsfonds Volkshuisvesting (SVn), between December 2011 and February 2012. Furthermore, the website of SVn[14] is an important source, consulted between November 2011 and February 2012.

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21 ECP Policy Programme Upper Austria

21.1 Introduction

Programme title		Energy Contracting Programme (ECP programme)
Description/ type of programme		Support programme for Energy Performance Contracting in buildings
Type of building(s) or construction		Utility buildings
Overall aim of programme		Creating a market for Energy Performance Contracting in Upper Austria
Target group		Municipalities and companies
Main technologies / approaches		Sustainable heat production (among others): Biomass (district heating and biomass CHP) Solar thermal Heat pumps Energy efficiency measures for buildings Energy efficiency services (mainly ESCOs)
Location		The region of Upper Austria
Time frame	Start date	1998
	(Planned) end date	On-going
Programme originator		The Upper Austrian regional energy agency: O.Ö. Energiesparverband (ESV)
Key stakeholders:		ESV
		Regional government of Upper Austria
		ESCOs
		Build owners

21.2 Project description

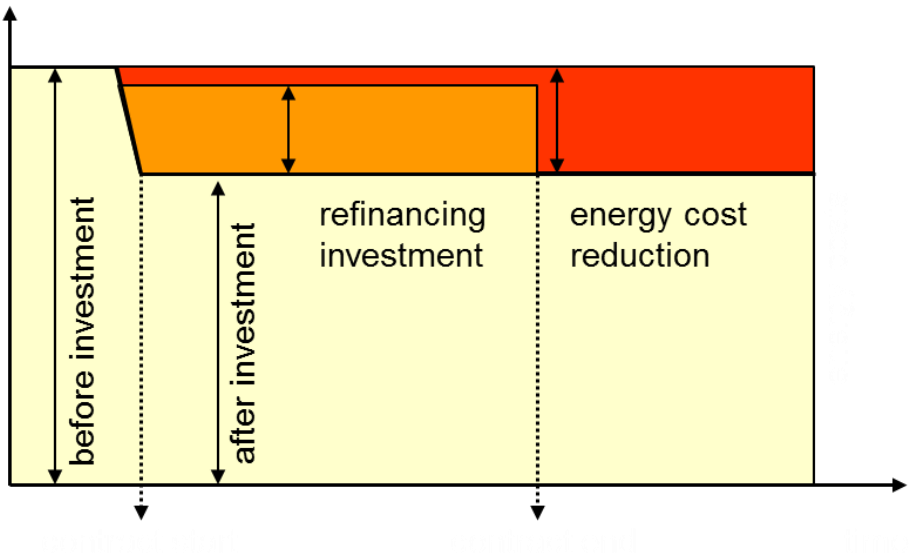
Total (projected) energy saving per year (in GWh/y)	50 GWh/y Or, emission reduction of 20-30 kton CO2 per year
Conditions of subsidy	Contracting duration max. 10 years Investments between €50.000 - €500.000,- (eligible costs)
Total investments	€ 31 million, in ECP contracts between 1998-2010
Total subsidies	13,5-20% of the project investment

The regional government of Upper Austria (1.4 million inhabitants) set up a policy programme in 1998 to create a market for energy efficiency services on a regional scale. A subsidy scheme (TPF programme) was established to support Energy Performance Contracting (EPC), also known as Third Party Financing (TPF), for energy efficiency in public buildings and installations. Earlier programmes suggested that this concept would return the most energy savings per euro invested. The programme was set up in cooperation with the regional energy agency of Upper Austria, O.Ö. Energiesparverband (ESV), which became responsible for implementing the policy programme. The ESV is set up and funded by the regional government to promote energy efficiency, renewable energy sources and innovative energy technologies. The ECP programme is thus embedded in a range of programmes that the ESV runs in this field. Therefore, the ESV has a lot of relevant expertise in its organisation, and can make relevant links with other programmes. The ESV is seen

as the ‘regional energy knowledge centre’ as it has the knowledge of the local/regional market and short lines to their target groups. The ESV is an independent institutional body that is financed by the regional government of Upper Austria (department of Energy), and it’s Director (Mr. Gerhard Dell) is also the Commissioner of Energy of Upper Austria.

According to the ESV, Energy Performance Contracting (EPC) is a way to remove the investment barrier. EPC shifts the costs and part of the benefits of energy efficiency investments to an external contractor, the ESCO. The ESCO pays for the energy efficiency investments and guarantees a decreased energy bill. A pre-negotiated percentage of the savings on the energy bill shall go to the ESCO for a fixed contract period to cover the investment and potential ESCO profit. Until then, the savings for the client will be modest, but after the contract period the client will profit from a significantly lower energy bill. Figure 1 depicts the principle of EPC, as how it is implemented by the ESV in Upper Austria.

Figure 21.1 The principle of energy performance contracting



Source: Egger, C. (2006), ‘*Creating a market place for energy efficiency*’, O.Ö. Energiesparverband (ESV), presentation prepared for World Sustainable Energy Days March 2006 (Wels, Austria)

The ESCO and project host (i.e. build owner) set up a contract which includes the proposed measures and expected energy savings. This contract includes the financial and legal conditions, as well as the technical specifications of the measures implemented. In most cases, the ESV is already involved during the drafting of the contract as an advisor. After the finalization of the (draft) contract, the contract is sent as an application to the ESV. However, officially, the application is headed to the regional government of Upper Austria, but in practice directly sent to the ESV. The ESV checks the applications on their feasibility: whether the contract fulfils to the formal procedures/requirements and as such is eligible to get a subsidy from the regional government, and whether the contract is a ‘fair deal’ for the participants in the contract (i.e. whether the ESV ‘beliefs’ that the proposed energy savings can be realised). Furthermore, the ESV checks whether the financial and technical feasibility of the proposed investment are realistic. For example, the proposed implementation measures are checked with the calculated savings and the quality, viability and fairness of the contract is evaluated.

The ECP programme does not have an extensive list of eligibility criteria, as the ESV knows the actors involved (they have a trust-relation). The main criteria that the project should comply to are:

- The programme subsidises a maximum contract period of 10 years. Longer contracts are also eligible but only the 10 years period will be subsidised.

- Only energy related costs are eligible for subsidy.
- Investment costs range between EUR 50,000 and EUR 500,000

When the ESV approves the application, the ESV submits the approved contract to the regional government, who makes the final decision on funding decision. If a positive decision has been taken, the subsidy is paid out directly to the ESCO (so no longer involvement of the ESV). The subsidy consists of a single grant, an annual payment would involve too much logistics. The height of the subsidy depends on the type of investment that is under consideration, but generally ranges between 10-15% of the total capital/investment costs for the proposed project.

After the implementation of the contract, there is no further monitoring/verification of the contract by the ESV to 'check' whether savings are actually achieved. The main argument is that the contract is set up between two parties that control each other (e.g. if the ESCO does not realize the agreed energy savings, the build owner will complain); this is inherent to the EPC concept. In other words, the reported savings of 50 GWh/y are based on the ex-ante calculations of energy savings listed in the contractual conditions of the implemented projects and are not verified after implementation by the ESV or any other institutional body.

