

Financing of Sustainable Housing Retrofit Guidelines for Financial Institutions



The guidelines shall help commercial financial institutions to gain sustainable energy finance experience and to develop sustainable energy capacity and activities in-house to finance retrofit of the building stock by making use of the promotional programs provided by the European Union.



Technical References

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This publication is intended as an information for participating financial institutions at seminars on financing of sustainable housing retrofit projects in member states of the EU. It provides an overview of the instruments and the respective promotional programs of the EU to finance the energetic retrofit of buildings. It is based on the reports and information provided by official EU documents and the respective web-pages of the EU, especially the page <http://www.buildup.eu/financing-schemes> and further pages linked to it. Parts of the document are copied from those web-pages of the EU, Parts of the document are taken from following EU documents:

- **FINANCING ENERGY EFFICIENCY: FORGING THE LINK BETWEEN FINANCING AND PROJECT IMPLEMENTATION**, Report prepared by the Joint Research Centre of the European Commission, Authors: Silvia Rezessy and Paolo Bertoldi, May 2010, see http://ec.europa.eu/energy/efficiency/doc/financing_energy_efficiency.pdf
- **FINANCING THE ENERGY RENOVATION OF BUILDINGS WITH COHESION POLICY FUNDING**, ENER/C3/2012-415, prepared by Julien Paulou (ICF International), Jonathan Lonsdale (ICF International), Max Jamieson (ICFInternational), Isabella Neuweg (ICF International), Paola Trucco (Hinicio), Patrick Maio (Hinicio), Martijn Blom (CE Delft), Geert Warringa (CE Delft), 14 February 2014
http://ec.europa.eu/energy/efficiency/studies/doc/2014_guidance_energy_renovation_building_s.pdf

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Abbreviations

CEB	Council of Europe Development Bank
CEF	Connecting Europe Facility
CFI	Commercial financial institution
CHP	equipment
CFI	Commercial financial institutions
DFI	Development Financial Institutions (like EIB, KfW, EBRD)
DG	Departments of the European Commission, Directorate-General
DG REGIO	European Commission, Directorate-General for Regional and Urban Policy
DSR	Debt service ratio
EAGGF	Guarantee and Guidance Fund
EASME	Executive Agency for Small and Medium-sized Enterprises
EBRD	European Bank for Reconstruction and Development, London
ECA	Export Credit Agency
ECCP	European Climate Change Program
EE	Energy Efficiency
EEA	European Environment Agency
EEE-F	European Energy Efficiency Fund
EEPR	European Energy Program for Recovery
EEN	Enterprise Europe Network
EEM	Energy Efficient Mortgage
EIB	European Investment Bank
EIM	Energy Improvement Mortgage
EPBD	Energy Performance of Buildings Directive
ERDF	European Regional Development Fund
ESCO	Energy Service Companies
ESI	European Structural and Investment Funds. the European Regional Development
EU	European Union
EnerPHit	the standards for energy retrofits, based on the Passive House methodology and
EuroPHit	the project to implement the EnerPHit standard in the MS of the EU
IEE	Intelligent Energy Europe
IFC	International Finance Corporation
IFI	International Finance Institutions
JASMINE	Joint Action to Support Microfinance Institutions in Europe
JASPERS	Joint Assistance to Support Projects in European Regions
JEREMIE	Joint European Resources for Micro to Medium Enterprises
JESSICA	Joint European Support for Sustainable Investment in City Areas
KfW	Kreditanstalt für Wiederaufbau, Germany
kWh	Kilo-Watt-hour
LGF	Loan Guarantee Facility
LIFE	Financial Instrument for the Environment
LLC	Life of loan coverage
LGF	COSME Loan Guarantee Facility
MS	Member States of the EU
NCCF	Natural Capital Financing Facility (NCCF) LIFE
NEEAP	National Energy Efficiency Action Plans (NEEAPs)
PF4EE	Private Financing for Energy Efficiency instrument (PF4EE) LIFE
SCF	Structural and Cohesion Fund
SE	Sustainable Energy: energy efficiency and renewable energy
SME	Small and medium enterprises
SPV	Special purpose vehicle

Notes on the Guidelines

Buildings account for nearly 40% of total energy consumption in the EU. With more than 200 million buildings in need of energy retrofits, many will require deep retrofitting if the EU's 2020 targets are to be fulfilled. The majority of the energy is used in heating and cooling. Deep renovation and improving the buildings envelope and applying passivehaus technologies can save over 80 % of the energy requirement of those buildings.

The EU has introduced legislation to ensure that buildings consume less energy. A key part of this legislation is the Energy Performance of Buildings Directive first published in 2002, which required all EU countries to enhance their building regulations and to introduce energy certification schemes for buildings.

The refurbishment of the building stock provides an opportunity to create local jobs, stimulates the economy and at the same time generates national savings. For example, in Germany, the KfW handles the promotional programs on behalf of the Federal Government. The programs for energy-efficient construction and refurbishment receive favourable terms through German federal budget funds to provide financial incentives for more energy efficiency in the housing sector. Recent studies show that in Germany energetic refurbishment of buildings is a win-win situation for the home owners, the environment, the economy and the federal budget¹.

The refurbishment of the building stock to high energy standards essentially contributes to the reduction of energy demand and the lowering of greenhouse gas emissions. For the proprietors the energy-saving rehabilitation is for the most part cost-effective when it is incorporated as part of the rehabilitation cycle, in other words combined with already planned modernization measures. The additional demand in the construction sector has a positive effect on employment, which benefits small and medium enterprises (SME) in particular. Within refurbishment projects the construction industry accounts for nearly three fourths of the direct employment effects. This also triggers indirect employment effects through the demand for inputs such as heating furnaces or insulation material in other industries. Investments in renovation are investments in future savings. The person who pays benefits, that is either the home owner who is paying lower energy bills or the government which is stimulating activities and receiving taxes.

Such retrofits can either be done all in one go or incrementally in a step-by-step manner. Step-by-step refurbishment – as proposed by the EuroPHit project - constitutes the most appropriate approach in most cases of energy efficient refurbishment, both from the building perspective (modernization where and when needed) and from the point of view of the house owners with limited resources. Significant reductions in energy consumption have been demonstrated in many successfully completed retrofits. For further information on this project, please visit the webpage <http://passiv.de/en/>.

¹ The current and previous evaluations and studies on the economic impacts are available at <https://www.kfw.de/KfW-Konzern/KfW-Research/Economic-Research/Evaluationen/Energieeffizient-Bauen-und-Sanieren/> see Tabelle2 on page 7 of the study



Building retrofits generate energy savings over the lifecycle of the investments, therefore long term financing is needed. Getting finance right is the first step in the provision of the full solution. Financial institutions can help their clients because they have access to low cost capital and grant funds provided by the EU or the local government. Governments can promote retrofit projects by own grant funds. These guidelines shall help Financial Institutions to have a better understanding of the EU funding system and with the design of special financial tools and financing programs. It will also provide the necessary information to present financing proposals to the decision making hierarchy of banks or to apply for promotional refinancing at international promotional banks and the EU.

The guidelines are drafted by the Friedrichsdorfer Institut zur Nachhaltigkeit (IzN) e.V. as a contribution to the Europhit Project under the program "INTELLIGENT ENERGY – EUROPE". More details on this program, and descriptions of all other projects, are available on <http://ec.europa.eu/intelligentenergy>.

1 The EuroPHit Project



The overall objectives of the **EuroPHit** project is the promotion of energy efficiency in buildings and the reduction of energy consumption and green house gases. This is achieved by a reduction of energy demand of the buildings, reduced consumption of fossil fuels and electricity, use of renewable energies, implementation of refurbishment measures and improved comfort of housing. There are significant non-financial yet material co-benefits delivered through the execution of an optimal energy efficiency retrofit including enhanced health and comfort and improved standards of living. These co-benefits may be as strong, or stronger, drivers of a retrofit than the pure economics. There is a strong correlation between the amount of co-benefits and the relative depth of the retrofit: The deeper the retrofit, the greater the likely positive side effects to the building's occupant and owner.

The EuroPHit project shall help the clients to apply the best available technology when they invest in energy efficiency of their buildings. It aims to

- significantly increase the quality and energy efficiency of step-by-step refurbishments throughout the EU by developing a comprehensive and integrated methodology,
- implement uniform quality assurance of both design and construction, encouraging implementation by key actors and fostering knowledge dissemination through new and existing project networks,
- mobilize financial resources to support the energy efficient refurbishment of the building stock.

The most viable strategy of building retrofit is a **step by step approach** of applying the best technologies every time when refurbishment activities are implemented. For each building this requires a lifecycle concept and a long term strategy. The EuroPHit project will produce exemplary refurbishment plans that anticipate the overall workflow for the step by step retrofit. Using these plans, along with the construction details for each step, future designing and building teams will have a thorough understanding of what has been done, and what remains to be done. By this strategy the building owners shall find the best feasible and most viable



solutions in a step by step approach. The EnerPHit standard seeks an optimal investment in different climates and different architectural contexts.

The **EuroPHit** project makes use of and promotes **EnerPHit**, one of the most stringent and integrated standards available internationally for energy retrofits. The **EnerPHit Standard**, in turn, is based on the Passive House methodology and concept, a tried and true approach to efficient building with over 20 years of positive examples to show.

Through a focus detailed planning paired with quality building components, superior insulation, ventilation with heat recovery, thermal bridge free design and airtight construction, Passive House buildings reach high levels of energy efficiency and comfort. Adherence to the strict Passive House criteria result in buildings with superior air quality and comfortable indoor temperatures year round that use up to 90% less energy than the typical building stock, or less than 1.5 litres of oil or 1.5 cubic meters of gas to heat one square meter of living space for an entire year. Vast energy savings have also been demonstrated in warm climates where conventional buildings typically require active cooling. Over the last two decades, the Passive House Standard has gained rapidly in recognition and has proven to be a reliable approach in an ever increasing range of climates



Retrofitting with Passive House principles: EnerPHit

Achieving the Passive House Standard in refurbishments of existing buildings is not always a realistic goal, due in large part to unavoidable thermal bridges in the existing structure. Renovations according to Passive House principles are made possible by retrofitting to the EnerPHit Standard. See http://passipedia.passiv.de/passipedia_en/certification/enerphit

EnerPHit – the Passive House Certificate for retrofits

It is not always possible to achieve the Passive House Standard (new constructions) for [re-furbishments of existing buildings](#), even with adequate funds. For this reason, the PHI has developed the “**EnerPHit** – Quality-Approved Energy Retrofit with Passive House Components” Certificate.

Significant energy savings of between 75 and 90 % can be achieved even in existing buildings, for which the following measures have proved to be particularly effective:

- improved thermal insulation (based on the principle: if it has to be done, do it right)
- [reduction of thermal bridges](#)
- considerably [improved airtightness](#)
- use of very good quality [windows](#) (there is no reason why Passive-House-suitable windows should not be used whenever the opportunity arises)
- [ventilation with highly efficient heat recovery](#) (again, Passive-House-suitable systems are highly recommendable)
- efficient heat generation
- use of renewable energy sources

These are exactly the same measures that have proved to be successful in new construc-



tions. A number of examples demonstrating the application of high-efficiency technology in existing buildings have become available in the meantime. The Passive House Institute has advised on the implementation of several projects and carries out measurements in modernised buildings.

To know more about the **EnerPHit-Standard** you can also visit the corresponding section in the Passive House Institute's website: "[EnerPHit](#)" - [New PHI-Certificate for Refurbishment of existing buildings](#). Based on Passive House principles, the EnerPHit Standard calls for high quality, energy efficient components. Setting the EnerPHit Standard as the target ensures that both the energy demand as well as the quality is future-proof.

To inform and motivate Financial Institutions (FI) to support the EuroPHit project by own credit-lines and promotional finance based on promotional programs of the EU is an important integral component of the EuroPHit project.

2 Barriers to the use of sustainable energy

The EU has identified the following barriers to the use of financial investments for sustainable energies (SE) in buildings including energy savings and renewable energies²:

2.1 Market barriers and failures:

- High pre-investment development and transaction costs partially due to small size of projects, esp. in the residential sector;
- Information failure on the part of customers: lack of customer awareness and a very high perceived risk of new more efficient technologies by both users and financiers,
- Mistrust in energy audits, benefits initially invisible;
- Information failure on the side of commercial financial institutions (CFIs): general lack of sustainable energy (SE) finance experience within commercial financial institutions, lack of dedicated time and resources to develop SE capacity and activities in-house;
- Lack of visibility and scale of SE finance: SE projects often represent a relatively small niche business for major banks;
- High perceived end-user credit risks;
- Low collateral asset value of SE equipment and difficulties creating creditworthy financing structures. Collateral value is low because for most SE projects equipment represents a sizeable share of total project cost with high portions of engineering, development and installation costs;
- Energy savings as revenue is foregone by financiers: cash flows from saving energy are not (yet) conventional revenues in what is still an asset-based culture in financing. This discourages commercial financial institutions entry into this market. Energy cost

² See: FINANCING ENERGY EFFICIENCY: FORGING THE LINK BETWEEN FINANCING AND PROJECT IMPLEMENTATION, Report prepared by the Joint Research Centre of the European Commission Authors: Silvia Rezessy and Paolo Bertoldi, May 2010, page 2 and 3

savings should be incorporated into lenders' analysis of free cash flow and ability of borrowers and end-users to meet debt service payments³;

- lack of reliable long term forecasting regarding the development of the energy prices, which prevent the savings calculations for repayment of long term credits;
- Even where payback periods are short and economic benefits clear, SE projects are often not implemented because of high upfront costs;
- In the rental sector: Split incentives between building owners and tenants;
- In the residential sector: long payback periods, lack of contractors, small project size and lack of support for holistic retrofits.

2.2 Legal barriers

- Public sector: the rules of public budgeting – including the annual budget cycle and multiannual savings cash flow – make it difficult for public entities to finance energy efficiency investments from savings in energy costs (similar rules exist in large companies);
- Public sector: local authorities may have to finance energy efficiency investments from their investment budget whereas the resulting savings are credited to the operational budget;
- Residential, joint home ownership: Ambiguities in the legal standing of joint home ownerships and lengthy and cumbersome decision-making due to a large number of decision makers (residential sector); In the case of properties which are managed by housing management companies, steps for renovation are only undertaken with great reluctance, especially if the proportion of rented units is very high. Here, better living comfort and yield (profitability from rental) are not always aligned. Statutory regulation of renovation cycles normally do not include energy efficiency investments
- Residential and rental sectors: uncertainties related to tenant-owner issues and building ownership;
- All sectors: not considering life-cycle costs in procurement decisions.

2.3 Barriers in case of joint home ownership of residential buildings

Specific issues arise with blocks of flats with individual owners, whereby owners' associations need to be involved in line with the specific legislation and practices. It should be noted that achieving energy savings in multi-apartment buildings with common heating/cooling sys-

³ EE equipment is highly specific to a certain site or application. High asset specificity implies illiquidity of certain investments, which leads to higher interest rates being required by investors in those investments. Transaction cost economics uses the term “high assets specificity,” which entails poorer collateral and creates higher risk in that specialized assets cannot be redeployed without sacrifice of productive value. Such assets adversely affect the firm’s ability to borrow because firm-specific assets often cannot be redeployed as collateral for borrowing.

tems often depend not only on the overall energetic retrofit of such buildings but also the behaviour of end-users.

