European Commission

TECHNICAL GUIDANCE

Financing the energy renovation of buildings with Cohesion Policy funding

FINAL REPORT

A study prepared for the European Commission
DG Energy

Energy

This study was carried out for the European Commission by

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ISBN 978-92-79-35999-6

DOI: 10.2833/18766

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Document title	Financing the energy renovation of buildings with Cohesion Policy funding
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Date	14 February 2014

List of abbreviations

BgEEF	Bulgarian Energy Efficiency Fund
CEN	European Committee for Standardization
CEEF	Commercializing Energy Efficiency Finance
CFL	Compact fluorescent lamps
CHP	Combined heat and power
COP	Coefficient of performance
CoM	Covenant of Mayors
COSME	Programme for the competitiveness of enterprises and SMEs (2014-2020)
CPR	Common Provisions Regulation
CSRs	Country-specific Recommendations
DG ENER	European Commission's Directorate General for Energy
DG REGIO	European Commission's Directorate General for Regional and Urban Policy
E2B EI	Energy Efficient Buildings European Initiative
E2BA	Energy Efficient Buildings Association
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy efficiency
EeB PPP	Energy Efficient Buildings Public-Private Partnership
EED	Energy Efficiency Directive
EESF	Energetics and Energy Savings Fund
EIB	European Investment Bank
ELENA	European local energy assistance
EPBD	Energy Performance of Buildings Directive
EPC	Energy performance contracting
ERDF	European regional development fund
ESCO	Energy service company
ESF	European Social Fund
ESI Funds	European Structural and Investment Funds
FEI	Financial engineering instruments
FI	Financial instruments
GNI	Gross national income
HVAC	Heating ventilation and air conditioning
JASPERS	Joint Assistance to Support Projects in European Regions
JESSICA	Joint European Support for Sustainable Investment in City Areas
LED	Light emitting diode
MA	Managing Authority
MFF	Multiannual Financial Framework
MLEI – PDA	Mobilising Local Energy Investments – Project Development Assistance
M&V	Measurement and verification
MS	EU Member State
NEEAPs	National Energy Efficiency Action Plans
NPV	Net Present Value

NREAPs	National Renewable Energy Action Plans
NSRF	National Strategic Reference Framework
NZEB	Nearly Zero-Energy Building
O&M	Operation and maintenance
OP	Operational Programme
PA	Partnership agreement
PDA	Project Development Assistance
RE	Renewable energy
REECL	Residential Energy Efficiency Credit Line
RED	Renewable Energy directive
RTDI	Research, Technological Development and Innovation
SE	Sustainable energy
SEAPs	Sustainable energy action plans
SEI	Sustainable energy investment
SFP	Seasonal Performance Factor
SlovSEFF	Slovak Energy Efficiency and Renewable Energy Finance Facility
SMEs	Small and medium-sized enterprises
UDFs	Urban development funds
VC	Venture capital
WG	Working group

Definitions

Beneficiary	For the ESI Funds, 'beneficiary' means a public or private body as well as, only for the purposes of the EAFRD and EMFF Regulations, a natural person, responsible for initiating or initiating and implementing operations; in the context of State aid schemes, the term 'beneficiary' means the body which receives the aid; in the context of financial instruments, the term 'beneficiary' means the body that implements the financial instrument or the fund of funds as applicable [Common Provisions Regulation]
Co-financing	All ESI Funds resources are required to be co-financed by other public or private resources. The Operational Programme sets out how the ESI funding and its co-financing should be invested, either as grant or through financial instruments. Both the ESI funding and the co-financing must be administered and spent in line with the applicable EU regulations.
Cohesion Policy	Cohesion Policy provides the framework for promoting economic growth, sustainable development, prosperity, and social integration across all 28 EU Member States. It aims to reduce economic, social and territorial disparities across the EU through eleven thematic objectives for the 2014-2020 programming period. The Funds providing support under the Cohesion Policy are the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF).
Combined heat and power	Combined heat and power (CHP) is a process that captures and utilises the heat that is a by-product of the electricity generation process. The captured heat can either be used in the immediate plant surroundings or as hot water for district heating.
Common Provisions Regulation (CPR)	The CPR sets out the common rules applicable to the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF) (the 'European Structural and Investment Funds'), which are operating under a common framework. It also defines the provisions necessary to ensure the effectiveness of the European Structural and Investment Funds and their coordination with one another and with other Union instruments. It includes provisions on planning of programmes, thematic objectives, financial management and monitoring and evaluation of programmes.
Cost-optimal level	'Cost-optimal level' means the energy performance level which leads to the lowest cost during the estimated economic lifecycle of a building [EPBD (recast) 2010/31/EC].
Deep Renovation	In accordance with the Energy Efficiency Directive (see recital 16), cost-effective deep renovations lead to a refurbishment that reduces both the delivered and final energy consumption of a building by a significant percentage compared with the pre-renovation levels leading to a very high energy performance. Such deep renovations could also be carried out in stages. The Commission services have indicated (see SWD(2013) 143 final) that the significant efficiency improvements resulting from deep renovation are typically of more than 60% energy savings.
Energy Efficiency Directive (EED)	Directive 2012/27/EU on energy efficiency establishing a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 20 % headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date.
Energy Audit	An energy audit is defined as a systematic procedure with the purpose of obtaining adequate knowledge of the existing energy consumption profile of a building or group of buildings, an industrial or commercial operation or installation or a private or public service, identifying and quantifying cost-effective energy savings opportunities, and reporting the findings [Directive 2012/27/EU].
Energy Performance Certificate	A certificate recognised by the Member State, or a legal person designated by it, which includes the energy performance of a building calculated according to a methodology based on the general framework set out in the Annex of Directive 2002/91/EC [EPBD, 2002/91/EC]. Energy Performance Certificates must be accompanied by recommendations for cost-effective improvement options to raise the performance and rating of the building.
Energy Performance Contract (EPC)	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.