Besides evaluating applications for the ECP programme, the ESV is also responsible for the promotion of the ECP programme (via the ESV Energy Academy). The subsidy scheme for the EPC programme is supported by an intensive communication programme, financed by the regional government of Upper Austria. This was (and is) necessary as the EPC concept is complex and was rather 'new' when the programme was launched. Moreover, one of the successful elements of the ECP programme is that communication and project implementation should go hand-in-hand. In the first 1,5-2 years after the start-up of the ECP programme, the ESV did hardly received any applications for the subsidy scheme (they almost cancelled the programme at that time). However, after signification communication efforts, the ECP programme received more and more applications and became more successful – in particular over the last couple of years.

Initially (until 2002), the ECP programme only targeted energy efficiency in municipal buildings. After 2002, the ECP programme was expanded to include commercial parties and also supported investments in renewable energy projects and municipality investments in energy savings (e.g. street lightning). At this moment, private home owners are excluded from the ECP programme (t is thought that the overhead costs would become too high) as they are already targeted by other programmes that are managed by the ESV.

During the period the ECP programme is operational (1998-2011), there have been 15 ESCOs established that have carried out over 100 projects (50% public buildings, and 50% private sector), with 6 ESCOs being very active in project implementation. From these projects, about 40% of the projects are renewable energy projects (Anlagen) and 60% of the projects are related to energy efficiency measures (Einspar). Within these projects, the average energy consumption has been reduced by 25-30% in public and commercial buildings.

The strategy for Upper Austria is to have 100% space heating and electricity from renewable energy (and energy savings) by 2030, and to reduce the heat demand in Upper Austria by 39%.

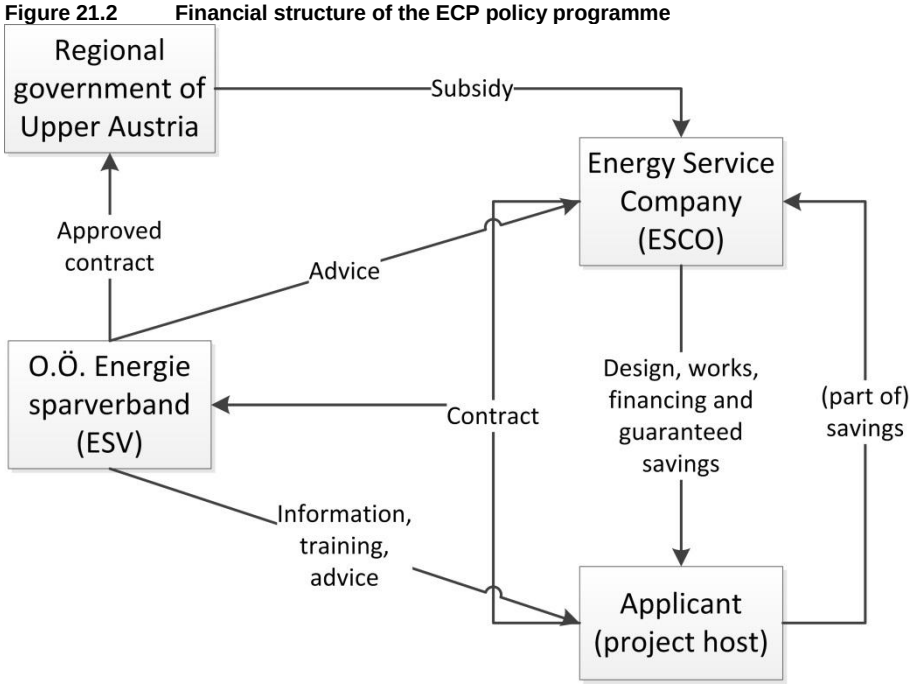
21.3 Financial characteristics

The ECP programme is funded by the regional government of Upper Austria. The height of the grant/subsidy depends on the type of measures that are proposed in the application for financing (subsidies range on average between 10-15% of the capital costs).

21.3.1 Financial construction

The financial construction of the ECP programme is, more or less, as follows: The ESV receives and evaluates the applications. Based on the economic and technical feasibility assessment(-s) of the ESV, the regional government of Upper Austria grants the application the subsidy. The ESV councils the (successful) implementation of the grant scheme.

Figure 21.2 Financial structure of the ECP policy programme



21.3.2 Conditions & Instruments applied

Applicants can receive a grant of up to 20% of investment costs. Renewable energy measures are supported by a 13,5% grant. Applications are checked and evaluated by the ESV. This includes an analysis of the calculations of investment costs and expected savings. This evaluation determines whether the subsidy will be granted and what the height of the subsidy will be.

21.3.3 Risk profile

The ESCO bears the risk of the investments, as the ESCO needs to deliver the agreed energy savings that a part of the contractual conditions.

21.4 Analysis

Strengths

- The leveraging effect of the subsidy is significant. 31 million EUR investments (117 projects) were supported by an average 10-15% of subsidies.

- According to the ESV, the combination of an information programme (both at the demand and supply sides of the EPC-market) and financial support is essential for the programme's success.
- The value of the subsidy is not only financial, it gives the actors involved the idea of government approval, which increases trust in the concept with the stakeholder involved.
- Targeting municipalities at the start up of the programme worked well, because their financial continuity is guaranteed (e.g. a school or city hall cannot go 'bankrupt') by the regional government (or in the end the national government).
- The programme is set up by the regional government (instead of the national government). Their specific knowledge of the local market allows them to operate more efficiently than a national government would in a similar situation.
- The long term approach is important for an innovative and complex financing structure like EPC. This allows the actors and the market to get used to the concept, as it takes quite some time to establish a successful EPC-market. The continuity of the scheme increases trust.
- The ESV provides technical support to both the clients and the ESCOs via different routes (e.g. ESV's training facility). This allows them to mediate and match demand and supply.
- Due to the local nature of the programme, the ESV knows the actors (in particular the ESCOs) involved. The ESV built up a trust relation with most of the actors. This reduces the need for formal checks and thus the amount of red tape. The short lines between the actors and the ESV make the programme accessible.
- The ESV's expertise with similar programmes enables them to run the ECP programme efficiently, jointly with a successful communication programme/campaign.
- An energy services market has been established that would not have existed in absence of the programme support.
- The legal framework in Austria allows the use of energy performance contracting. In other countries this concept is known to cause problems with public procurement legislation (which is not the case in Upper Austria).
- Checking achieved savings is not necessary, because the two contract parties will control each other. This is inherent to the EPC concept.

Weaknesses

- There is a lack of ESCOs in Upper Austria. Starting up an ESCO from scratch appeared to be nearly impossible. The successful ESCOs in this programme are (large) existing companies that decided to expand their activities to include EPC. Their existing business and size enables them to access capital much easier than a newly established company can. This limits the growth of an EPC market.
- The concept of EPC is complex and was new when the programme started. It therefore took quite some time before clients got used to the concept and gained trust in the programme. According to the ESV, it takes at least 5 years to successfully implement a programme like this.
- Clients find it hard to believe that they can reduce their bills, without investing. It sound like free money; too good to be true. Convincing them requires a lot of communication.
- A weakness in the initial programme was the use of pre-selected banks for the financing of the investments. It turned out that ESCOs and clients preferred to work with their own bank.
- Capital for ESCOs is expensive. It is uncertain whether the established EPC market is able to survive in absence of the ESV programme.