For the social aspects of retrofit projects especially in case of retrofit of social housing projects and recommendations to overcome the owner-tenant dilemma see Annex 6.3.

3 Market based Financial Instruments for Sustainable Energy Investments in Buildings

The primary financing options available for project proponents to finance energy efficiency of buildings are market based financing instruments, which are **different types of loans** (bank loans, forfaiting, leasing etc.) as well as **equity**. Since energy efficiency measures are subsidised by many official national and international sources there is also a wide range of financing instruments at preferential rates available (grants, soft loans, repayment subsidies etc.). With down to as low as 1,2% for housing loans in 2015 it is difficult to undercut commercial offers by public financing, so these sources will concentrate on longer maturities, grant loans for higher risks projects or offer grants. These public financing sources will be described in chapter 4. It is recommended to combine market based with public instruments. Since, however, it is normally impossible to finance 100% of the cost of an energy efficiency project out of public funds the knowledge of market based instruments and the philosophy behind bank financing is essential.

Whereas for public supports economic benefits (externalities) play an important role as justification for subsidies, such benefits (like GHG –avoidance) do not play a role for financing. The central interest of a lender is simply focused on a sound relationship between investment and operating cost on one side and the incoming future cash flow on the other side.

3.1 Cash Flow as basis for financing

The basis for financing is the financial soundness of a project. The basis for financial soundness is the cash flow. Cash flow from energy efficiency projects consists of:

Figure 1

Inflows	Outflows
Savings from efficiency gains	Equity share at investment cost
	Operation cost
Higher rents (house-owners)	Higher rents (tenants)
Loan disbursements	Repayment/interest for loans

Apart from the fact, that all cash flow data are future estimates, investment cost (and equity/debt –share), rent increase, debt services and operation cost can be reasonably well estimated, if necessary, a low and a high scenario can be applied.

Savings are a more complicated issue, as they will arrive as “avoided outflows”. Of course they can be estimated, but if it must be well defined how and on which basis they are measured and (!) whether they are really available for debt service. It is important that:



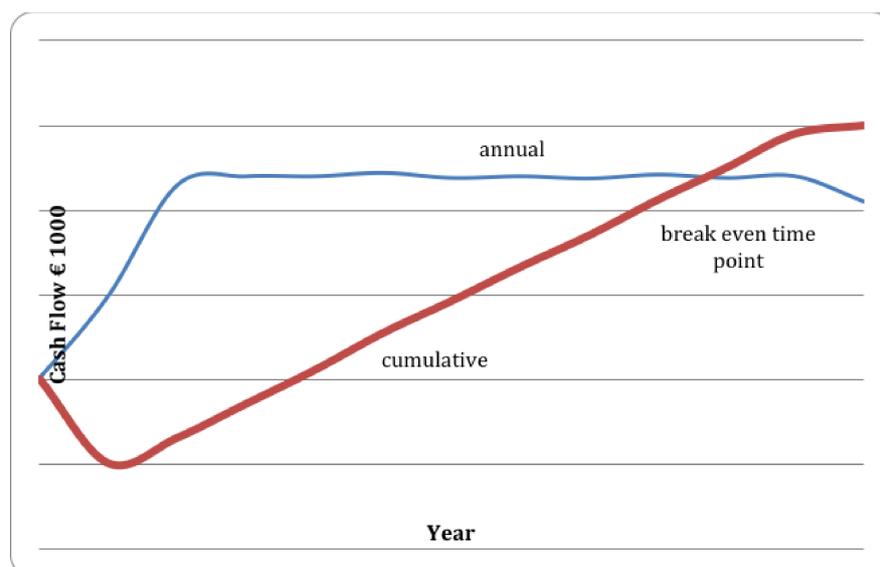
- The base case values have to be well defined in terms of physical units (like kWh) as well as monetary units
- Since there is normally no separate accounting for energy savings in an organisation it must be defined how they are measured and how price changes are treated. (For example, what happens if oil or gas prices are declining?)
- If debt services have to be paid in foreign currency, there must be contingencies for exchange rate fluctuations
- Savings do not always arrive at the same place as the outflows (investment versus operating budget; tenant versus landlord). Therefore it must be clarified that savings are available for debt services or (in the case of rents) landlords can benefit from savings by higher rents

Separation of incidental and energy related cost:

Quite frequently houses undergoing energy efficiency refurbishment do also need other renovation (“incidental renovation”), for example if the heating system is already 20 years old, the walls need repainting, the windows are close to breakdown and the roof is leaking. Energy savings alone can seldom recover total refurbishment cost. A property-owner will also not be in the position to increase rents based on investments necessary for the upkeep of the building. Therefore energy related cost and incidental cost have to be separated.

For financing it must be clear how these different investment parts are covered by a future cash flow. For the energy related part future savings (or the rent increases) are available for debt service, incidental cost can only be financed by a loan if there is a future incoming cash flow: For the house owner rents (not rent increases) can be used unless there are other re-payment obligations, for a public institution or a community part of the budget must be assigned either to serve as equity contribution to the investment cost or to be put aside for the future debt service.

Figure 2: Cash flow profile of an energy efficiency project



Characteristics are:

- Long gestation period (break even point after many years only)



(line 13)

Line 17: Net cash-flow is calculated by project cash flow minus debt service (line 9 minus 11 plus/minus line 13)

Line 19: Profit tax: For the project the principal repayments have to be added to the net cash flow and the depreciation deducted to arrive at the taxable income. Here a (corporate) tax rate of 35% has been assumed, depreciation is assumed to be spread linear over ten years. In reality the tax rate depends also on the overall earnings of the company as well as its status. A public entity may not pay any tax, an ESCO does, depending on the national tax rate. (In the EU between 10 and 38%). So the 35% are more on the pessimistic side.

Line 20: Net cash flow after tax. In line 10 above the tax has to be deducted from the project cash flow (not yet taking into account the debt service. This ratio is needed to calculate the debt service ratio. Equity in cell D 19 is a memory item.

Lines 21-22: A redemption subsidy of 15% of the principal repayments has been assumed (German example). This improves the net cash flow after tax.

Lines 23-25: All internal rates of return (IRR) refer only to the net investment, which is equal to the equity of € 125.000. This explains the very high volatility of the pre- and after tax –IRR.

Lines 27-29: Debts service cover (which should be safely above 1 for a bank finance: In this case it is a bit too close to 1 (years 1-5) for a solid financing and it urgently needs the redemption subsidy. For an improvement (without subsidy) equity could be raised as well as the repayment period could be extended. A scenario analysis should also be carried out for the safety of the project.

Economic IRR:

The economic IRR refers to the entire project cost (€ 625 000) without considering finance (leverage) and taxes. Here no external benefits or cost are considered.

Line 34-35: It can be seen that the economic IRR deviates considerably from the financial IRR.

3.2 Is the project bankable?

One must keep in mind that the cash flow is an estimate of an average development, which may fluctuate into different directions. Banks want to know, up to which extent such fluctuations are possible and therefore they will check the preconditions for such fluctuations as well as the securities in case of problems arising:

1. Real and perceived technological risk

in particular:

- Quality of design and construction
- Expected savings will not be reached
- Novelty of technology and previous experience (is there any experience?)

2. Financial risk,

in particular:

- Cash flow, debt service ratio and other key ratios
- Price changes
- Budgeting of energy cost savings: Are savings recognised as such? How are they booked? Can they be separated from other cash flows?

3. End-user behaviour affecting energy savings

4. Maturity match and country-adapted length of repayment periods: Maturities are not autonomous, but they depend on the monthly or annual cash flow derived from



the project (savings). Since payback periods from energy savings are long, maturities are also long and depending on the country, repayment periods are unusual

5. **Creditworthiness of borrower (private/municipalities/institution etc.) and /or collateral**
6. **Participation of public institutions**

3.3 Sensitivity and scenario analyses

To judge the actual risk sensitivity and scenario analyses will be applied by changing assumptions like income (rent or savings), energy prices, interest rates, leverage, investment cost increases etc.

Figure 4: Example for a bank ratio (sensitivity) analysis: life of loan coverage

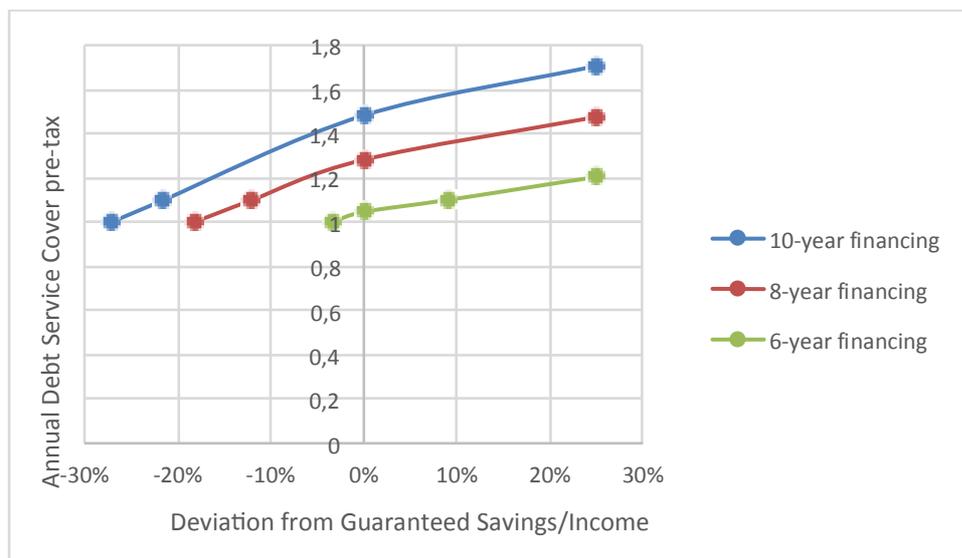


Figure 4 shows an example for a sensitivity analysis of the life of loan cover (LLC). The life of loan cover equals the ratio between the net present value of income/savings divided by the residual loan in the respective year. It shows to which extent the remaining loan is covered by the present value of the cash inflows and it should be above 1.

In figure 4 the relation between different repayment schedules for the loan and deviation from the expected savings can be seen. With a six year repayment period the LLC is already touching 1 with a deviation of only -3% of expected income, which is very unsafe, whereas with an extension of the repayment period the LLC a critical value of “1” will only be reached if the savings are more than 25% beyond expectation. Similar analyses can be carried out with debt service ratio and more influence factors like energy prices, interest rates or efficiency factors can be analysed. It should be noted that it makes no sense to cumulate negative expectations, because such a pessimistic approach will definitely lead to negative results. Such an analysis, however, can open the eyes for the most influential parameters,

which have to be taken care of: In case an investment appears to be too risky, a step by step approach might be chosen

3.4 Financial instruments for energy efficiency investments in buildings

3.4.1 Debt financing, Credit lines, Revolving funds, preferential loans

A conventional bank loan is the simplest form of debt. It is an agreement to lend a principal sum for a fixed period of time, to be repaid by a certain date and with interest calculated as a percentage of the principal sum per year and other transaction costs. Soft loan or preferential loan schemes are a mechanism whereby public funding helps to reduce the cost of loans disbursed by financial intermediaries such as commercial banks. The loan configuration varies depending on the borrower/lender and the type of measures to be undertaken. However actual pay-back time is usually taken into account in the loan.

Main characteristics

- Loan maturity usually matches the actual pay-back time of SE projects in buildings. Depending on the type of measures financed, loan maturity may vary from 5, 10 or 20 years.
- Interest rates vary across debtors, banks, long or short terms, regions etc. Currently they range from 1% to 5%. Typically, the interest rate will be fixed over a certain period of time and will be capped to a maximum throughout the course of the loan.
- Corporate or project loans can be done under recourse or limited recourse structures (see chapters 3.4.2 and 3.4.3).

There are two main methods of repayment:

- **Constant (“bullet”) principal repayment**, which means that the repayment is a fixed percentage of the original debt (as in Figure 3): € 50.000 each year). In this case, interest is calculated on the remaining amount, meaning that interest payments (and also total debt service) are declining each year (as in Figure 3) from 20.000 to 4.000). Since the debt service is highest at the beginning, the bullet method is often disadvantageous for private house owners who are normally financially tight at the beginning and who prefer to have an equal yearly or monthly payment.
- The second method is **annuity repayment**, which means that the annual principal repayments are calculated in way that interest plus principal repayment always add up to the same yearly (or monthly) amount, The formula is:
- $A = C \cdot \frac{i \cdot (1+i)^t}{(1+i)^t - 1}$; A= Annuity; C=Total debt; i= interest rate; t=repayment period ⁴.

⁴ The repayment period t can be annually, semi-annually, monthly or any other period of time. The interest rate i, however, has to be adapted to the period used.

In case of the example in Figure 3 ($A=500.000$; $i=4\%$; $t=10$ years) the annual payment (annuity) would amount to: $A = 500.000 \cdot \frac{0,04 \cdot (1+0,04)^{10}}{(1+0,04)^{10}-1} = 61.645,47$. In contrast to the bullet repayment (70.000 in the first year) this is lower in the first six years, but higher in the last four years.

- Grace periods are periods at the beginning without any repayments, but only interest payments. This can also facilitate the financial burden at the beginning, but on the other side the entire repayment period will be extended or the debt service has to be increased

Credit lines will be granted for smaller projects of similar character up to an agreed overall amount. The advantage for the borrower is that the loan approval process will be carried out only once for the first one of similar projects as far as the limit of the credit line is not exceeded. **Revolving loans** are similar, but the first loan for the first project(s) has to be partly or fully repaid to open the possibility of financing for a follow up project.

Frequently EE-financing from commercial banks is combined with **preferential loans**. These are loans or sometimes grants from national or multinational institutions (see chapter 4) handed out at preferential conditions, i.e. lower interest rates, longer maturities, repayment subsidies or even grants in exchange for fulfilling certain conditions, mostly the achievement of pre-defined efficiency values.

In Germany the KfW has subsidised housing renovation for many years. KfW finances itself at low rates on the capital markets thanks to its AAA rating and the guarantee of the Federal State. KfW receives a subsidy from the government to lower the interest rate at which it lends to commercial banks, which can thus offer loans to homeowners at below market rates.

3.4.2 Project finance

Project finance, non-recourse-finance or cash-flow related funding – refers to transactions whereby the project is financed largely based on its own merits rather than the balance sheets of the project sponsors. There are two basic types of project finance, which are often combined: Pure **cash flow related finance** will only take the future cash-flow as security, whereas **secured debt finance** is additionally safeguarded by all of the project assets, including the revenue-producing contracts. Project lenders are given a lien on all of these assets, and are able to assume control of a project if the project company has difficulties complying with the loan terms. When making a secured loan, banks evaluate both the **quality of the borrower and the collateral**, but the centre of interest is the cash flow and the question, whether the cash flow generated will be sufficient to cover the debt-service (interest plus repayment). No bank is really interested to go through tedious procedures of a foreclosure and therefore collaterals will only serve as a solution of last resort. Therefore ratios proving that the cash flow is sufficient to cover the repayment are very common in project finance, mainly:

- Debt service ratio DSR (Net-cash flow/debt service) >1 ;
- Life loan (coverage) ratio LLC:(net present value of cash flow available for debt service/ / outstanding/debt in the period) > 1 , at all times
- Leverage: Depending on the creditworthiness of the borrower and the project equity requirements will be higher or lower. A leverage of 80% (loan to total capital) and 20% equity is often considered as the upper limit for loans, more usual are leverages

around 70%, in critical cases lower.