21.5 Conclusion

- The Energy Contracting Programme is successful in terms of achieved savings and leveraged investments.

- Establishing an energy performance contracting market requires a long term approach and intensive communication. The subsidy is only successful in combination with information and advice. The expertise, local knowledge and contacts of the ESV were a key factor for the success of the programme.
- Setting up ESCOs proved to be difficult and the financial incentives are considered essential for a viable energy services market.

22 Renovation of buildings in the ownership of Pardubice region, Czech Republic

22.1 Introduction

Project title		Renovation of buildings in the ownership of Pardubice region
Type of buildings		Public buildings, including schools, hospitals, social and healthcare centres.
Overall aim of project		Reduction of energy costs for heating and hot water in >30 public buildings (schools, hospitals, social centres) in Pardubice region
Type of project		This project uses Energy Performance Contracting (EPC) to improve energy efficiency in buildings owned by the Pardubice region. The cost of investment is exclusively paid from energy savings. The project is split into 5 phases (lots), each with a separate tender for contractor. Second phase (lot) has been the largest in terms of size of the investment.
Main technologies and approaches		Energy saving measures: decentralization of the heating system, new boiler room instead of district heating systems; reconstruction of heat sources (steam to water); new heat pumps; reconstruction of distribution systems and heat exchangers; thermostatic valves, direct individual room control systems.
Location		Pardubice region, CZ
Time frame	Start date	2007-2008 (lot 1-3 started in 2007; lot 4-5 in 2008)
	Planned end date	2019 – 2020 (depending on the lot, 13 years contract duration)
Project originator		Regional Authority of the Pardubice region (located in East Bohemia) – the idea came from a discussion between a civil servant of the regional authority of Pardubice region and an ESCO marketing agent. At the inception of the project, the regional authority hired a consultant (ENVIROS) to map the potential for projects to be financed via this EPC and help the regional authority with public procurement of contractors.
Key stakeholders		Originator/host: Regional Authority of the Pardubice region – owner of those public buildings, the project is grouped into 5 lots (10-20 buildings each)
		Mapping and support with the tender for this project: ENVIROS – consultancy that helped prepare the tender for the Regional Authority (including mapping eligible building projects). The consultant helped to make the objectives clear, to arrange the procurement process, and to select the project contractor.
		Management & Implementation: ESCOs – ENESA, EVC – these were selected as project contractors. About 2/3 of building projects has been implemented by ENESA, about 1/3 by EVC. ESCO used forfeiting as a financing model (explained below).
		Third Party Funding (TPF) through local banks – local banks provided loan to ESCO and then became the creditors for these loans via forfeiting.

22.2 Project description

The information in the table below is for the second phase (lot) of this project. This is the largest lot, including a pool of buildings (10 schools, 1 healthcare centre and 1 social care centre).

Total (projected) energy saving per year (in GWh/y)		**Guaranteed: natural gas 4 020 MWh/year heat 230 GJ/year Achieved: natural gas: 4 766 MWh/year heat: 1 597 GJ/year**
Costs	Depreciation period (years)	12 years
	CAPEX (total, in mEUR)	€ 1.5 million (excl. VAT)
	CAPEX (annualised, in mEUR)	€ 1.5 million (excl. VAT) – the energy efficiency instalments took one year
	OPEX (in mEUR/y)	€ 19 700/year (costs related to energy management, verification and monitoring)
Benefits	Energy savings (in EUR/y)	Total cost savings: € 367 600 year

As mentioned above, the project was realised in 5 phases, each having a separate call for tender. Altogether there have been around 50 buildings reconstructed by ESCOs through this project. The ESCO services consisted of designing the concept and project proposal, financing, delivery and putting into operation, training, energy management and guarantee.

The goals of building owner (regional authority of Pardubice region) have been:

- to reconstruct the heating systems without the need for equity,
- to improve the thermal comfort in the buildings managed by the regional authority;
- proper management of public money, and
- long-term energy management.

The most information has been provided for the first 3 lots, which were implemented in 2007. The total investment cost of these 3 lots has been CZK 83 million (€ 3.3 million) excluding VAT (around € 4 million incl. VAT).[15] The reconstruction took place in the first year. Energy savings after the first year amounted to CZK 18.8 million (€ 748 000). Within the scope of the EPC contract, ESCOs (Enesa and EVC) guaranteed CZK 17.5 million (€ 698 000) in energy savings per year in the remaining 12 years of contract (total contract duration is 1 year installation + 12 years repayments). This represented approximately 23% in energy savings (energy costs before reconstruction have been CZK 56.7 million (€ 2.26 million) per year).[16] An overview of the 3 lots is in the table below.

Phase	**CAPEX (in CZK; excl. VAT)**	**in EUR**	**OPEX (CZK/year)**	**in EUR**	**Energy savings (CZK/year)**	**in EUR**
Phase 1	10 359 087	410 000	198 740	7 900	2 167 000	85 600
Phase 2	39 377 458	1 560 000	496 290	19 800	9 302 700	367 700
Phase 3	33 244 747	1 310 000	496 290	19 800	7 287 000	288 100
Total	**82 981 292**	**3 280 000**	**1 191 320**	**47 500**	**18 756 700**	**741 400**

Source: ENESA

[15] http://www.epc-ec.cz/databaze-projektu-epc-ec

[16] http://www.pardubickykraj.cz/aktuality/58995/pardubicky-kraj-snizil-v-roce-2008-spotrebu-energie-ve-svych-budovach-o-18-milionu-korun?previev=archiv

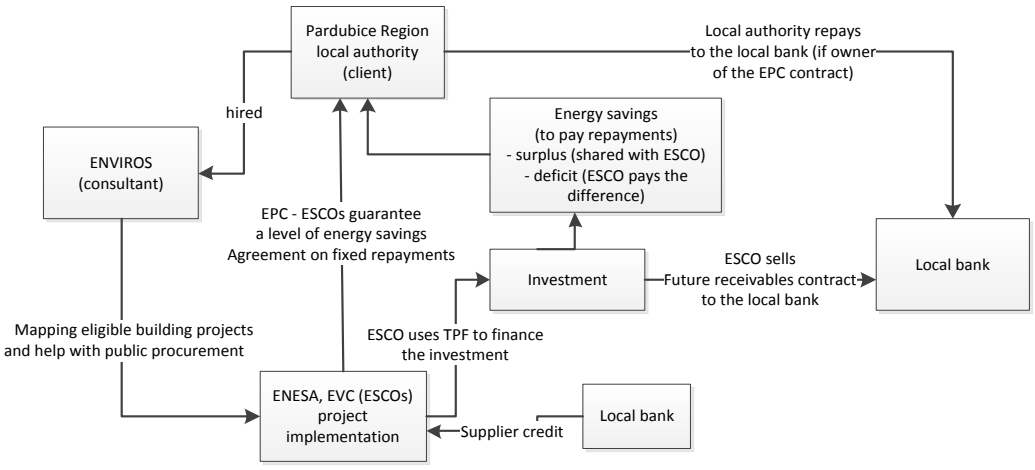
22.3 Financial characteristics

22.3.1 Financial construction

The financing structure of this project has been the so-called “forfeiting” structure. This is a form of transfer of future receivables from one party (owner of future receivables – an ESCO) to another (buyer – a financial institution (FI)). The original creditor (the ESCO) cedes his claims and the new creditor (the FI) gains the right to claim future receivables from the debtor (the client).[17] The ESCO sells future receivables to an FI in return for a discounted one-time payment. To apply it to this case study, under this system, ESCO is the borrower, i.e. it uses TPF via local banks to finance the investment in energy efficiency improvements for buildings of the regional authority of Pardubice region (client). A loan agreement has been made between the ESCO and the client on fixed monthly payments (the size of the monthly fixed payment = total cost of investment divided by 12 years multiplied by the interest rate divided by 12 months). ESCO hence became the owner of this future money stream from the client. After implementing the energy efficiency measures, ESCO sold this payment stream (the right for fixed repayments for the duration of the contract, in our case 12 years) to a local bank. Since then, the client has been making repayments to this local bank instead of to the ESCO.

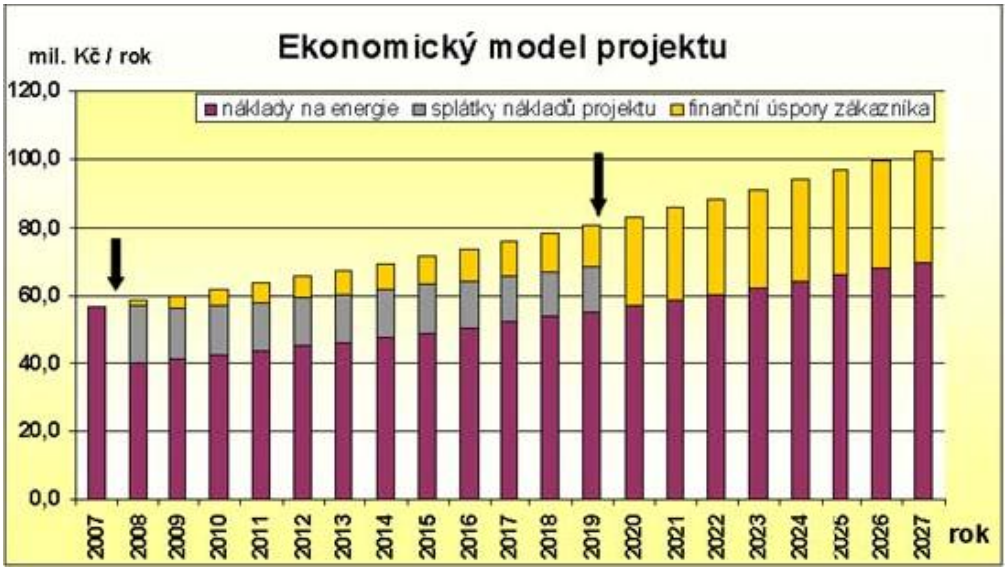
The ESCO provided performance guarantee to the regional authority of the Pardubice region that all investment costs will be repaid exclusively from the energy savings this project generates within the contract period. Moreover, it guaranteed that the energy costs, including the repayments for the investment, each year of the contract will be lower than energy costs if the project was not implemented. Each year, the ESCO provides energy management, i.e. it checks and monitors the energy consumption and savings of the client. If the energy savings are lower than the agreed fixed repayments, the ESCO is obliged under the contract to pay for the deficit. If the energy savings are higher than the agreed fixed repayments, the surplus is shared between the ESCO and the client.

The picture below shows the financing structure:



The economic model of the Pardubice region project for the first 3 lots has been based on a contract period of 13 years, i.e. 1 year installation and 12 years of repayment of the investment (see graph below).

[17] http://ec.europa.eu/energy/efficiency/doc/financing_energy_efficiency.pdf



Source: ENESA
Notes: in CZK million/year, energy costs (purple), repayments (grey), energy savings for the customer (yellow)

22.3.2 Conditions & Instruments applied

- The financing instrument applied has been the above explained 'forfeiting structure';
- The interest rate agreed with the local bank for the loan to ESCO has been 6-7%;
- The loan duration has been 13 years (1 year installation + 12 years repayments);
- As in such forfeiting agreements, the ESCO assigned - via an Assignment Agreement - future receivables (e.g. the client payments) from an Energy Service Agreement to a lender together with pledge of assets;
- The client, the ESCO and the lender also signed a "Notice and Acknowledgment of Assignment" where the client acknowledged the terms of the Assignment Agreement and further agreed not to set-off any future claims;
- All the technology installed is the responsibility of the ESCO;
- ESCO performs maintenance of the system and the client pays fixed monthly payment for this service under a separate Maintenance Agreement.

22.3.3 Risk profile

Since the loan is on the balance sheet of the ESCO, the ESCO is exposed to the credit risk of the client. Furthermore, ESCO is responsible for the technical aspect, i.e. operational performance. The following are the risks that ESCOs in such projects must manage:

- The risk of achieving lower energy savings than expected (and hence make repayments from its own resources if compensation to the building owner is necessary);
- The risk of operational breakdown of the systems.

Once the ESCO sold the repayment stream to the local bank, the local bank bears the credit risk. However, since the client is a regional public authority, the credit risk is negligible. Entering in such contracts is viewed positively by ESCOs as well as by local banks.

Regarding the technical risk, this is born by the ESCO alone. In this project, ESCOs involved are strong and experienced players on the Czech market, hence they were able to assess the technical risk. According to Enesa, there has been a very low technical risk for them in this project since they have a great experience with managing such assignments.

22.4 Analysis

There have been no real barriers identified for this project, according to the ESCO. It seems ESCOs mitigate the risk of achieving lower energy savings than guaranteed by underestimating these savings. However, this may come with the risk for the ESCO of not winning the contract if a competitor offers higher energy savings. Hence, there is always a trade-off between mitigating the risk of not achieving estimated targets and not reaching the full potential of the ESCO market.

Key barriers for any EPC project in the Czech Republic have been access to funding and mistrust from client towards ESCO projects. In addition, the unpredictable financial future of some of the clients has also been a barrier to ESCO projects in the Czech Republic. As such, the ESCO market in Czech Republic is less developed, similar to other Central and Eastern European countries. In 2009, there have been approximately 8-10 companies offering EPC services. ESCOs involved in this project were well-placed and experienced players. There have also not been any problems with the client, i.e. the regional authority. One of the reasons for such a smooth project implementation was said to be the fact that the client was a regional authority, i.e. the more decentralised the public authority, the easier it is to handle the project.