- Debt service ratios and leverage are depending on each other to a certain extent: A low DSR can be raised either by a longer repayment period or by a lower leverage (higher equity)

In **EE project financing** above a certain threshold there are two common models of third-party financing. One is direct lending to the end-user and another is lending to the ESCO (see chapter 3.4.4). When the end-user is the borrower, then end user credit risks are separated from project performance and project technical risks: the financial institution assumes the end-user credit risk, while all technical and performance matters are addressed between the ESCO and the end-user. The loan, however, is on the balance sheet of the end-user. Loan financing can be combined with savings guarantees from the contractor.

A **bond** is a debt security, in which the authorized issuer owes the holders a debt and, depending on the terms of the bond, is obliged to pay interest (coupon) and/or to repay the principal at a later date, termed maturity. Thus the *issuer* is the borrower (debtor), the *holder* is the lender (creditor), and the *coupon* is the interest. An example of bond financing relevant to energy efficiency is **issuing municipal bonds in procuring funding for municipal energy efficiency**.⁵ Bonds, however, are mostly issued for the borrower as an entity (which is recourse financing, see chapter 3.4.3), whereas a project has to have a certain minimum size as well as a separate project company to qualify for bond financing under the name of the project.

3.4.3 Recourse (balance sheet finance/secured) finance):

In recourse finance a loan is granted on the basis of the creditworthiness of the investor (mostly supported by a collateral). Cash flow and NPV are (for the bank) of secondary importance. It is assumed that the investor knows the cost benefits of the project, but it also depends on the creditworthiness, the experience and the credit rating of the borrower whether or not a bank will request information on the project cash-flow.

Because smaller companies may not have sufficient internally generated cash flow or the debt capacity to borrow easily for general corporate purposes, they often turn to secured debt by offering collateral such as inventory and receivables or property, plant, equipment, or sometimes a bank letter of credit. Pledging collateral may allow such companies obtain bank loans when they would not normally qualify for unsecured loans. The collateral is used to reduce a bank's loss in the event of a default on the loan. Secured loans, however, can only be obtained up to a certain percentage of the company's asset values, which means that service oriented companies with little assets like ESCOS must often use the equipment provided to their customers as collateral. For private house-owners as well as proprietors of

⁵ The city of Varna in Bulgaria issued municipal bonds to obtain financing for an EE project involving retrofit and modernization of the city's street lighting. The bonds raised 3 million Euro, and the simple payback of the project was 2 years and 9 months. The municipality collected relatively high volumes of financing by issuing general obligation bonds at 9%. Repayment of the bonds was done in three equal portions during a three year period, primarily as revenue bond emission through the savings. Six other cities participated in issuing bonds to raise funding for their projects.

apartments the bank will normally look at the income either from the house-owners job or from the proprietors rent-income.

3.4.4 EPC and ESCO financing

An energy performance contracting (EPC) arrangement is an integrated contract in which a contracting partner (such as an Energy Service Company – ESCO) designs and implements energy conservation measures with a guaranteed level of energy performance for the duration of the contract. The energy savings are used to repay the upfront investment costs, after which the contract usually ends.

EPC (Energy performance contracting) refers to the contractual arrangement between the provider of energy services and the customer (beneficiary)

ESCO-Energy service company: “Natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer’s facility or premises” (*Energy Efficiency Directive (EED, 2012/27/EU)*)

Main characteristics:

- Under an Energy Services Agreement the contractor provides a performance guarantee, while the end-user pays fixed monthly payment to amortize the investment.
- Payment for services delivered is based (either wholly or in part) on the achievement of EE improvements and on meeting the other agreed performance criteria.
- The contractor and client can split the technical risk in accordance with a pre-arranged percentage by introducing a shared savings scheme in the contract.
- Typical EPC contract terms amount to 10 years but can reach 15 – 25 years.
- Depending on the resources of the ESCO and on the market demand, ESCOs may finance projects themselves or help secure funding by providing performance guarantees.
- ESCO financing structures can employ project finance-type debt, usually with additional collateral or credit support.

Implementation

- Depending on the implementation model, the contracting partner to implement the measures is either a general contractor (GC), a general planner (GP) or an Energy Service Company (ESCO)
- In an EPC, investments can be financed by the building owner, by an ESCO or by a financial institution (Third-Party Financing - TPF), either directly or, more generally, through a combination of financial products (equity, loan, grant, incentive scheme, etc.).

Advantages:

- EPC guarantees a certain level of energy savings and shields the client from any performance risk.
- The ESCO has knowledge of technical requirements, permit legislation and support schemes.



Financing of Sustainable Housing Retrofit

Guidelines for Financial Institutions

- Enables facility upgrades to be paid for immediately, bringing forward future energy and operational savings.
- Low interest financing options are often available, including tax-free municipal leases.
- The ESCO represents a single point of accountability, simplifying the upgrade process significantly.
- Annual energy savings can be measured and verified according to the International Performance Measurement & Verification Protocol (IPMVP).
- Allows organisations to disconnect project debt from the building owner.

Disadvantages

- EPC is a complex arrangement - establishing an EPC is time-consuming and requires (external) expertise since each project needs to be assessed individually to estimate potential savings.
- Any failure or shortfall from the expected result requires reconciliation to recover shortfall.
- ESCO by itself is not yet a financing solution. Depending on the share of hardware/equipment to be installed upfront there is still a financing problem for the ESCO which might also affect the customer
- Small ESCOs as well as ESCOs with a high volume of mandates will have problems to finance a high share of equipment and will therefore either come back to project finance or to forfeiting, which will involve the customer
- EPCs have relatively high transaction costs, especially when they address the building envelope. As such, they are mainly suitable for large scale or bundled projects due to their complexity.

Measurement and verification (M&V): while the contract is running, the results (energy saved) need to be continuously monitored: this can also be advantageous for the investor if there is no proper accounting for the energy savings.

ESCOs tend to focus on “low hanging fruit” options that have shorter paybacks and a lower risk exposure. However, properly modelled FIs can de-risk the EPC and motivate ESCOs to take longer term engagements, going closer to deep renovation, in particular in the public sector. When the ESCO borrows, it effectively packages together financing with turnkey project implementation and services agreement. In this case the financier has to evaluate not only the end-user credit risk, but also project economics, project engineering and technical performance ESCO financials and equity contribution, ESCO management and performance track record, and all project contracts including the Energy Services Agreement. The loan is on the balance sheet of the ESCO and the ESCO is exposed to the end-user credit risk unless forfeiting is used.

3.4.5 FORFAITING:

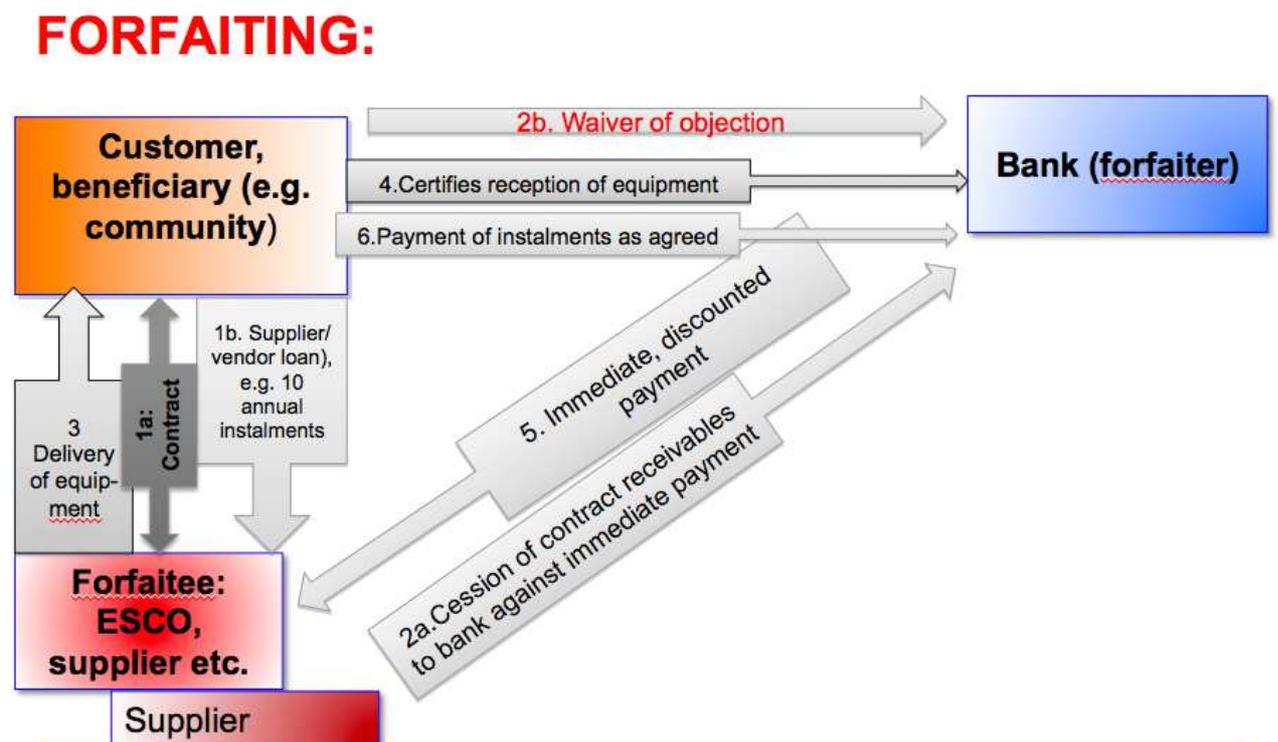
Financing á forfait means basically

- Selling a receivable for a discounted lump sum to a bank (forfeiter), normally on the basis of bills of exchange



- Example: A sum of € 1 Million in 10 annual repayment instalments, discounted at a forfeiting fee of 4% annually yields an immediate payment of € 880.000 (minus around 0,25% provision fee etc.)
- Passing on all accountability from the financial obligation, meaning: There is no more financial obligation from the side of the seller of the receivable (Supplier or ESCO) in case of breach of contract, non fulfilment etc.
- This “abstractness of the forfeiting document” will be further emphasised by a “waiver of objection”, which means the customer waives his right to object legally against his repayment obligation because of any dispute (like non fulfilment of conditions, late delivery, warranties etc.)
- Forfeiting can be used when an ESCO is in an energy performance contract (EPC) arrangement with an end-user and the ESCO sells future receivables (e.g. the end-user payments) to the bank. The bank then assumes the credit risk, in return for a discounted one-time payment

Figure 5: forfeiting:



- (1a) Customer and supplier (or ESCO) conclude a contract for the delivery of hardware or the refurbishment of a building on a turn key basis. In the case of an ESCO there will also be a maintenance agreement, which is usually not part of the financing, because maintenance fees can be paid immediately
- 1b. Both parties conclude also an agreement on the terms of payment on a vendor loan basis. (e.g. 10 equal annual payments). These payment obligation of the customer can be (and is usually) supported by signing ten drafts or bills of exchange to facilitate a later cession. The bills of exchange will be, apart from the forfeiting agreement, the legal basis of the claims

Financing of Sustainable Housing Retrofit**Guidelines for Financial Institutions**

- 2a Cession of the claims to a (forfeiting) bank. This will often be a specialised forfeiting bank and not the customer's regular bank.
- 2b The customer signs a "waiver of objection", stating that there will be no claim of refusing any payment because of unfulfilled contractual obligations (in other words: the customer cannot withhold any payment to the bank because the supplier/ESCO has not reached the guaranteed savings)
- 4 and 5: Immediately after reception of the hardware or the completion of the refurbishment works (as stated in the agreements) the bank pays the discounted sum to the supplier/the ESCO.
- 6: The customer re-pays the instalments as agreed in the vendor loan agreement to the bank. There is no interest, because the disbursed sum has been discounted already. The customer, however, pays back the original sum as stated in the vendor agreement and not the discounted sum (e.g. in the above example the supplier/ESCO would receive € 880.000, but the customer must pay back 10x € 100.000 = € 1 Million)
- The ESCO or equipment vendor may provide a performance guarantee, which can serve as a replacement of the waiver of objection.
- Preferably the equipment installed should be owned by the customer, especially if it serves as a collateral
- A separate maintenance agreement between the ESCO and the end-user ensures that the ESCO performs maintenance of the system and the end-user pays fixed monthly payment in return for this service.

Advantages of forfeiting

- One of the main advantages of forfeiting is the availability of immediate cash flow for financing an EE project.
- Payments are made from the end-user directly to the bank, an advantage for the ESCO as ESCOs are often unwilling to maintain EPC financing on their balance sheets.
- Cost are reduced if the end-user's creditworthiness is better than that of the ESCO.
- For the contractor (the ESCO) : The debt is not booked on his balance sheet, so the potential for further debts remains unlimited
- Forfeiting can be used in situations where the end-user has a better creditworthiness than the ESCO or equipment vendor

Disadvantages of forfeiting

- Often transaction costs of setting a forfeiting contract are said to be high. This must not be the case, but depends on the creditworthiness of the ultimate debtor (the forfaiitee) as well as the country. Using forfeiting banks in a low interest country can be cheaper, but one must take note of a potential exchange rate risk
- The waiver of objection poses the problem that the investor cannot stop the payments any more if contractual obligations are not reached (This can, however, avoided if the operational part is separated from the investment part. Operation cost normally need no financing.)
- In many cases, especially with smaller projects, the cash flow generated is not



enough to serve as collateral.

- Forfeiting needs immaculate creditworthiness of the debtor and/or the project (otherwise it becomes expensive or impossible)
- Forfeiting documents can be sold on by the forfeiting bank worldwide, so the ultimate repayment might have to be effected to a yet unknown institution.

3.4.6 LEASING:

Leasing is a common way of dealing with the initial cost barrier. Leasing is a way of obtaining the **right to use an asset** (rather than the possession of this asset). In many markets finance leasing can be used for EE equipment, even when the equipment lacks collateral value. Leasing companies, often bank subsidiaries, have experience with vendor finance programs and other forms of equipment finance that are analogous to EE.

There are essentially two main types of leases: **capital lease** and **operating lease**. Under a **capital lease** a lessee is required to show the leased equipment as an asset and the present value of lease payments as debt on its balance sheet. **Operating leases** are not capitalized on a company's balance sheet and lease payments are treated as an expense for accounting purposes. The period of contract is less than the life of the equipment and the lessor (investor) pays all maintenance and servicing costs. Leasing is the most common form of equipment manufacturers' vendor financing.

Leasing is a suitable option for projects where physical assets - rather than labour or services - form the bulk of the expenditure, and where, in the event of default, the ultimate owner may be denied continued use of the asset. As the transaction costs involved in leasing on a small scale would be high and there would be greater risk for the lender and cost for the borrower, leasing is not suitable for projects with a low component of physical assets, such as small-scale retrofitting projects in buildings. Leasing works best with simple equipment and large quantities of sales or installations. Leasing, especially operating leasing is also not really a good solution for goods that cannot be returned without high cost for de-installation: therefore leasing will be the exception for housing retrofits.