Key criteria for success have been:

- Access to funds – ESCOs involved were experienced players, the local banks see these type of loans favourable since the client (regional authority) presents negligible credit risk because a public authority cannot go bankrupt;
- Expertise of the ESCO – the ESCOs involved have excellent experience and know-how in the Czech market;
- Regional public client – presents low credit risk, regional authorities better manageable clients than more centralised authorities due to less bureaucracy;
- Capable consultants providing support services to the client to prepare such tenders for EPC – good expertise of the consultant involved in mapping potential buildings as well as preparing the tender was identified as a success factor. The consultant made the objectives of the tender very clear (in comparison if the client itself prepared the bid) and enabled the contractor to prepare well for the bid (assess the potential for energy savings).

Lessons learned:

- The implementation of the project went well, i.e. the actual energy savings were higher than estimated (approximately CZK 1 million, i.e. €40 000), hence ESCOs could be taking on more risk and guaranteeing higher energy savings;
- Access to finance is the key for the uptake of such local investments.
- Non-EU funding tends to be faster, and much more adequate for regional application since the administrative burden is lower.

22.5 Conclusion

- First big pool of projects by a regional public administration in the Czech Republic;
  - in total 30-50 projects in different locations split over five phases of the project (for each phase a separate tender);
- Importantly, there has been no financial requirements for the regional authority;
  - The ESCO overtook all the responsibility for financing, thus the public authority did not need to indebt itself;
- Everything worked smoothly due to ESCOs experience within the market and due to available finance through the local bank;

- The project has been regarded as successful. The payback period of the investment is 12 years. Based on this time span, the monthly repayments have been calculated. The business model shows that it is expected that there will be a surplus of energy savings every year. The evaluation after the first year showed CZK 1 million (€40 000) surplus (approximately 5.7%) of energy savings compared to the estimations.

23 Refurbishment Universität der Kunste Berlin

23.1 Introduction

Programme title		Energy Saving Partnership – Universität der Kunste in Berlin, Germany
Description of project		Refurbishment of public buildings
Type of building(s) or construction		University buildings of the faculty of Arts (Kunste)
Overall aim of programme		Energy savings (cost savings) in the public buildings of the Universität der Kunste in Berlin, Germany
Type of project		Energy Performance Contracting
Main technologies / approaches		Measures performed to improve energy performance include: Air conditioning and ventilation Heating and hot water optimisation, including pipeline insulation Lighting Energy Control System
Location		Berlin, Germany (9 buildings, 52.000 m2)
Time frame	Start date	Summer 2003 (contract signed)
	(Planned) end date	Summer 2004 (SBT implemented the project) The EPC contract duration is 10 years (2004-2014)
Programme originator		Universität der Kunste
Key stakeholders:		Universität der Kunste in Berlin, Germany
		Siemens Building Technologies (SBT, as being the ESCO)
		Berliner Energy Agency (as programme manager of the project on behalf of the Energy Saving Partnerships (ESP) of Berlin)
		Regional government (senate) of Berlin

23.2 Project description

Total (projected) energy saving per year (in GWh/y)	4,87 GWh/year (CO2 savings: 1,180,000 kg/CO2); 27,6% savings in total energy consumption per year; €240.000 energy costs are saved per year (2001 prices)
Conditions of subsidy	Project needed to fulfil to requirements of ESP; Siemens (SBT) needs to comply to agreed energy savings in EPC contract, otherwise their yearly return is not paid out
Total investments	€1.085.000 investment (by SBT) in heat supply system, insulation of pipelines, optimisation of hot water production, air conditioning, electronic devices as well as in lighting

The Senate of Berlin (on behalf of the University of Arts), together with Siemens Building Technologies (SBT) Germany, has concluded an Energy Performance Contract (EPC) regarding the refurbishment of 9 buildings of the University of Arts in Berlin. The buildings are partly historical and partly modern – with construction years between 1880 and 1988. A proposal of the University of Arts has been made towards the Berlin's Senate and/or Berliner Energy Agency (Berliner Energieagentur) to participate as a 'partner' in the Building Pool of the Energy Saving Partnerships (ESP) programme of Berlin. The ESP programme was developed by the Berlin's Senate as a model for efficient energy performance contracting with the aim of achieving ambitious objectives for

climate protection and reducing energy costs in the face of a tight budgetary position. The main reason for the University to participate in the Building Pool of the ESP programme was to reduce its operational expenditures – in this case the University's energy costs. The refurbishment project in the University of Arts qualified for the Building Pool (i.e. net yearly energy costs of at least €200.000) under the ESP programme, as before the refurbishment the University's yearly (net) energy costs were about €860.000 (2001 prices).

The ESP programme was jointly developed by the Berliner Energy Agency and the Berlin's Senate Department for Urban Development in 1996[18]. Within the ESP programme, the Berliner Energy Agency acts as independent project manager, who moderates and manages the process (e.g. the negotiations on the baseline and the contract) and brings forward the procurement process; the projects proposed by the partners in the ESP programme are procured publicly, where the 'winner' of the procurement contract (in this case Siemens) concludes the EPC contract with the building owner (in this case the University of Arts) for implementing the procured contract (in this case the refurbishment project). In the refurbishment project, the Berliner Energy Agency acts as the (independent) project manager. The University of Arts pays a commission fee for the project management of the Berliner Energy Agency, which is further co-financed by the Berlin's Senate. In this particular case, the University of Arts and the Berlin's Senate contribute both 50% to the total project management costs of the Berliner Energy Agency. The project management involvement of the Berliner Energy Agency lasts until the termination of the EPC (so by the end of 2014). The (special) position of the Berliner Energy Agency as independent project manager within the ESP programme, for negotiating the EPC contracts with the ESCO (Siemens in this case) and the process management (incl. monitoring and verification of the achieved energy savings) during the EPC contract is perceived as one of the key success factors of the ESP programme, according to the Berliner Energy Agency.

The EPC contract is implemented by Siemens (the ESCO), who financed the investments/ measures that have been implemented for the refurbishment of the University's buildings. Siemens is responsible for the planning, implementation and management of the energy savings measures and as such bears the operational and economic risk of the project[19]. The investment costs made by Siemens in 2003/2004 are recovered through the resulting energy cost savings[20]. In the EPC contract between the University of Arts and Siemens, it has been concluded that 27,6% energy savings should be realized on yearly basis (compared to 2001) in the 9 public buildings of the University of Arts. Therefore, the yearly energy cost savings are about €240.000 (2001 prices), depending on the energy prices. From these cost savings, Siemens obtains €200.000 as a performance-based fee for their on investments made in 2003/2004, where the remaining (€40.000) is obtained by the University of Arts as energy cost savings. However, before Siemens can obtain their yearly performance-based fee, they have to comply to the agreed energy savings level of 27,6%. If Siemens does not comply to this target (in a certain year), then the yearly return is not paid out, meaning that the financial risk is completely with Siemens. The monitoring and verification of the achieved energy consumption and savings of the public buildings of the University of Arts is done by the Berliner Energy Agency in their role of independent project manager.
In July 2006, the University of Arts received the Green Building Partner Status, as part of the EU GreenBuilding Programme (hosted by the Joint Research Centre). In order to get included in the

[18] More information on the Berlin Energy Saving Partnerships programme can be found in case study Non-EU funded projects: 09 EPC Berlin Energieagentur

[19] For the University of Arts, the advantage of this model is that they do not bear any investment costs, can outsource the implementation of the energy saving measures, and realize energy cost savings.

[20] The overall aim within the ESP is that public buildings (within the project) are 'pooled' in a way that less profitable buildings can be combined with more profitable ones such that, in the end, the agreed energy savings (and consequently the cost savings and profits) can be realized.

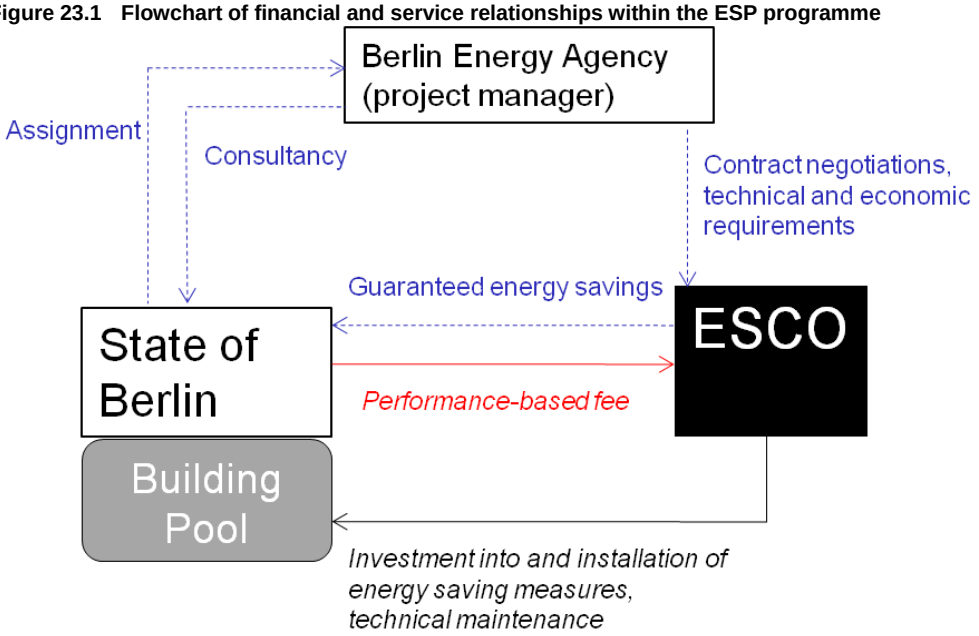
EU's GreenBuilding Programme, the University of Arts had to reveal that the main motivations for energy efficiency are environmental considerations and energy savings.

23.3 Financial characteristics

23.3.1 Financial construction

Siemens (the ESCO) has undertaken the complete upfront investment of €1.085.000 into the energy saving measures for the refurbishment of the 9 public buildings of the University of Arts (the Assignment). The investment costs can be recovered via the performance-based fee (€200.000 yearly) that Siemens can obtain when it realizes the agreed energy savings (see Figure 1). The project management costs (yearly basis) of the Berliner Energy Agency (as part of the ESP programme) are (co-)funded by the Berlin's Senate (50%) and the University of Arts (50%).

Figure 23.1 Flowchart of financial and service relationships within the ESP programme



Source: Berliner Energieagentur (2006): *Performance Contracting - Energy Saving Partnership - A Berlin Success Model*

23.3.2 Conditions & Instruments applied

The investments in the energy saving measures for the refurbishment of the public buildings of the University of Arts in Berlin are undertaken by Siemens Building Technologies (SBT).

23.3.3 Risk profile

Siemens is fully bearing the technical and economic risks related to the investment (and maintenance) of the energy saving measures implemented. Siemens is responsible for the operational performance of the technical systems, including any risks caused by a breakdown of the systems. Siemens finances the investments, and legally guarantees a minimum level of energy savings; otherwise the performance-based fee will not be paid out. In other words, if the targeted energy savings in a certain year are not achieved, Siemens will still need compensate the University of Arts.

23.4 Recommendations

- The Energy Saving Partnerships of Berlin are successful due to the special position of the Berliner Energy Agency within the programme – as independent project manager, and due to the co-finance of the project management costs by the senate of Berlin.

24 Bad Radkersburg

24.1 Introduction

Project title		Integrated Energy-Contracting (Energy Conservation Measures and Renewable Supply) for Elderly Home Bad Radkersburg
Type of building		Residential care home for the elderly
Overall aim of project		1.Substitution of heating oil, 2. Reduction of final energy demand
Type of project		Integrated Energy-Contracting
Main technologies and approaches		Substitution of heating oil boilers through a connection to a renewable heating network, Energy conservation measures for heat, electricity and water in the areas of building technologies, building envelope and user motivation
Location		Bad Radkersburg, Styria, Austria
Time frame	Start date	10-2010
	Planned end date	09-2025
Project originator		ESCOs
Key stakeholders:		LIG Steiermark (Building owner)
		Siemens Austria and Quelle GmbH (ESCOs)
		Graz Energy Agency (Facilitator/Intermediary for project development, procurement and IEC contract design)
		Operator of elderly home (building tenant)

24.2 Project description

Total (projected) energy saving per year		0.35 GWh/y final energy (Heat: 31%, electricity 12%, water 5% CO_2 93% (conversion to renewable supply)
Costs	Depreciation period	15 years
	CAPEX	€ 0.23 million (investment in RE +EE)
	CAPEX (annualised)	€ 0.02 million per year
	OPEX	0.064 (energy cost) + 0.032 (O&M, EE) – 0.024 (savings) = € 0.072 million per year
	Other costs	All included in capex and opex (life cycle cost ESCo model)
(Projected) benefits	Energy savings	€ 24,000 /y for energy savings figures see above
	Other benefits (e.g. demonstration, learning, example setting, local energy saving goals, etc.)	Benefits for the building owner: Building owners pay for outputs and results (services) instead of inputs and components (e.g. technology). Thus technical as well as financial and operational risks can be outsourced to an ESCo and the building owner can request guarantees for the total cost and overall performance of the energy service package. EC- models can facilitate access to capital to overcome high up-front cost of RE and EE investments. Some ESCos provide

Total (projected) energy saving per year		0.35 GWh/y final energy (Heat: 31%, electricity 12%, water 5% CO_2 93% (conversion to renewable supply)
		financing themselves, but frequently ESCos are capital-constrained and but may still take the role of facilitator for third party financing solutions. EC is a modular and customized service package, according to the specifications of the building owner. Outsourcing the responsibility for energy related services to an experienced actor may reduce information barriers, up-front cost and access to capital (if the ESCO (co)-finances the equipment or facilitates financing) and the 'hassle factor' for the building owner. ESC and IEC are particularly suitable for RET, because their energy out-puts can be measured directly without needing a baseline. Thus ESC reduces the expenses for measurement and verification significantly and the risks associated with the savings guarantee, in comparison to the EPC model.