Leasing FIs are generally more prone to base debt service on project cash flow. On the other hand lessors generally require comprehensive insurance packages and operation and maintenance guarantees for equipment, which implies additional cost for borrower

Leasing (in particular cross border leasing) reached some positive (as well as negative) reputation on the basis of tax saving models. Contracts, however, are complicated, sometimes tricky and therefore such solutions are not recommended without the advice of experienced (and expensive) international tax experts and lawyers.

3.4.7 Vendor financing (equipment supplier/vendor credit)

In order to support their marketing efforts, many general equipment manufacturers have established either captive or third-party vendor financing relationships. Vendor financing helps the manufacturer sell its product by facilitating financing of a customer's purchase. Vendor financing occurs when a financier provides a vendor with capital to enable them to offer "point of sale" financing for their equipment. Leasing is a very frequent form of vendor financ-



ing.

Under a vendor financing scheme there are two types of arrangements: one between the vendor and the financier; and the other between the vendor and the customer. The former defines the terms that can be offered to the customer such as rates, length of term and necessary documentation. The vendor/customer agreement defines the repayment terms of the loan. For energy efficient equipment these agreements can be structured such that the customer payments are lower than the value of energy savings associated with the new equipment.

If vendor financing is done by a third party, that party has typically done the work necessary to become comfortable with the technical aspects of the product as well as its collateral value. An example of vendor financing was the OTP Bank-Tivi street lighting program in Hungary. IFC has a Guarantee Facility Agreement (GFA) with OTP supporting loans to small and medium-sized municipalities to acquire turnkey street lighting system retrofits. A vendor finance program was successfully implemented with Tivi, a company specialising in municipal street lighting. The OTP facility provided financing on a series of Tivi projects, using a fixed payment energy services agreement vendor finance structure.

Because equipment finance increases the vendor's sales and profits, the equipment *vendor* has an interest in supporting the financing. This can take the form of direct recourse, limited or partial recourse, or repurchase or remarketing of equipment in default and repossession events. Utilities can be important partners or originators for EE equipment loan financing. If the utility can perform collections of finance payments via energy bills, the credit structure of the loans will be enhanced.

3.4.8 Export finance

A related kind of vendor financing is export financing, if goods and services are sold by a supplier abroad. There are two main types: export financing which works exactly like **vendor financing** with the only difference that two countries and possibly two currencies are involved. The second type is **buyer financing**: in this case the bank, which is normally located in the exporter's country, will disburse the loan to the exporter, but the obligations from the loan are taken over by the buyer. Economically this type is similar to forfaiting, because the original claim is also transferred, however without the abstract character of forfaiting. Objections because of non-fulfilment of contractual obligations are possible. Export and buyer financing can also be supported by export insurances like Euler-Hermes in Germany or Co-face in France.

For short term vendor credits (up to two years) there is also the possibility of using **letters of credit**, although this will be the exception for the long term types of projects in efficiency investments for buildings. The disbursement on the basis of a letter of credit can also be tied to the fulfilment of certain obligations like obtaining a certificate on having reached a certain standard of energy savings.

3.4.9 Project Bundling and larger projects

Successful **project bundling (pooling/aggregation) strategies** can help to overcome many of the key barriers. Achieving scale is a critical issue for any new business but is particularly



acute in the EE finance marketplace, which is characterized by a large number of small projects. To achieve sufficient scale, a strategy is required that allows for the aggregation of individual projects, technologies, service offerings, and investments into a larger and more cohesive combination of opportunities, which would be interesting for ESCOs financial institutions. As demonstrated by the uptake of energy performance contracting in Germany and Austria, targeting public institutions and facilities for large-scale retrofit programs can kick-start market activity. In the residential sector, housing associations – backed by legislative rules that give them sufficient statutory powers – are important actors.

For a higher financing volume see the sections on **Equity financing, Subordinated Debt financing (mezzanine finance) and Project financing** in the EU document *FINANCING ENERGY EFFICIENCY: FORGING THE LINK BETWEEN FINANCING AND PROJECT IMPLEMENTATION* pages 13 to 18 http://ec.europa.eu/energy/efficiency/doc/financing_energy_efficiency.pdf

3.4.10 Other Financing Tools

'Wholesale' financing instruments

Development Financing Institutions (DFIs) – often in cooperation with national governments – provide framework facilities that extend **credit lines** to local financial intermediaries for on-lending to private person and enterprises for investments in energy efficiency in certain sectors. Credit lines may be combined with a grant component targeting end-borrower investment grants and administration fees for participating banks (see the implementation of EU programs via EIB, CEB, EBRD and KfW).

Pooled procurement

Pooled procurement refers to procurement by public or by private entities joining forces in procuring energy efficient products or services related to improving the energy performance of new and renovated buildings, purchasing energy efficient office equipment and more efficient vehicles.

4 Public supports

Governments can help to close the financing gaps, catalyse private investment and accelerate energy efficiency market uptake via financial and non-financial interventions. However, given that the large majority of sustainable energy (SE) technologies are commercially competitive, public financing should pave the way for private financing, rather than substitute for it. Development Financial Institutions (like EIB, KfW, EBRD) have an important role in financing and leveraging financing for SE projects because they can raise funds in the financial markets and make them available to project proponents by on-lending via commercial banks. As shown in Germany, KfW can also utilise state subsidies to improve the financial conditions of programs and expand their volume. Special purpose credit lines and/or revolving funds may be appropriate tools when there are liquidity constraints in the banking sector or the need to provide long-term credits to finance institutions. A guarantee scheme or other risk mitigating tools may be appropriate in case of high upfront costs of SE investments (see **Annex1**).



4.1 Grant programs

Grant programs are provided by the EU and state governments to support the upfront cost of innovative energy efficiency investments that may entail long amortisation periods like retrofit of buildings. Investment subsidies increase the financial rate of return on investment. In addition, investment subsidies improve cash flow and thus increase investors' access to debt finance. **Public grants** programs are used in all Member States (MS) of the EU – though to a different extent – in order to support SE projects that contribute to energy and social policies and meet other public policy goals, such as increased employment. The publicly-backed grant schemes introduced at the national level vary a lot in nature – some MS targeted the residential sector with investment subsidies in the form of grants (or even low-income households only). In new MS a strong focus has been placed on grants targeting existing residential buildings, in particular panel multi-family buildings. The advantage of public grant programs is that, provided the subsidy level is sufficient to attract the building owners, subsidies can be an important factor in raising the general awareness and trust in SE projects. Comprehensive program packages are needed where public grant programs interact with other financing schemes deployed by public and commercial FIs in order to increase the investment volume.

4.2 Credit lines and guarantee schemes

Credit lines and guarantee schemes for sustainable energy (SE) are available in a number of countries. In some Member States credit lines and guarantee schemes have typically been established by the Development Financial Institutions, such as the CEB, EIB, EBRD and KfW, targeting energy efficiency projects implemented by local authorities, and legal persons.

In case of a step by step retrofit (as in the case of the EuroPHit project which implements the EnerPHit standard) a repayment bonus financed from a grant (**redemption grant**) can be used in connection with loans to reward the borrower when certain efficiency targets of the EnerPHit standard have been achieved.

Preferential soft loans are commonly used for energy efficiency measures. Loan conditions include:

- Extended payback periods, low or zero interest rates,
- Short-term interest deferral periods, and/or
- Inclusion of payback grace periods.

4.3 Redemption Grants, the example of KfW, Germany

In Germany the energy standards are laid out in the Energy Conservation Ordinance (Energieeinsparverordnung/EnEV). These standards apply to **new buildings**. KfW promotes the refurbishment of houses if after refurbishment they do not exceed a specific energy requirement for a comparable new house. The KfW successfully used redemption grants in their promotional programs for the energetic retrofit of residential buildings. The redemption grants



are refinanced out of the government budget. KfW has defined five levels of support for a "KfW Efficiency House" in the building stock:

- KfW Efficiency House 55 (equals passive house)
- KfW Efficiency House 70
- KfW Efficiency House 85
- KfW Efficiency House 100
- KfW Efficiency House 115

Simply put, the figures indicate in per cent how much of the maximum primary energy requirement for the whole building specified by the EnEV the house consumes. The best standard (55) receives the highest support. The repayment bonus means the borrower has to pay less. The bonus depends on the level of energy efficiency achieved. The achieved level of energy efficiency (total primary energy demand) has to be confirmed by an energy performance certificate issued by a registered energy advisor. The grant is transferred to the account of the borrower after completion of the refurbishment measures.

- 17.5 % of the loan as a repayment bonus for a KfW Efficiency House 55/Passivhaus
- 10.0 % of the loan as a repayment bonus for a KfW Efficiency House 70
- 5.0 % of the loan as a repayment bonus for a KfW Efficiency House 100
- 2.5 % of the loan as a repayment bonus for a KfW Efficiency House 115
- 2.5 % of the loan as a repayment bonus for a KfW Efficiency House Monument

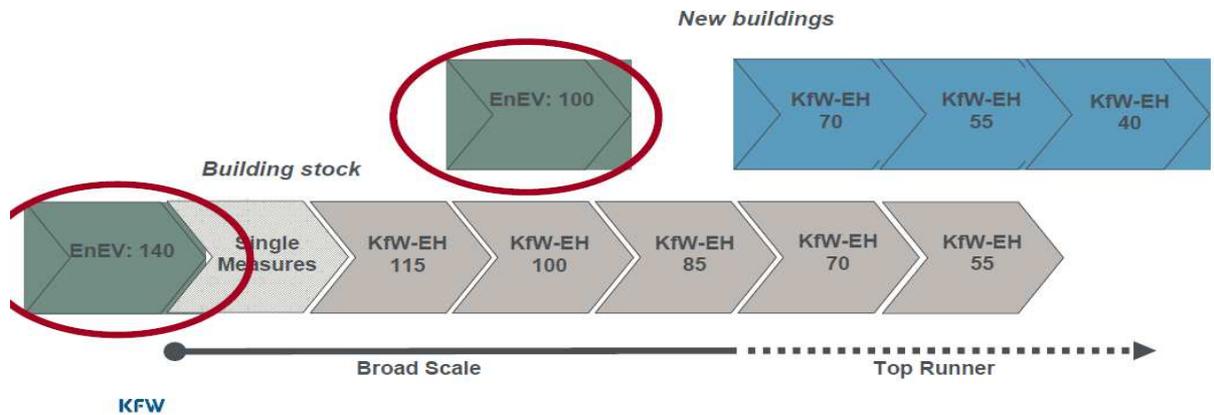


Figure 6: KfW promotion of energy efficiency in buildings (EnEV = Energy Saving Ordinance = legal requirement, 100 stands for 100% level of legally required energy efficiency)

4.4 EU Funding for Sustainable Energy in Buildings⁶

The EuroPHit pilot projects shall create a demand for further step-by-step retrofits of buildings with advanced technologies. Promotional funding by the European Union or by national

⁶ This section is based on the respective web pages of the EU internet presentations. Partly the text is copied from those web-pages.

or regional schemes and by the Development Financial Institutions (like CEB, EIB, EBRD and KfW) can support this development by the provision of grants, guarantees and preferential credit-lines via local commercial financial institution (CFI) which act as the on-lending banks. The following section shall give an overview of the available financial instruments which can be used by the CFI to support the energy efficiency in buildings and the EuroPHit project. The following summaries of the promotional funding programs are based on the statements of the respective institutions.

The EU Commission makes direct financial contributions to support projects or organisations which help implement an EU programs or policies. Grants and funding are awarded by:

- The **Commission Directorate-General** (DG) directly responsible for the policy in question
- Commission **offices and agencies** around Europe
- National or regional authorities.

Most relevant for the EuroPHit Project are the promotional programs offered by the:

- DG ENERGY http://ec.europa.eu/energy/index_en.htm,
- DG REGIO http://ec.europa.eu/regional_policy/index_en.cfm
- DG ENVIRONMENT http://ec.europa.eu/environment/index_en.htm

Mostly grants are awarded by tenders, or by special programs and projects. Several funds cover aspects of energy efficiency and buildings and renewable energies. The definitions of the programs targets and topics are sometimes overlapping, so that a regional program provided by the DG REGIO may contain a topic which could also be used to finance building retrofits as well as a program which contain energy efficiency provided by the DG Energy. Therefore it is important to discuss possible financing with the EU, the local administration and the Development Financial Institutions, like the EIB who is implementing most of the promotional programs of the EU. The EU Budget periods cover 7 years. The new period has started for 2014 to 2020. The programs which include energy efficiency of buildings are designed to achieve the 2020 targets of the EU.

The detailed management of programs which receive support from the Structural Funds is the responsibility of the Member States. For every program, they designate a local managing authority which will inform potential beneficiaries, select the projects and generally monitor implementation. An overview of the administration (national and regional authorities) in charge provides the following web page: Managing authorities http://ec.europa.eu/regional_policy/index_en.cfm. Here a country can be selected and the contact information for the managing authorities of the various programs will appear below on this page http://ec.europa.eu/regional_policy/manage/authority/authority_en.cfm?pay=120&list=no

For the EuroPHit Project grants are needed to finance technical assistance and energy consulting for the implementing CFIs and the end-users of promotional programs. Energy advice is needed to design the step by step retrofit concepts, to supervise the retrofit process and finally to issue the energy performance certificate, according to the requirement of the EU

building directive or the EnerPHit standard (see below).

4.5 Europe-wide funds

<http://www.buildup.eu/financing-schemes/35692>

In this category you will find a list of the existing **European funding mechanisms** that are aimed at promoting, improving and supporting energy efficiency and renewable energy in the residential, commercial and industrial sectors. The European Commission has set up the **Executive Agency for Small and Medium-sized Enterprises (EASME) to manage on its behalf most of the schemes**, see <http://ec.europa.eu/easme/> . Some of them are exclusively linked to energy efficiency and renewable energy, while others have more general goals that tackle infrastructure and regional development, but can also be applied to energy related projects.

Figure 7: Funding sources and promotional programs offered in Europe, see

<http://www.buildup.eu/financing-schemes>

The screenshot shows the 'BUILD UP Financing Schemes' website. The header includes the logo and navigation links. The main content area is titled 'Financing Schemes' and contains a description of the section, a search bar, and a 'Highlighted Schemes Info' section. A sidebar on the right shows statistics: 5 Schemes, 32 Countries, 193 Publications, 82 News, 188 Links, and 4 Events. Below the statistics is a 'Highlighted Cases' section with two entries: 'Life Cycle Tower One Building' and 'Local water authority in Sorgue'.

These funding mechanisms can be directly involved in financing a project or indirectly through the allocation of funds to national governments for the facilitation of a wide range of projects.

For the EuroPHit project the following financing schemes may be used (*the suitable financing schemes are discussed in more detail below*):



- [Intelligent Energy – Europe programme \(IEE\)](#) including ELENA
- [LIFE \(2014-2020\) and PF4EE, the financial instrument for energy efficiency](#)
- [COSME – the Programme for the Competitiveness of Enterprises and Small and Medium Enterprises \(SMEs\)](#)
- [Horizon 2020 Framework Programme](#)
- [European Structural and Investment Funds \(ESI\) 2014-2020](#)
- [Financial incentives supporting EPBD recast objectives \(Article 10, Directive 2010/31/EU\)](#)

The **main EU funding source for energy efficiency in buildings** are the European Structural and Investment Funds (ESI), as the sector is an important component of the Thematic Objective 4 - Low Carbon Economy, see http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/guidance_fiche_energy_efficiency.pdf

The specific contribution of ESI in terms of percentage of the total project cost depends on the co-funding rates defined in the different Operational Programs by the Member States.

In addition to this, EU funds can provide grant support to the preparation of projects through ELENA, see http://ec.europa.eu/energy/intelligent/getting-funds/project-development-assistance/index_en.htm. For the rest, JESSICA basically facilitates the use of ESI in the context of urban development funds and instruments like PF4EE (supported by LIFE) and European Energy Efficiency Fund (EEE-F) aim at attracting private funding to the projects.

The Europe-wide financing schemes are described in **Annex 6.2**

4.6 National and Regional schemes

4.6.1 National/Regional schemes for Individuals

<http://www.buildup.eu/financing-schemes/35693>

In this category you will find a list of the existing national and regional funding mechanisms that are aimed at **natural persons**, usually an owner or tenant of a residential building or apartment.

These schemes are aimed at small scale projects, either through non-repayable grants or through preferential soft loans. Their goal is to promote energy efficiency and renewable energy among a wide range of people that lack the incentive or the financial means to invest in expensive renovations and installations.

4.6.2 National/Regional schemes for Individuals for Municipalities/Social Housing

<http://www.buildup.eu/financing-schemes/35694>

In this category you will find a list of the existing national and regional funding mechanisms that are aimed at **legal persons**, e.g. companies, SMEs, municipalities, homeowners associations etc.



These schemes have greater diversity than those aimed at natural persons, because they range from relatively small, single-building interventions to large neighbourhood-scale projects. The funds can be available in the form of non-repayable investments and/or favourable loans (often a combination of the two).

4.6.3 National/Regional schemes for Residential Buildings

<http://www.buildup.eu/financing-schemes/35695>

In this category you will find a list of the existing national and regional funding mechanisms that promote energy efficiency and renewable energy in new and existing **residential buildings**, irrespective of the identity of the owner, developer or tenant. The energy-related funding mechanisms that exist for residential buildings range from relatively small grants for single-family apartments to sizeable investments in large scale housing projects.

The funding of residential building renovations may also have a social scope, since it enables current and future tenants to enjoy a more comfortable life and pay less in energy bills, without incurring a significant capital cost for the actual renovation.

4.6.4 National/Regional schemes for Non-Residential Buildings

<http://www.buildup.eu/financing-schemes/35696>

In this category you will find a list of the existing national and regional funding mechanisms that promote energy efficiency and renewable energy in **non-residential buildings and facilities**, such as commercial and office buildings, public buildings, industrial facilities etc. These funds are available in the form of non-repayable investments and/or preferential soft loans (often a combination of both).

Non-residential buildings are usually very energy intensive. Large scale heating and air-conditioning is almost constant, electrical equipment is plentiful and in frequent use. With proper planning and high quality work, there is much room for improvement in the overall energy efficiency of such buildings.

4.7 European Development Financial Institutions

Besides their role in implementing EU funding programs (see above), the European Development Financial Institutions (DFI) - CEB, EIB, EBRD and KfW- operate their own investment instruments for energy efficiency in buildings resulting in higher funding volumes in the building sector.

4.7.1 CEB

The **Council of Europe Development Bank (CEB)** is a multilateral development bank with a social vocation. CEB contributes to the implementation of socially oriented investment projects through four sectoral lines of action, namely:

- strengthening social integration
- managing the environment
- supporting public infrastructure with a social vocation



- supporting micro-, small and medium-sized enterprises (MSMEs)

The main purpose of CEB loans is to finance projects for the construction of housing, renovation or refurbishing of the existing housing stock and for the conversion of buildings into housing so as to provide decent and affordable housing for low-income population groups.

<http://www.coebank.org/index.asp?ChangeLangue=EN>

CEB contact: <http://www.coebank.org/contact.asp?arbo=136&theme=7&lang=EN>

4.7.2 EIB

The **European Investment Bank (EIB)** is the implementing bank for most of the financial programs of the EU. EIB Contacts: <http://www.eib.org/infocentre/contact/index.htm>.

The EIB in cooperation with the EBRD and other FIs has introduced several additional financial support mechanisms for the Structural and Cohesion Fund (SCF) in developing and coordinating financial instruments in the framework of Cohesion Policy with activities focused on the programs JESSICA, JEREMIE, JASPERS and JASMINE. In line with this pledge and the possibilities provided in the framework of the Structural Funds, there has been experience in connecting financial means from the Structural Funds with EIB funds to create revolving financial instruments for EE. One example is the JESSICA model that involves dedicating part of the Structural Funds to create revolving fund to support integrated urban development, including EE investments. **JESSICA** offers a scalable model to channel ERDF funds into EE and to leverage further public and private funds.

EIB makes loans to local banks and other intermediaries which subsequently "on-lend" to the final beneficiaries, such as national administrations and public sector bodies, see <http://www.eib.org/products/intermediated/index.htm?lang=en>

Loan conditions can be flexible in terms of the size, duration, structure etc. Lending decisions remain with the intermediary institutions, which also retain the financial risk of the on-lending. EIB has no contractual relationship with final beneficiaries. The intermediary FI must transfer a financial advantage reflecting the impact of EIB funding.

EIB Guarantees & Securitisation

<http://www.eib.org/products/guarantees/index.htm>

EIB guarantee large and small projects to make them more attractive to other investors. EIB provides guarantees for senior and subordinated debt, either in a standard form or as a debt service guarantee. Beneficiaries can be large private and public projects.

Depending on the underlying funding structure of the operation, a guarantee may be more attractive than one of EIB loans. It may either provide greater value-added or require lower capital charges. Under capital adequacy rules EIB guarantees provide a zero risk weighting to the guaranteed obligation.

4.7.3 EBRD

The European Bank for Reconstruction and Development (EBRD) addresses energy efficiency and climate change through its Sustainable Energy Initiative, including the bank's



Residential Energy Efficiency Credit Line (REECL) Framework. For example EBRD has launched special programs to improve energy efficiency of public buildings, i.e. Sofia Municipality.. <http://www.ebrd.com/pages/homepage.shtml#&panel1-3>

EBRD Contact: <http://www.ebrd.com/pages/about/contacts.shtml>

4.7.4 KfW

As a promotional bank, KfW Bankengruppe supports sustainable use of energies in Germany, Europe and throughout the world, see www.kfw.de . The potential which residential buildings offer in respect of energy efficiency and savings of green house gases has been demonstrated in Germany by the KfW programs “Energy-efficient Construction and Refurbishment”. In the EU banks receive global loans from KfW under the ELENA facility to fund the financing of investment projects of final beneficiaries and investors, including retrofit of buildings (see ELENA facility in Annex 6.2).

5 Design of an EuroPHit Financing Program

5.1 Basic approach

Financing has to take into account that the initial investment cost as well as current cost can be recovered and repaid to the projects sponsors (equity), the bank or a public lending institution. Therefore, after checking whether the future income stream is sufficient to cover such cost the characteristics of this stream has to be analysed. Such analysis has to be done individually, but there are also common characteristics of building refurbishment projects, such as:

- High initial investment cost (upfront cost)
- Long gestation periods (8-20 years), which are unusual for financing in many countries
- Apart from energy related cost and benefits there are also renovation cost/benefits (“incidental cost”) which normally will not generate any future savings or income
- Because of long repayment periods and price fluctuations insecurity about the future development
- External effects which do not appear as “real” benefits available for loan repayment
- Behavioural resistance of house owners, to bear high upfront cost for savings which will stretch over 8-20 years

To overcome such difficulties and to compensate for the invisible external benefits, public institutions provide a wide variety of supports which have been described in chapter 4.

Public supports can help:

- To shorten the long repayment periods and to make a project financeable by market based instruments
- To create trust for a refurbishment project in order to find financing sources, especially in countries where the type of project is still unknown
- To provide at least partial guarantees as replacement for collaterals
- To improve the cash flow and the net-present value of a project in order to find project



sponsors (equity as well as loan financing)

- To compensate for external, but intangible benefits (like CO₂ reduction)
- To improve the financing structure in particular for communities and public institutions lacking financial sources under strict saving requirements

Therefore such supports and their frequently rather complicated requirements should be taken into account when planning a project. Since, however, no project will be fully supported by such public funds, a combination of both market-based instruments (e.g. loans, forfaiting, energy performance contracting schemes), and public funding programs and grants must usually be applied. Public funds can also help to aim at “deep renovation” going beyond minimum energy performance requirements to capture all possible energy savings, since most buildings undergo major renovation only every 20 or 30 years.

5.2 Finance options

Public finance options, even if they are EU-funded, will usually be provided in the framework of a national programme (see chapter 4). There are numerous national schemes, like the “fonds chaleur” and the “0 per cent interest eco-loan” in France, the “schools energy efficiency loan scheme” or the “energy efficiency loan scheme for SME” in UK, the “warm homes scheme” in Ireland, the “crap your oil fired boiler”- scheme in Denmark, KfW “energetische Stadtsanierung” and “KfW Effizienzhaus “in Germany, “grants for housing rehabilitation” in Spain or “Tax deduction for building rehabilitation” in Italy, just to name a few examples. (<http://www.buildup.eu/financing-schemes/35695>).

They must usually be combined with credit-lines by local CFIs which include grant funds provided by grants of the EU or the local government budgets. If grants are available to support the implementation of financing programs, such grants can be used:

- for technical assistance to the borrowers (to pay for energy advisors)
- to pay for technical advice on financing of retrofit concepts
- to finance a repayment bonus (redemption grant) to reward the achievement of certain energy efficiency targets (calculated total primary energy demand of the whole building) which should be confirmed by qualified energy advisors
- to reduce the interest rate and soften the loan conditions.

The applicants for public support must be prepared to face quite some “red tape” setting pre-conditions for support, some are just supporting consulting services and there is always an upper limit in subsidies, which seldom exceeds 10-20% of the investment cost. Disbursement of grants or loan parts are usually tied to the achievement of certain efficiency steps and have to be certified by an independent consultant. Nevertheless, since applications are often made via the applicant’s bank, they can often serve as a kind of “entrance ticket” for market based financing. In many cases public support can make the difference between a project with negative and positive net present value.

Often they also enable the investor to go for a more expensive, but the more efficient long term solution (“deep renovation”) and they also force the applicant to consider the ultimate



goal of a refurbishment, even if it is done in steps.

Refurbishment buildings will usually also include the so called Incidental investments, which are not necessary income generating since neither the refurbishment of a cracked wall or a replacement of a roof after end of its physical life will justify any rent increases. Such investments have to be financed either from equity or from separate bank loans, based either on collateral or on the proprietor's income. The same is true for municipalities, who will have to finance such investments either from budget funds or from separate loans being repaid from the ordinary budget.

Figure 8: Refurbishment investment and financing

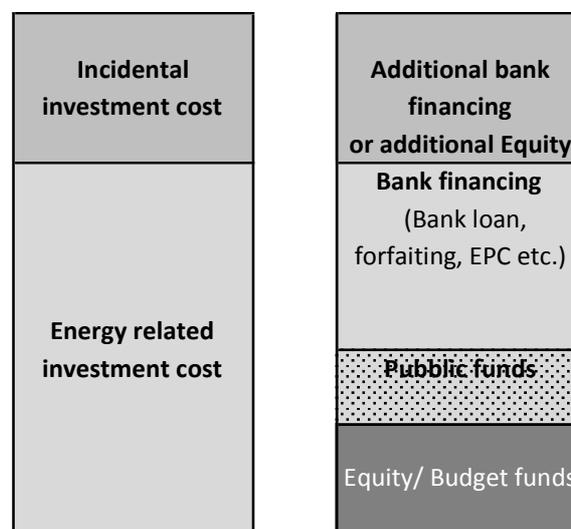


Figure 8 gives an overview of a combination financing scheme for a building refurbishment investment. The left column shows the two types of investment: the energy related and the incidental investment cost. The latter will be financed (right column) from an additional bank loan or equity (for public institutions: budget funds), the energy related part can be financed by a combination of equity/budget funds, public funds or public support schemes and bank financing. Financing can take on a variety of combinations like just normal bank loans, energy performance contracting or forfaiting. Public supports can be grants, subsidised loans, repayment subsidies or just guarantees enabling the investor to take a larger commercial loan. There is no “golden” way to financing: every alternative has its pros and cons as described in chapter 3 and the same applies to public supports (chapter 4). The necessary support instruments will vary from case to case, depending on the national or regional circumstances, e.g. ownership structures and social situation, and the design of the schemes will have to be tailor-made on this basis.

A financing program for EuroPHit projects needs to care about the special features of such projects, such as the step-by-step approach to refurbishment of a building to reach the EuroPHit standard. Mostly there are only small investment volumes of single projects. The returns in form of savings on energy-bills are spread over the life cycle of the projects and depend on the energy efficiency level achieved with each single step. Regarding the investment

measures the EnerPHit standard stresses the advanced state of the art and the “life cycle costs”.

Public supports and the ability for long term financing will also enable the investor to have a look at the life-time situation of the investment, in particular whether under consideration of the life cycle cost it is a more economically viable solution to go for higher standards, like for example triple glazed instead of double glazed windows, which will yield energy savings of 90% instead of 50% although it probably means 30% higher investment cost.

To support a step by step retrofit the achievement of certain energy efficiency targets can be combined with the provision of a bonus system. A repayment bonus financed from a grant (redemption grant) can be used in connection with loans to reward the borrower when certain energy efficiency targets have been achieved by single steps or by the completed retrofit project. As soon as a certain level of energy efficiency is achieved by the retrofit of the building a repayment bonus can be rewarded (see above section 4, in particular).

5.3 Special Issue of joint home ownership of residential buildings

Specific issues arise with blocks of flats with individual owners, whereby owners' associations need to be involved in line with the specific legislation and practices. It should be noted that achieving energy savings in multi-apartment buildings with common heating/cooling systems often depend not only on the overall energetic retrofit of such buildings but also the behaviour of end-users. It is also important to ensure that such renovations pay due attention to the ventilation systems, maintaining a healthy indoor environment. Investments in multi-apartment housing should always consider the installation of individual heating/cooling/hot water metering with related investments. The Energy Efficiency Directive requires introduction of individual metering and billing information based on actual consumption of heat/cooling/hot water consumption where technically possible and cost-effective in all multi-apartment buildings with a common heating/cooling/hot water source, see http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

For the social aspects of retrofit projects especially in case of retrofit of social housing projects and recommendations to overcome the owner-tenant dilemma see Annex 6.3

6 ANNEX

6.1 Public financing mechanisms

The text is partly copied from the following EU documents:

Technical Guidance, Financing the energy renovation of buildings with cohesion Policy funding, final Report, A study prepared for the EC DG Energy, EU 2014
ISBN 978-92-79-35999-6 (See Table 6, page 63ff and APPENDICES)
http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/financing_energy_renovation.pdf

Financing energy efficiency: Forging the link between financing and project implementation, report prepared by the Joint Research Centre of the European Commission, Authors: Silvia Rezessy and Paolo Bertoldi, May 2010, see
http://ec.europa.eu/energy/efficiency/doc/financing_energy_efficiency.pdf

6.1.1 Grants

Short description

Grants are non-reimbursable financial contributions for the implementation of specific energy efficiency and renewable energy measures (Sustainable Energy SE) selected by the final recipient from a pre-defined list. Grants are one of the most common forms of financing for SE projects, particularly where technologies are pre-commercial or in the early stages of commercial deployment or are otherwise prohibitively expensive.