The Integrated Energy-Contracting (Energy Conservation Measures and Renewable Supply) for Elderly Home Bad Radkersburg included the following measures:

1. Connection to renewable heating network (substitution of heating oil boilers)
2. Building technology efficiency measures (e.g. controls, rebuilding of central heat distribution including pumps, hydraulic adjustments, re-lighting
3. Solar thermal system
4. User behaviour campaigns

This project is driven by a combination of renewable energy and energy efficiency goals

1. Substitution of heating oil as energy carrier
2. Reduction of final energy demand
3. Lowest total cost of energy over 15 year project cycle

Non-energy-benefits include but are not limited to modernization of building energy infrastructure, CO_2 savings (>90%), outsourcing of technical and economical risks over the entire project term of 15 years.

Basically Energy-Contracting is a market driven approach, and therefore not too reliant on local supporting policies and regulations. Of course, the general climate goals (20/20/20) may be considered as a helpful general framework to put RE and EE higher on the agenda. In this particular case, the driver was a company policy (substitution of heating oil) which the project facilitator (Graz Energy Agency) transformed into the project goals listed above. The LIG company policy was supported by a so called "§15a agreement" between the federal government and municipalities.

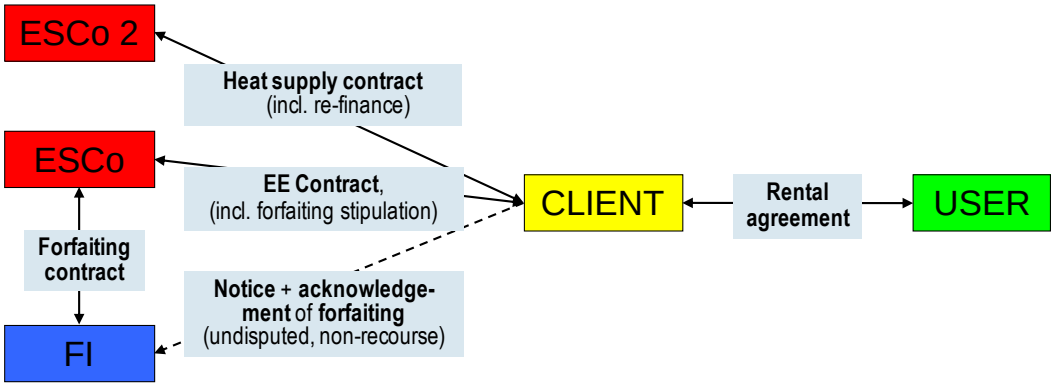
The project has a relative long time line, viz: 15 years. More specifically:

- 10-2009: Start of project development including procurement;
- 06-2010: Signing of Integrated Energy-Contracting contract;
- 10-2010: Commissioning of new RE and EE installations;
- Current status: Project delivers satisfactorily with annual audits to for quality assurance;
- 09-2025: End of IEC contract.

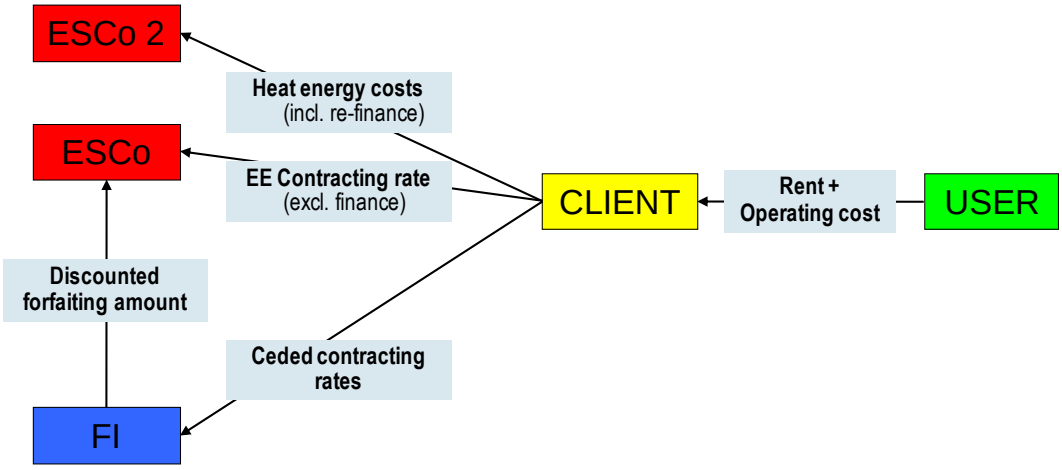
24.3 Financial characteristics

In the chart below, the contractual relationships of all key stakeholders involved are summarised

24.3.1 Financial construction



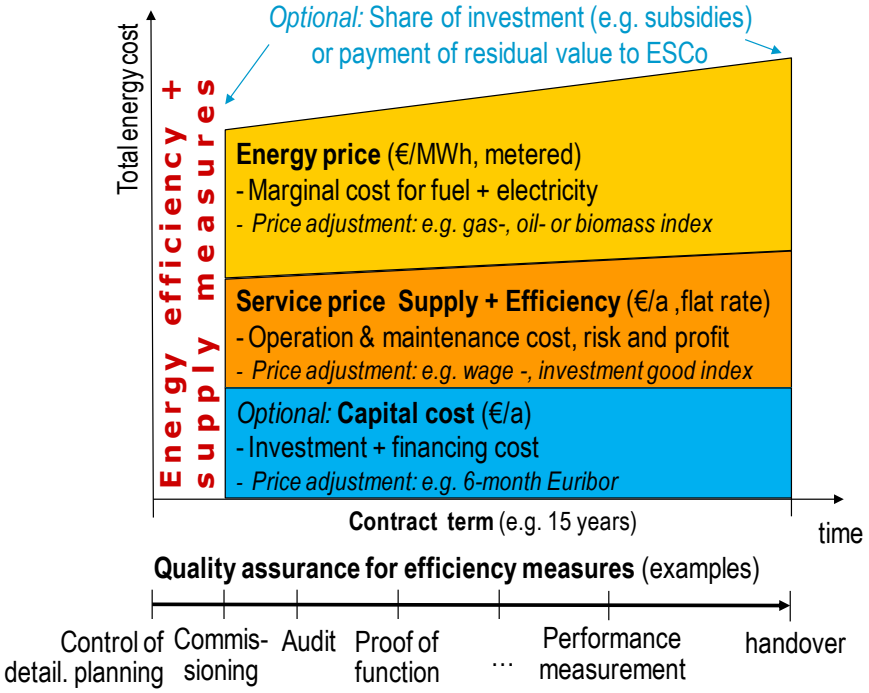
The cash flows between the stakeholders are depicted in the next figure:



The investment volume for RE and EE was € 230.000. The funding gap was closed by outsourcing an energy service package which in this case included funding by third parties (ESCo and finance institute). The investments are repaid over the project term of 15 years

Without third party financing, the project would have been at least delayed and the energy efficiency investments would or would not have happened at all.