Main characteristics

- A grant will often cover only part of the total cost and usually requires some form of co-financing.
- Rates may vary from 20% up to a maximum of around 75%.
- Target recipients and measures can be defined through the use of eligibility criteria.
- Grants can be combined with other financing mechanisms, such as preferential loan schemes, to incentivise the uptake of measures that are less likely to be selected because they have longer pay-back times.

Implementation

Grants and subsidies may be managed directly through a national administration or, if combined with preferential loans, through a dedicated fund.

Advantages of Grants

- Versatile and can be used to achieve a variety of policy objectives. In the context of SE, grants can be deployed to support innovation and technology development and can also be used to target support at specific end-users to meet social policy objectives such as fuel poverty.
- Can be used for proof of concept and demonstration activities and to encourage uptake of innovative / below cost-optimal measures.
- Enable SE measures identified as priorities by policy makers to be implemented.
- Conditions can be attached to grants to stimulate further private investment (e.g. require the simultaneous installation of other EE measures).
- Represent a flexible mechanism that can be used in combination with other financial mechanisms or technical assistance packages.
- Particularly suitable for economically depressed areas, immature / financially constrained markets.



Disadvantages of Grants

- Risk that desired outcomes are not achieved (e.g. investment in a specific type of measure).
- Risk of overspend if grant distribution process is not carefully communicated and managed.
- Can only be used once (compared with revolving funds for example), therefore limiting the utility and sustainability of public funding.
- Limited leverage and impact, tendency towards overpriced solutions.
- Little transparency and performance control.

Project types

- Grants are usually conceived to promote new technologies and are more suitable for early stage development including projects below cost-optimal levels.
- A grant may cover the cost of technical assistance to private and public beneficiaries/recipients to support them in the best choice of SE measures.

Project examples

- The Initiative for Energy Conservation in Houses “EXOIKONOMISI KAT’ OIKON” in Greece provides a good example of a scheme using grants in combination with loans. The program finances energy saving measures (e.g. thermal insulation, boiler replacement) for home owners. €396million (from ERDF) is divided between a revolving fund (€241 million) and a grant fund (€155 million). The loans paid out of the revolving fund have to be matched by commercial loans of equivalent value. The interest rate of the ERDF loan and the value of the grant depend on the income of the applicant (zero interest loans and 30% grant for low income households, low interest loans and 15% grant for medium income households, low interest loans only for households with a high income).
- The Renewable Heat Premium Payment (RHPP) in the UK is a grant scheme designed to increase the use of renewable heat technology (biomass boilers, solar thermal, and ground and air source heat pumps) in the domestic sector (including social landlords). Installations of certified technologies by certified installers are eligible for a grant that represents approximately 10% of the installed cost. Eligibility for most technologies is restricted to rural households that are not connected to the gas grid, thereby maximising the carbon savings associated with the scheme. This short-term, two year, scheme aims to maintain and build the renewable heat industry ahead of the introduction of a longer-term support program.

6.1.2 Soft loans

Preferential loans or soft loans refer to the acquisition of funds through borrowing: a lender provides a loan to a borrower for a defined purpose over a fixed period of time. The loan is provided at lower interest rates. Typically the interest rates are fixed over a certain period of time, usually 10-20 years and allow for long-term maturity.

Advantage of preferential loans

- Final recipients are incentivised to select the most appropriate and cost effective measures.
- Well understood mechanism among all parties
- Since loans are repaid, the money can be reinvested into more projects.
- Provided that the right conditions are present, preferential loan mechanisms are not particularly difficult to administer.

Disadvantage of preferential loans

- EE savings may not always be considered as a cash flow by some financial intermediaries, often extending the payback period for the measure.
- Not very suitable for poorer households who have no income to repay the loan.

6.1.3 Revolving funds

Revolving funds offer loans that can be repaid with the extra cash available due to savings of energy. The repaid loans are used to finance new EE projects. The funds are reimbursed by projects out of savings accumulated through energy efficiency and capacity gains. They are intended to channel liquidity into markets where there is a constraint both in terms of access to financing and in terms of the amount of financing available, that is, where liquidity is constrained. Revolving funds inject special purpose public finance into the commercial finance system and are an appropriate tool when **lack of liquidity** in the finance sector is a major constraint for private finance to EE or when financial institutions need **long-term credits to provide loans with longer tenor**.

Revolving funds are self-sustaining financial schemes, which usually require one-time initial investment. In the area of energy efficiency, a revolving fund could combine public-sector grants and adequate financing structure for energy efficiency funding, provide loan guarantees to cover the default risks related to energy efficiency investments, and provide private sector loans in an adequate size. In order to have the maximum benefits from the savings obtained through investments of the revolving fund, **an adequate and systematic monitoring of energy savings is required**. The advantage of revolving funds is that they are less dependent on external investors. If they are operated effectively, revolving fund can contribute to a permanent financing structure for energy efficiency investments, which is separate from political influence.

Typical disadvantages for using revolving funds in energy efficiency are that they require substantial upfront investment and also might be cumbersome and expensive to administer.

6.1.4 Guarantees

Short description

Guarantees are a type of risk sharing mechanism where the guarantor (e.g. a public body) assumes a debt obligation should a borrower default. For limited or partial guarantees the guarantor is only liable for part of the outstanding balance at the time of default, usually defined as a fixed percentage.

Main characteristics

While a number of guarantee structures exist, the main features that must be set out include:

Clear definition of the circumstances which would trigger the guarantee payment; the risk sharing formula; timing and calculation of guarantee claim payment; Responsibilities for collections against defaulting borrowers; disposition of recovered monies; maximum single loan guarantee exposures; guarantee approval and issuance procedures; and, guarantee fees.

Implementation

With partial credit guarantees the contracts are between lender and borrower (loan agreement) and between guarantor and lender (guarantee agreement). In partial risk guarantees the contracts are between guarantor and investor/lender and between guarantor and host country government.



Advantages

Guarantees help bridge the gap between the credit risk perceived by the lender and the actual credit risk. They can provide additional comfort to financial institutions, particularly local institutions, in relation to technologies or project approaches where they have less experience. The guarantee can therefore help project developers (or loan applicants) to access finance and reduce the cost of capital. Partial-risk guarantees enable the loan repayment period to be extended and the interest level to be reduced, thus improving project cash flow and viability. They can also increase debt-to-equity ratios, enhancing returns to project developers. Guarantees backed by public bodies help to direct the flow of private funds towards EE projects through risk mitigation, and therefore lever higher levels of private financing.

Disadvantages

Guarantees are not appropriate for all market situations and are not necessarily suitable for use in isolation. Where liquidity in financial institutions is considered the main barrier to financing, guarantees are of limited use. However, guarantees can form part of a broader strategy to increase lending among banks with good liquidity but a low risk appetite. Partial credit guarantee schemes do not provide an adequate solution to situations where a project investor has insufficient equity.

Project types

Guarantees can be used to help smaller financial institutions and ESCOs access capital at an acceptable cost.

Project examples

The Bulgarian Energy Efficiency Fund (BgEEF) offers partial credit guarantees as well as portfolio guarantees for ESCOs and for the residential sector. The ESCO portfolio guarantee covers up to 5% of defaults from the delayed payments of an ESCO portfolio; with this guarantee an ESCO can get better interest rates on its debt with commercial banks. The BgEEF acts as a financial buffer to take the shocks since delays in payments are more probable than clients defaulting.

Other examples include guarantee programmes provided by development and public banks – for instance KfW in Germany (described above), the Czech Guarantee and Development Bank in Czech Republic, KredEx in Estonia, BPME and Ademe

6.1.5 Energy Efficient Mortgage

An energy mortgage is a mortgage that credits a home's energy efficiency in the home loan. For an energy efficient home, for example, it could mean giving the home buyer the ability to buy a higher quality home because of the lower monthly costs of heating and cooling the home. For homes in which the energy efficiency can be improved, this concept allows the money saved in monthly utility bills to finance energy improvements. There are two types of energy mortgages:

- *Energy Improvement Mortgage (EIM)* - finances the energy *upgrades* of an existing home in the mortgage loan using monthly energy savings
- *Energy Efficient Mortgage (EEM)* - uses the energy savings from a *new* energy efficient home to increase the home buying power of consumers and capitalizes the energy savings in the appraisal

Essentially, an EEM is a reduced rate mortgage that credits the energy efficiency of the building in the mortgage itself. To get an EEM a borrower typically has to have energy rating conducted before financing is approved. This verifies to the lender that the building is energy efficient. In the United States EEMs are typically used to



purchase a new home that is already energy efficient such as an Energy Star qualified one. Such a system could also be applied to a certified Passivhaus.

An EIM is used to purchase existing homes that will have an energy efficiency improvement made. EIMs allow borrowers to include the cost of energy efficiency improvement in the mortgage without increasing the down payment. EIMs allow borrowers to use the money saved in utility bills to finance energy improvements. In the US both EEMs and EIMs require a home energy rating (building certification) to provide the lender with the estimated monthly energy savings and the value of the energy efficiency measures.

As an example of EIM in the EU, in 2009 France introduced eco-mortgage to undertake energy conservation works, which can be used in tandem with tax credits that are also available for home energy conservation. The mortgages *l'éco prêt à taux zéro (éco PTZ)* are available for a sum of up to 30,000 euro, subject to a limit of 300 euro/m² of the property. They are only available on a property constructed between 1948 and 1990. Repayment of the mortgage is over a period of 10 years, although in some cases the repayment period can be extended to 15 years. The mortgages are offered without a test of resources and are not subject to maximum income limits. The type of works envisaged by the regulations includes wall insulation, double and secondary glazing, new entrance doors, and replacement energy efficient space and water heating systems. The works will need to meet a minimum level of performance as set out in the regulations. The loans are available through the major French banks⁷.

Vermont and several other US states, where a uniform national Energy Star rating system has been adopted, provide successful examples of EIM and EEM. The Energy-Rated Homes of Vermont (ERH-VT) program provides a one-stop service to obtain EIM. In order to qualify for an EIM, an energy rating must be performed. ERH-VT provides the energy assessment, obtains contractor bids for the planned measures, oversees the contractor's work, conducts a post-construction energy rating and prepares documents to secure the energy efficiency mortgage.

6.1.6 On-bill financing

Integrating loan payments with energy bills and allowing utilities to cut off energy supply to defaulting customers has the potential to both lower collection costs and enhance credit quality of the financing scheme, thereby lowering financing costs. Payment via utility bill reduces risk of credit default and lowers collection risk.

Energy regulators may disapprove and distrust the addition of loan repayments into utility bills, preferring to keep the utility/customer contractual relationship implicit in utility billing simple and straightforward, and resisting, in particular, provisions allowing customer disconnection due to loan repayment default⁸.

⁷ In social housing the loan is available in all French banks for large refurbishment projects (at least 2 different kind of tasks). Preferential loans for retrofitting social housing Eco Pret Logement Social apply for 2009 and 2010 with a 1.9% interest rate. The loan is up to 16 000 € for 15 years, available at the Caisse des Dépôts for refurbishment of social housing.

⁸ In 2009 this model was introduced via the Clean Energy Works Program (CWEP) in Portland (Oregon). Under CWEP single-family residential homeowners can receive 100% financing to implement a wide range of EE measures. Loans are provided at attractive levels of fixed interest rates and are amortized over a 20-year period. Customers repay loans through their regular utility bill.



6.2 Europe wide funds

6.2.1 ELENA

ELENA (European Local ENergy Assistance) financing facility for cities and regions is a technical assistance facility that mobilises funds for investments in sustainable energy at local level across the EU. The ELENA facility is provided within the framework of the IEE II program (Intelligent Energy Europe) and supports local and regional authorities in contributing to the “20-20-20” initiative of the EU.

»» ELENA

Several facilities

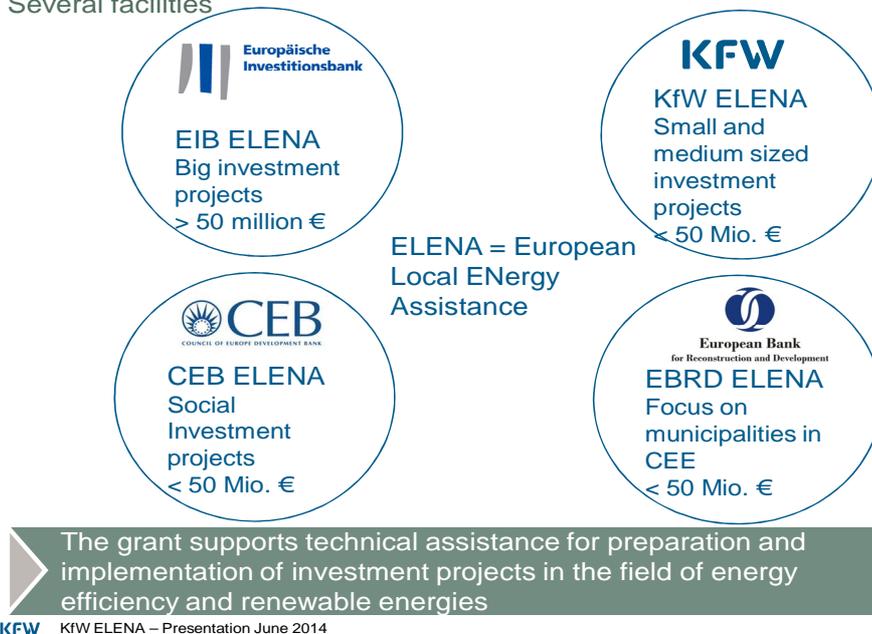


Figure 9– ELENA facilities at the DFI

ELENA covers a share of the cost for technical support that is necessary to prepare, implement and finance the investment program, such as feasibility and market studies, structuring of programs, business plans, energy audits, preparation for tendering procedures. ELENA covers up to 90% of the technical support cost needed. There are four ELENA facilities, all managed by the Development Financial Institutions: CEB ELENA, EBRD ELENA and KfW ELENA (project size between EUR 6 and 50 m) and EIB ELENA (project size > EUR 50 m). Country restrictions apply to CEB ELENA and EBRD ELENA. It is funded through the European Commission’s Intelligent Energy-Europe program.

See http://ec.europa.eu/energy/intelligent/getting-funds/project-development-assistance/index_en.htm.

The KfW-ELENA facility offers a approach in order to mobilize sustainable investments of small and medium sized municipalities and, where appropriate, Energy Service Companies (ESCOs).

KfW-ELENA consists of two elements:

- ELENA grant from the European Commission for Project Development Services
- global loans to local participating financial intermediaries (PFIs) in order to target smaller investments (volume up to EUR 50 million).

Eligible Participating Financial Intermediaries are banks motivated to expand their lending to municipalities for the financing of sustainable energy projects. **Eligible Participating Coordinating Entities** must have the required institutional capacity and experience to coordinate a carbon credit program. **Eligible Final Beneficiaries** of Technical Assistance are local or regional authorities and other public bodies within IEE participating countries

Specific aspects of KfW ELENA Facility

Global loans to local financial intermediaries

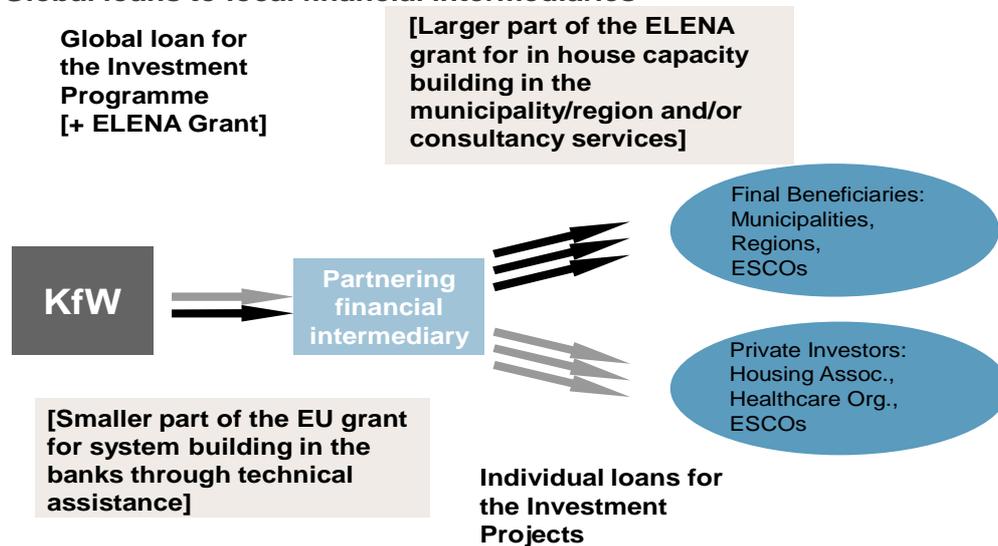


Figure 10: KfW ELENA facility

Financial institutions may contact the EIB or KfW to receive grant funds and long term loans for the financing of retrofit projects according to the EnerPHit standard. At KfW-ELENA the interest rate for the global loan depends on the financial standing (creditworthiness) of the participating financial intermediary.

6.2.2 LIFE and PF4EE

<http://ec.europa.eu/environment/life/funding/life2014/index.htm>

LIFE is the EU's financial instrument supporting environmental and nature conservation projects. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value.

The [new LIFE \(the Financial Instrument for the Environment\) Regulation](#) establishes the Environment

and Climate Action sub-programs of the LIFE Program for the 2014–2020 funding period, with a budget set at €3.4 billion in current prices. Funding will be given to the following two pilot financial instruments for the purpose of achieving the general objectives of the LIFE Regulation:

- Natural Capital Financing Facility (NCCFF)
- Private Financing for Energy Efficiency instrument (PF4EE)

PF4EE contributes to meeting the general objectives of the LIFE Regulation further specified in the priority area “climate change mitigation”. The implementation of the PF4EE instrument will be entrusted to the European Investment Bank (EIB) through indirect management.

The PF4EE instrument’s two core objectives are:

- to make energy efficiency (EE) lending a more sustainable activity across European financial institutions, incentivizing private commercial banks and other financial institutions (both together “financial intermediaries”) to address the energy efficiency sector as a distinct market segment, and
- to increase the availability of debt financing to projects supporting the energy efficiency priorities of Member States set in the NEEAPs.

The PF4EE instrument will provide a risk participation mechanism (Risk Sharing Facility) for private sector financial institutions and expert support for financial intermediaries (Expert Support Facility) combined with EIB long-term funding (EIB Loan for Energy Efficiency).

The target final recipients for the PF4EE instrument are expected to be defined in the context of the MS NEEAPs and will be primarily those targeted by the national/regional schemes developed by MS to implement their NEEAPs. They would include private individuals, but could also include small municipalities or other public sector bodies undertaking small energy efficiency investments capable of using energy savings to repay up-front borrowing.

6.2.3 LIFE Action Grants

http://ec.europa.eu/clima/policies/budget/life/grants/index_en.htmPolicy

Grants are available for a variety of different climate action projects including pilot, demonstration, best practice and capacity building projects. Grants are also available for non-profit organisations, including NGOs, working towards climate goals at European level.

Action grants are aimed at projects that pursue general and specific objectives of the priority areas. There are several different types of projects:

- **Practice projects:** These projects apply appropriate, cost-effective, state-of-the-art techniques, methods.
- **Pilot projects:** These projects apply a technique or method that has not been applied or tested before or tested only outside the EU and that offer potential climate advantages compared to current best practice.
- **Demonstration projects:** These projects put into practice, test, evaluate and disseminate actions, methodologies or approaches that are new or unknown in the project’s specific context, such as geographical, ecological, socio-economic, and that could be applied elsewhere in similar circumstances.
- **Best practice projects** and approaches taking into account the specific context of the project;



- **Information, awareness and dissemination projects:** These projects aim to support communication, dissemination of information and awareness-raising in the field of climate action.

"Traditional" projects cover i.a. the priority areas:

- [LIFE Climate Change Mitigation](#)
- [LIFE Climate Change Adaptation](#)

"Traditional" projects may be **best-practice, demonstration, pilot** or **information, awareness and dissemination** projects. **Best practice projects** apply appropriate, cost-effective and state-of-the-art techniques, methods and approaches taking into account the specific context of the project; **demonstration projects** put into practice, test, evaluate actions, disseminate methodologies or approaches that are new or unknown in the specific context of the project, such as the geographical, ecological, socio-economic context, and that could be applied elsewhere in similar circumstances; **pilot projects** apply a technique or method that has not been applied or tested before, or only elsewhere, that offer potential environmental or climate advantages compared to current best practice and that can subsequently be applied on a larger scale to similar situations; **information, awareness and dissemination projects** aim at supporting communication, dissemination of information and awareness raising in the fields of the sub-programs for Environment and Climate Action.

The EuroPHit project meets the criteria of LIFE Climate Change Mitigation (sub-program for Climate Action) and partly also LIFE Climate Change Adaptation (sub-program for Climate Action), see: <http://ec.europa.eu/environment/life/funding/life2014/index.htm>

LIFE Climate Change Mitigation (sub-program for Climate Action) will co-finance action grants for **best practice, pilot** and **demonstration** projects that contribute to the reduction of greenhouse gas emissions; that contribute to the implementation and development of Union policy and legislation on climate change mitigation, including mainstreaming across policy areas, in particular by developing, testing and demonstrating policy or management approaches, best practices and solutions for climate change mitigation; that improve the knowledge base for the development, assessment, monitoring, evaluation and implementation of effective climate change mitigation actions and measures and that enhance the capacity to apply that knowledge in practice; that facilitate the development and implementation of integrated approaches, such as for climate change mitigation strategies and action plans, at local, regional or national level; and that contribute to the development and demonstration of innovative climate change mitigation technologies, systems, methods and instruments that are suitable for being replicated, transferred or mainstreamed. See also the LIFE section of the [DG Climate Action web-site](#).

LIFE Climate Change Adaptation (sub-program for Climate Action) will co-finance action grants for **best practice, pilot** and **demonstration** projects that contribute to supporting efforts leading to increased resilience to climate change; that contribute to the development and implementation of Union policy on climate change adaptation, including mainstreaming across policy areas, in particular by developing, testing and demonstrating policy or management approaches, best practices and solutions for climate change adaptation, including, where appropriate, ecosystem-based approaches; that improve the knowledge base for the development, assessment, monitoring, evaluation and implementation of effective climate change adaptation actions and measures, prioritising, where appropriate, those applying an ecosystem-based approach, and to enhance the capacity to apply that knowledge in practice; that facilitate the development and implementation of integrated approaches, such as for climate change adaptation strategies and action plans, at local, regional or national level, prioritising, where appropriate, ecosystem-based approaches; and that contribute to the development and demonstration of innovative climate change adaptation technologies, systems, methods and instruments



that are suitable for being replicated, transferred or mainstreamed. See also the [LIFE section of the DG Climate Action web-site](#).

Financial Institutions may contact the EIB to receive grant funds and long term loans for the financing of retrofit projects according to the EuroPHit standard under LIFE. European Structural and Investment Funds

http://ec.europa.eu/regional_policy/what/future/index_en.cfm

Under the new Cohesion Policy there are different topics of climate change mitigation which also cover building retrofits. The cohesion policy comprises **5 Structural and Investment Funds**: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund, the European Agricultural Fund for Rural Development (EAFRD), the European Maritime and Fisheries Fund (EMFF). The ERDF and the Cohesion Fund are the Funds with the greatest focus on energy efficiency in buildings and in the built environment in general. Countries could propose to the EU to use the cohesion funds to implement EuroPHit projects as model cases. EU Cohesion Policy investments from 2014-2020 will make more than €38 billion available to support the shift to a more environmentally-friendly economy through investments for energy efficiency and renewables.

6.2.4 ERDF

The ERDF is the biggest single source of EU funding for reducing disparities in terms of development (per-capita GDP), productivity and employment across the EU. The scope of the Fund, and the investment priorities for regional development programs are set out in the [proposed Regional Development Fund Regulation for 2014-2020](#). All regions in Europe will receive funding from the ERDF. National and regional authorities establish their own development programs and select the projects to be financed. Under the proposal, regions would have to concentrate ERDF support on a limited number of objectives in line with the Europe 2020 strategy which with the help of the Fund will be turned into practical action.

The proposed ERDF will channel resources towards energy efficiency and renewables, innovation and support for small and medium-sized businesses (SMEs). The ERDF can co-finance national, regional and local schemes related to, for instance, the insulation of walls, roofing and windows and replacement of old boilers. There is no additional funding; therefore **this measure requires a shift in the priorities set at regional level**. It is up to MS and regional authorities to decide whether to make use of it or not.

6.2.5 JESSICA

Structural funds can be used to create revolving financing instruments for energy efficiency in cities. **JESSICA - Joint European Support for Sustainable Investment in City Areas**, is an initiative of the European Commission in co-operation with the EIB and the CEB. <http://www.eib.org/products/jessica/index.htm>. It supports sustainable urban development including energy efficiency improvements. A range of financial tools are used including equity investments, loans and guarantees, offering new opportunities for the use of EU structural funds. EU countries can choose to invest some of their EU structural fund allocations in revolving funds to help recycle financial resources to accelerate investment in Europe's urban areas.

Contributions from the European Regional Development Fund (ERDF) are allocated to **Urban Development Funds** (UDFs) which invest them in public-private partnerships or other projects included in an integrated plan for sustainable urban development. These investments can take the form of equity, loans and/or guarantees. Alternatively, managing authorities can decide to channel funds to UDFs



using **Holding Funds** (HFs) which are set up to invest in several UDFs. This is not compulsory, but does offer the advantage of enabling managing authorities to delegate some of the tasks required to implement JESSICA to expert professionals. **Owing to the revolving nature of the instruments, returns from investments are reinvested in new urban development projects**, thereby recycling public funds and promoting the sustainability and impact of EU and national public money.

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JESSICA Networking Platform: The [JESSICA Networking Platform](#) was launched in 2009 by the Commission (DG Regional Policy) in co-operation with the EIB/CEB and the EIF to support the implementation of JESSICA.

EIB involvement in JESSICA is threefold:

- Advising and assisting national, regional and local authorities in implementing JESSICA
- Promoting the use of Urban Development Funds and best practice across Europe
- Acting as a Holding Fund, when requested by Member States or managing authorities.

6.2.6 JESSICA Holding Fund

ERDF Funds have been used to create special Funds like EIB-managed JESSICA Holding Fund: JESSICA Holding Fund for the modernization of residential apartment houses. The Fund shall invest in energy efficiency projects for multi-apartment housing via the Lithuanian banking sector. Funds have been contributed from the ERDF alongside national match funding. Intermediary banks will act as energy-efficiency focused JESSICA Urban Development Funds (UDFs) in providing long term preferential loans with a fixed interest rate not exceeding 3%. The loans will be offered to home-owners in multi-apartment buildings with tenant associations acting as representatives and managing the process of implementation of chosen energy efficiency projects.

6.2.7 Financial incentives supporting EPBD recast objectives

Financial incentives supporting Energy Performance of Buildings Directive (EPBD) recast objectives (Article 10, Directive 2010/31/EU)

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010L0031:EN:NOT>, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006L0032:EN:NOT>, http://ec.europa.eu/energy/efficiency/end-use_en.htm

EPBD: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. Article 10 of [Directive 2010/31/EU](#) (EPBD recast) requires for Member States to outline the existing and proposed measures and instruments including those of financial nature, which promote the objectives of the Directive. Member States can communicate these lists



through the Energy Efficiency Action Plans (EEAP) referred to in Article 14(2) of [Directive 2006/32/EC](#).

The existing and proposed measures listed by Member States "may include, in particular, measures that aim to reduce existing legal and market barriers and encourage investments and/or other activities to increase the energy efficiency of new and existing buildings, thus potentially contributing to reducing energy poverty. Such measures could include, but should not be limited to, **free or subsidised technical assistance and advice, direct subsidies, subsidised loan schemes or low interest loans, grant schemes and loan guarantee schemes**. The public authorities and other institutions which provide those measures of a financial nature could link the application of such measures to the indicated energy performance and the recommendations from energy performance certificates."

The Commission shall examine the effectiveness of the Listings for Article 10 of Directive 2010/31/EU in supporting the implementation of the Directive. The Commission's examination and possible advice or recommendations may be included in its report on the National Energy Efficiency Action Plans. Upon request, the Commission shall assist Member States in setting up national or regional financial support programs that help increase energy efficiency of buildings, but mainly existing buildings, by supporting the exchange of best practice between the responsible national or regional authorities or bodies.

The National Energy Efficiency Action Plans and Separate Listings for Article 10 of Directive 2010/31/EU are available at http://ec.europa.eu/energy/efficiency/end-use_en.htm

6.2.8 European Energy Efficiency Fund (EEE-F)

<http://www.eeef.eu/home.html>

http://ec.europa.eu/energy/eepr/eeef/eeef_en.htm

The European Energy Efficiency Fund (EEE-F) is a public-private partnership dedicated to mitigating climate change through energy efficiency measures and the use of renewable energy in the member states of the European Union. It focuses on financing energy efficiency, small-scale renewable energy and clean urban transport projects targeting municipal, local and regional authorities and public and private entities acting on behalf of those authorities. The EEE-F was established in 2011 with a volume of € 265 million, with funding coming from the European Union, the European Investment Bank, the Italian Cassa dei Depositi e Prestiti and Deutsche Bank. The fund provides debt, equity and guarantee instruments, as well as technical assistance grants to support project development. Around 70% of the funding is intended for energy efficiency projects, with the remainder allocated to renewable energy and clean urban transport. The fund aims at bringing already well-proven technologies to the mainstream, and at strengthening the European ESCO market and the use of energy performance contracting.