The underlying IEC business model can be summarized as follows and includes third party financing through an ESCo as well as a third party financing institution:



The ESCo's remuneration is made up of the following three price components:

- **Energy price** (per MWh of useful energy metered): Covers the marginal "consumption related" cost per MWh of useful energy supplied. To rule out incentives to sell more energy, the ESCo's calculation of the energy price should include consumption related cost only (in economic terms: the marginal cost), i.e. exclusively the expenditure for fuel and auxiliary electricity.
  To account for final energy price developments during the contractual period, the ESCo's energy price will be adjusted by using statistical energy price indices depending on the fuel used (e.g. gas or biomass index), which are defined in the IEC Contract. Such, the risk (and chances) of final energy price development remains with the ESCo's client.
- **Service (or basic) price for Energy Supply** (flat rate): All operation related cost, i.e. the cost for operation & maintenance, personal, insurance, management etc. of the energy supply infrastructure as well as entrepreneurial risk.
  During the contractual period, the prices will be adjusted (typically every year retrospectively) by using statistical indices such as wage or investment good indices.
- **Service price for Energy Efficiency** (flat rate): In analogy to the above service price all operation cost of the energy efficiency measures. As is shown in Figure 5, the two basic prices can be combined.
  Capital cost of energy efficiency and supply investments may or may not be part of the service package.10 If (co-) financed by the ESCo, the ESCo will get a remuneration for it's capital cost minus subsidies and building cost allowances.
  During the contractual period, the prices may be adjusted by using statistical indices such as 6-Month Euribor.

In the above mentioned price components, all the ESCo's expenditure items for the defined scope of services throughout the contractual period must be included ("all inclusive prices"). Correspondingly, project or life cycle costs (LCC) will be calculated at the Integrated Energy-Contracting model, which should be considered at the comparison with an in-house implementation.

Since Energy-Contracting is basically a market based approach, the energy service package was tendered under a negotiated procedure regime which included a competition for solutions and prices.

Outsourcing to an ESCo has the added value of also outsourcing technological and economical implementation and operation risks to a third party over the entire project life cycle.

24.3.2 Risk profile

The most important threats are:

- ESCo business models depend on the willingness of a building owner to outsource comprehensive service packages. Outsourcing may threaten existing jobs, organizational routines and even question the performance of individuals previously responsible for sustainable energy agendas. Consequently ESCo models may face opposition from existing personnel of building owners, because changes in competences, organizational and procurement routines are required.
- Hiring sufficiently qualified personal with interdisciplinary skills may be a barrier for ESCo development.
- Although EPC-models are a market based instrument, some (legislative) policy support is required to solve existing barriers, e.g. by:
  - Allowing public entities to conclude multi-year contracts with ESCos, which do not count against public deficit limits,
  - Solving the split incentive problem between building owners and renters/ occupants. This applies particularly to the residential sector but to a lesser extent also to the commercial building sector;
  - Allowing life cycle cost optimization across separate investment and operation budgets. This is a key barrier which for private and public organizations;
  - Additional barriers for successful implementation include procurement regulations and budgets by public authorities, companies, or housing corporations that are not based on lowest net present value of life-cycle cost calculations.

At this point no substantial risks have materialized thanks to a thoroughly prepared and controlled project preparation and implementation.

24.4 Analysis

Strengths

- Proven and market based model;
- Performance based payments provide incentives to maximise efficiency;
- Reduces hassle-factor for building owner by outsourcing risks, guarantees for all-inclusive cost, and modular package service.

Weaknesses

- Limited to cost-effective measures;
- Long contracting periods and minimum project sizes required;
- ESC is limited to energy supply, so does not maximise the full EE potential in a building.

Opportunities

- Expected growth of ESCo markets with increased awareness of the benefits of Energy Contracting, increasing cost competitiveness of RET, regulatory support and engagement by public building owners.

Threats

- Willingness of building owners and existing personnel to outsource service package to an ESCo;
- Complex contracts covering entire project cycle;
- Separate investment and operational budgets of building owners;
- Split incentives.

24.5 Conclusions and Lessons learnt

There are no easy or one-fits-all solutions to how to implement energy efficiency projects. In any case, **the decision of the building or business owner to tap into energy efficiency resources** (either voluntarily or forced by regulations) remains a basic requirement – independent of the implementation model. In other words, efficiency markets need ”**educated” customers to demand energy efficiency (services) in the market**. Furthermore, even the most ”educated” customers will require independent facilitators/intermediaries to support them on their journey through this complex matter.

The following key lessons can be learned for ESCO market development:

1. Successful **market development** – in particular for EPC in the public sector – was **demand-side driven**. (Potential) ESCO customers defined their goals and needs for energy efficiency service packages and **put out requests for proposals on the market**. On the contrary, studies and even investment grade audits (IGAs) are not sufficient to create projects.
2. To foster market development, the role of **independent market and project facilitators as intermediaries between ESCOs and their (potential) clients** has proved to be a key success factor (as represented, e.g., by energy agencies).
3. Contracting to an ESCO is a strategic “**make or** buy” decision of a (potential) client. Outsourcing to an ESCO competes with a standard in-house implementation and has substantial implications on the standard buying routines of the outsourcing institution. The decision also implies either entrusting one **general contractor** (ESCO) versus contracting to individual subcontractors for planning, construction, O&M as well as optimization.
4. **Outsourcing requires new organizational routines on the customer side**; e.g., with regard to procurement practices (typically “negotiated procedures” are applied), interdisciplinary co-operations between different departments and project engineers or long-term cross-budgetary financial management.
5. **Energy-Contracting is a flexible and modular energy service package**. This also implies that the ESCO customer may define – depending on his own resources – what components of the energy service will be outsourced and which components he carries out himself.
6. **Energy efficiency often is not the driving force and not a stand-alone business case** but a (beneficial) side effect. Better listening to the “real” needs expressed by customers and building strategic alliances with facility managers, security, automation and other building technology tasks to incorporate energy efficiency goals or minimum performance standards early on in project development is required.
7. **Financing is not necessarily the core business of ESCOs**. Their core competence usually lies in technical, economic and organizational matters of an energy service package. **ESCOs should serve as finance vehicle, not necessarily as financiers themselves**. Nevertheless, of course, payments to ESCOs must be secured.

8. The Energy-Contracting approach offers **integrated solutions for the project life cycle** (planning, construction, O&M and optimization) and is **interdisciplinary** (technical, economical, financial, organizational and legal aspects) in order to achieve guaranteed performance and results of the efficiency technologies deployed. The ESCO concept **opens up solutions, which are not achievable through standard, disintegrated implementation processes** (life-cycle cost optimization across investment and operation budgets, integrated planning or performance guarantees over the complete project cycle…). However, these opportunities also imply a **highly complex product**.

Many obstacles to energy efficiency root in the fragmented nature and small units of end-use energy conservation potentials, the low interest in energy efficiency itself and must not be attributed to the Energy-Contracting approach or ESCOs in general. A well designed obligation scheme might be a helpful driver for the development of ESCO markets, but is not sufficient. It cannot replace a more differentiated approach in each market segment. On the way to better developed energy service markets, strong efforts on all levels of policy framework, capacity building, removal of barriers and concrete product development remain to be done.

In conclusion, the Integrated Energy-Contracting model is ideal to combine energy savings with supply of renewable energy.

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