EEEF pursues its environmental goals by offering funding for energy efficiency and small scale renewable energy projects. The Fund observes the principles of sustainability and viability, combining environmental considerations and market orientation. It does so by financing economically sound projects, allowing for a sustainable and revolving use of its means.

Beneficiaries of the Fund are municipal, local and regional authorities as well as public and private entities acting on behalf of those authorities, such as local energy utilities, Energy Service Companies (ESCOs), district heating combined heat and power (CHP) companies or public transport providers. Hence, there has to be a direct or indirect municipal link in the project. This can be achieved either by a direct involvement of a municipality (e.g. building owner, investor) or by a long-term contract between the municipality and a third party (e.g. concession for public transport, Energy Performance Contract (EPC) for a public building).



6.3 Social Aspects of Retrofit Projects

6.3.1 Solution approaches for Home Owner Associations

This issue especially concerns apartment blocks, where the privately-owned property of a particular flat is connected to a pro rata share of the shared property (common property). In the 'new EU Member States' this kind of property is proportionally very high due to the former state-owned housing situation.

Occupants bear financial responsibility for their own special property. Each property owner must pay a share of the costs incurred to manage the common property. Energy efficient renovation and rehabilitation of single units in an apartment block need to include investments in common property like the heating system or the outside walls.

According to a Housing owner association in Frankfurt, such discussions often occur at the owners' meetings, which is where the advertisement for approval needs to be done. Without the majorities, the required work is not executed. By now, energy renovations can be legally implemented with no need of a 100% quorum, since a lower quorum is enough. However, a lack of this quorum can lead to an investment delay which eventually affects the conservation of value of the whole property.

Despite the problems, energy efficiency measures during retrofits substantially increase the value of the property and it has been the main factor in convincing owners.

6.3.2 Solution approaches to the owner-tenant dilemma

In the case of properties which are managed by housing societies, the residents need to accept the retrofits, because it is mandatory. Sometimes steps for renovation can be only undertaken with great reluctance, especially if the proportion of rented units is very high. Here the yield (profitability from rental) is often of greater importance than better living comfort. In Germany, statutory regulation of renovation cycles normally includes energy efficiency investments.

According to current law in Germany, only modernization costs can be allocated to the tenants. The rent increase is 11% per year, based on the costs of energy-efficient renovation, and that can be very expensive for the tenants. The problem is that the rent increases often much higher than the amount the tenant saves by reducing the energy bill and many families can no longer afford the rent. In many cases and under pressure, some families start looking for homes with cheaper rent to move as soon as possible. During the retrofit, some residents also take the opportunity to move for other reasons than the rent increase (preference for a larger home, preference for a smaller house etc.).

The socioeconomic profile of the residents/tenants are often socially and culturally diverse, there are engineers and teachers as well as persons with low-income or in a situation of financial instability/unemployment. There are also many residents with a migration background. So, before starting a retrofit, the companies should analyze if the residents could afford the new rent and continue living there.

Obviously not everyone voluntarily accepts the retrofit. A minority doesn't approve the results and sees no personal benefit in the retrofits. Despite the problems, the overall outcome of modernization with investments in energy efficiency is positive and most residents are satisfied with it. The wide acceptance of retrofits depends on the following factors:

- The houses become more beautiful after the retrofit. This improves the building



image, there is more demand to live there and the value of the house rises;

- A reduction of costs in the energy bill (lots of locals don't know how much energy they can save by retrofitting the house, so many are surprised with the outcome);
- With modern installations, the feeling of comfort increases. For example, the house receives often façade insulation, new windows, new heating, new electrical installations and the bathroom is renovated. The surrounding area, for example, gets a place for bicycles or becomes clearer, with proper lighting and a vegetation type that enables locals to visualize all the corners in case of problematic neighborhoods.

According to the interviews, all the respondents believe that the locals are not firstly interested in thinking about energy efficiency terms because of the environment, but to save money by reducing electricity bills.

6.3.3 Recommendations for new projects

Constant information strategy by different means:

- The ideal is to start informing as early as possible. It is important that both parts speak to each other and the owners explain the tenants what is going to be done, how long it will take and how much it will cost. Unfortunately, owners often simply begin to retrofit the house without contacting the tenants beforehand.
- Continuously inform residents through big meetings, small meetings, informal conversations, leaflets, web sites etc; personally explain the reasons for retrofit and clarify any doubts. The residents should be constantly informed about what was going to happen, with the further plannings for the next years.
- Show projects to residents of houses/buildings in the neighborhood that have been renovated so that people have an idea of how their home will look like after the refurbishment. Some Housing companies also present the results of their projects to the press, to disseminate knowledge and to arouse the interest of future clients.
- Information should be shared with the neighbors and friends network to make sense: in the beginning many residents cannot imagine what the results of the retrofits would be. For example, many residents of one settlement in Frankfurt believed that the ventilation system would make a lot of noise, but changed their minds when they saw that it had functioned smoothly in the neighbor's house. Moreover, when they saw that the neighbor's house was more beautiful after retrofit, many people were excited about the refurbishment of their homes.
- If the residents are immigrants, language barriers have to be considered as these people sometimes don't want to say anything because they feel ashamed. It is important to think about how to get them to participate more in the process.
- Professional advice: if the communication between tenant and owner no longer works, then it is preferable to contact a third party to take care of the situation (a Tenant association for example).

Consider locals/tenants as an important part of the retrofit process

- Understand the needs of each family, go to their houses and observe how families live and what they want, considering that refurbishments cannot be planned without entering the houses and without consulting the residents beforehand. Address the families from the perspective of the family routine, and not only through the architectural and technical aspects of the homes. Listen to the locals and understand how the retrofits will affect the routine of the residents in the future (the way people walk through the house or sit down at the table etc.).



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For example, sometimes it is something very easy to fix, like putting an awning on the front door of the house so that people will not get wet in the rain while carrying the shopping bags and trying to find their house keys;

- Take the suggestions and criticisms of the residents into consideration in the project and understand that locals live there, not the builders, so they know better what they want. In the case of one settlement in Frankfurt, in the original plan from the company responsible for the project the garbage containers would be placed inside the buildings, which was refused by the residents fearing unpleasant odor. The company tried to argue that it would not stink due to the ventilation technology, but the locals insisted and the company respected their decision. In the case of another company, when existing homes are retrofitted, residents have the option to choose the colors they want in their homes, as the color of the tile, but not to decide on the technical aspects. When it comes to new constructions, a residents' committee has the opportunity to influence the planning phase, i.e., the construction plan, technical part, installations etc.
- During the retrofits, there are many problems regarding the residents who remain in the house all day long, like shift workers, families with young children, and elderly residents with health problems, who would have to live for a month with dirt, noise and bricklayers. These people cannot go to the bathroom while it is being renovated. For elderly or sick residents, some companies have a team of social management that takes them out of home on days when there is more noise and brings them back at night. Or there is always the possibility of offering a few days in a hotel.

For each problem some companies try to find an individual solution: For example, for residents with health problems that remain indoors all the time, the company could provide one house in the settlement with some furniture so the family moves there for four weeks during retrofit.

In the case of one settlement in Frankfurt, other minor problems were identified and solved, such as:

- In the retrofit, the windows of the houses were enlarged. For residents who complained that they could no longer hang their curtains, because the curtains were now very small, the company responsible for the project gave them new ones;
- For residents who could not drag the furniture alone before the retrofit began, the company sent people to help them;
- For families who complained that they had no room to store their stuff during the retrofit, the company provided some packing boxes;
- If the bricklayers broke something in the house during the retrofit, the company quickly sent someone in house to repair it (without bureaucracy).

Establish confidence between the company and the residents:

- Just implementing a good information policy is not enough, one must comply with the agreed points and act according to the law. It is very important that each party (tenants and owners) hold on to their rights and obligations, acting fairly by the rules.
- To ensure that residents are always well informed, the company needs to build an office on site and provide someone to answer questions when needed. From the beginning to the end of the process, the same company employees group should accompany the retrofits and communicate with the locals. The company employees should be all the time with the residents, listening to their suggestions and problems and answering questions, establishing a relationship of trust with them.
- It is important to believe the locals, for example if they say they are sick and need a replacement home during the retrofit, not to ask for a medical certificate and try to solve problems personally (not written).
- Show that the company understands the problems of each family and treats each case as an individual one, but the decisions on each case must be consistent and fair, because no family

should get more than the others. The trust makes the convincing process easier.

6.4 Technical Criteria of a Financing Program

The following draft proposal for a financing program by development financial institutions (DFI) and implementing commercial financial institution (CFI) to improve the energy performance of residential buildings by a step-by-step refurbishment and integration of renewable energies according to the EnerPHit standard may serve as an example and as a basic concept for the application of financial instruments.

The program should be suitable for everyone who wants to substantially reduce the energy consumption of an existing building. The program should provide long-term financing for investments in building retrofit and in energy conservation in old buildings.

Who is eligible to apply? Everyone investing in owner-occupied or rented residential buildings. In general, these are the owners and land lords, for example: private individuals, home owners, joint home ownerships, housing companies, housing cooperatives, operators of residential establishments, municipalities, municipal associations, other bodies and institutions incorporated under public law.

Contracting projects and district heating companies are also eligible for financing.

What may be co-financed? Funds are made available for measures in residential buildings. These are buildings whose primary purpose is residence, including homes for the elderly and nursing homes. Funds will not be available for holiday homes, cabins or cottages.

The application must be supported by an **energy advisor's** confirmation that the rehabilitation is intended to achieve the EnerPHit Standard in one go or incrementally in a step-by-step manner. It is recommended to seek expert energy advice. Services of energy auditors, architects and civil engineers with special qualification in the field of thermal rehabilitation can be financed from the loan and grant funds (if available).

See http://passipedia.passiv.de/passipedia_en/certification/enerphit

Significant energy savings of between 75 and 90 % can be achieved in existing buildings, for which the following measures have proved to be particularly effective:

- improved thermal insulation (based on the principle: if it has to be done, do it right)
- [reduction of thermal bridges](#)
- considerably [improved airtightness](#)
- use of very good quality [windows](#) (there is no reason why Passive-House-suitable windows should not be used whenever the opportunity arises)
- [ventilation with highly efficient heat recovery](#) (again, Passive-House-suitable systems are highly recommendable)
- efficient heat generation
- use of renewable energy sources

These are exactly the same measures that have proved to be successful in new constructions. A number of examples demonstrating the application of high-efficiency technology in existing buildings have become available in the meantime. The Passive House Institute has advised on the implementation of several projects and carries out measurements in modernised buildings. To know more about the EnerPHit-Standard you can also visit the corresponding section in the Passive House Institute's



website: ["EnerPHit" - New PHI-Certificate for Refurbishment of existing buildings](#)

The following packages of measures are supposed to be financed

Basic package, minimum requirement **for single family houses, ribbon/terrace buildings and apartment buildings with up to 8 flats:**

- 1) Insulation of the building shell including the exterior walls with (country and climate specific minimum requirements) and the thermal insulation of the roof with (country and climate specific minimum requirements) and a moisture barrier
- 2) Reduction of thermal bridges and improvement of airtightness
- 3) Replace window frames with windows frames with three chambers profiles and with low energy glass. Only windows which have already been changed and adhere to an advanced standard should remain
- 4) Ventilation with heat recovery
- 5) Installation heat meters and thermostatic radiator valves. Insulation of heating pipes in all parts of the building which are not inside the thermal shell.

Basic package, minimum requirement **for apartment buildings with more than 8 flats:**

Insulation of exterior walls with (country and climate specific minimum requirements)

- 6) Replace wooden window frames with window frames with three chambers profiles and with low energy glass. Only windows which have already been changed and adhere to an advanced standard should remain
- 7) Installation heat meters and thermostatic radiator valves. Insulation of heating pipes in all rooms which are not inside the thermal shell of the building.

In addition to this basic package following thermal rehabilitation measures are recommended and can be financed from the loan:

Additional measures:

- Thermal insulation of the roof with (country specific minimum requirements) and a moisture barrier
- Thermal insulation of the basement ceiling with (country and climate specific minimum requirements)
- Replace and seal window frames at balconies
- Replace single glass outside doors with doors with low energy profiles and low energy glass
- Renovation and installation of ventilation systems, if possible controlled systems with heat recovery

Improvement of heating:

- Improving the heating installations in the buildings, exchange of radiators,
- Insulation of the heat pipes; insulation of the domestic hot water pipes
- Installation of heat meters and thermostatic radiator valves
- Hydraulic balancing of heating system
- Installation of heat cost allocators
- Installation of efficient heat transfer stations for district heatings.

In principle all exterior walls, the entire basement ceiling or all exterior walls which have contact with the ground will have to be insulated and all windows will have to be renewed if they are contained in the corresponding package of measures.

Single-case based energy audits

If the basic packages cannot be implemented and the building has certain peculiarities single-case based energy audits may be presented to apply for a loan. In that case the home owner may prove by the presentation of energy audits that at least 30 % energy savings are achieved by a different package of measures or step-by step refurbishment.

What proportion of the investment may be co-financed?

Loan amount:

Up to 100% of the investment costs including ancillary expenses (architect, advice on saving energy, etc.) may be financed.

Possibilities of cumulation:

The combination/cumulation of loans from other sources and other promotional funds (e.g. loans or allowances/subsidies) is **admissible** as long as the sum of the loans, grants and allowances does not exceed the sum of the expenditures.

What is the maximum loan term?

What are the conditions?

For loans with a maturity of up to 10 years the interest rate is fixed for the entire term.

For loans with a maturity of more than 10 years the interest rate is fixed for the first 10 years of the term. Before the end of the fixed-interest period the bank proposes a new interest rate to the on-lending bank.

How is the loan disbursed?

How is the loan repaid?

What collateral is to be provided for the loan?

a) Private-sector borrowers

Customary collateral (such as land charges, guarantees, insurance, mortgage bond)

The form and amount of collateral are agreed during the loan negotiations between the applicant and his/her implementing Commercial financial institution (CFI).

+calculation of savings including repayment capacity from savings.

+Separation of energy and incidental part

b) Public-sector borrowers

For local authorities: in principle, no security is required; for companies operated by the local authorities and other public-sector applicants: 100% modified deficiency guarantee of the local authority/authorities or corresponding legal entities under public law.

The following conditions apply for special grants (if available):

Energy performance certificate and financial incentives

Upon submission of an energy performance certificate a partial debt relief or repayment bonus can be awarded if it is confirmed that the rehabilitated building reaches the EnerPHitstandard (for more details see the German case of a redemption grant above)

How to apply?

The application must be filed prior to the start of the project. Planning and energy consulting services



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do not count as the start of a project. Debt consolidations and follow-up financing for investment projects already completed are excluded from financing.

Private-sector applicants

Loans are granted to the investor only via credit institutions, which must assume the liability for the loans they on-lend. The application is therefore to be filed with a credit institution. Borrowers may choose the credit institution at their discretion.

The loan is granted on the condition that the measures are carried out by one or several professional firms. The related invoices have to be presented to the bank.



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