Energy service company (ESCO)	A natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed term of the contract [ESD, 2006/32/EC].
European Structural and Investment Funds (ESI Funds)	The European Structural and Investment Funds (ESI Funds) operate under shared management between the Commission and the Member States. In the 2014-2020 period, the term European Structural and Investment Funds refers to the following five funds: (1) European Regional Development Fund (ERDF), (2) European Social Fund (ESF), (3) Cohesion Fund (CF), (4) European Agricultural and Development Fund (EARDF), (5) European Maritime and Fisheries Fund (EMFF)
Ex-ante evaluation	Prior to approval of OPs within the 2014-2020 programming period, the CPR requires that an ex ante evaluation be carried out in the course of preparing the OP in order to improve the quality and design of each programme, and verify that objectives and targets can be reached.
Final recipient	For the ESI funds, 'final recipient' means a legal or natural person that receives financial support from a financial instrument. [Common Provisions Regulation]
Financial Engineering Instrument	Financial Engineering Instruments are those set up under Article 44 of Council Regulation (EC) No 1083/2006. As part of an Operational Programme, the Structural Funds may finance one of the following: (a) Financial Engineering Instruments for enterprises, primarily small and medium-sized ones, such as Venture Capital funds, Guarantee funds and Loan funds; (b) Urban Development Funds, that is, funds investing in Public-Private Partnerships and other projects included in an Integrated Plan for Sustainable Urban Development; (c) Funds or other incentive schemes providing Loans, Guarantees for Repayable Investments, or equivalent instruments, for energy efficiency and use of renewable energy in buildings, including in existing housing.
Financial instrument	The preferred term (compared to 'Financial Engineering Instrument') for the 2014-2020 programming period. The European Structural and Investment Funds may be used to support financial instruments under Operational Programmes in order to contribute to the achievement of specific objectives set out under a given priority. Financial instruments shall be implemented to support investments which are expected to be financially viable and do not give rise to sufficient funding from market sources. Financial instruments may be combined with grants, interest rate subsidies and guarantee fee subsidies.
Financial Intermediary	The body acting as an intermediary between the supply and demand of financial products.
Financing mechanism	In this report, the term financing mechanism is used to designate any form of financial support, whether it be grant-based or structured around financial instruments.
Heat recovery system	This is the part of a bidirectional ventilation unit equipped with a heat exchanger designed to transfer the heat contained in the exhaust air to the (fresh) supply air.
Lock-in effect	This term refers to the fact that once some basic energy efficiency measures have been implemented, it becomes less cost effective to fit more comprehensive measures in the future.
Low hanging fruit	"Low hanging fruit" is a term used to designate energy efficiency measures that are the most cost-effective, least invasive and that tend to have quick payback periods and yield energy savings of up to 20-25% in some cases. This can include measures such as operation and maintenance, behaviour change, and lighting upgrades.
Managing Authority	For every Operational Programme, a Managing Authority (at national, regional or another level) is designated. The managing authority bears the main responsibility for the effective and efficient implementation of the Funds and thus fulfils a substantial number of functions related to programme management and monitoring, financial management and controls as well as project selection. The Member State is also allowed to designate intermediate bodies to carry out certain tasks of the Managing Authority.
Operational Programme	Document approved by the Commission comprising a set of priorities which may be implemented by means of grants, prizes, repayable assistance and financial instruments, or a combination thereof, depending on the design of the Operational Programme.

Project Development Assistance	Project Development Assistance (PDA) refers to activities aimed at supporting project promoters throughout the project development cycle. These can include: mobilising relevant stakeholders, developing feasibility studies and business cases, applying for funding, and addressing legal issues.
Nearly zero-energy building (NZEB)	A building that has very high energy performance, as determined in accordance with Annex I of the EPBD recast. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby [EPBD recast, 2010/31/EC].
Net present value	NPV is a standard method for the financial assessment of long-term projects. It measures the excess or shortfall of cash flows, calculated at their present value at the start of the project.
Positive-energy building	Positive energy buildings refer to buildings that on average over the year generate more energy from renewable energy sources than they consume from external sources.
Split incentive	The split incentive refers to a situation where the owner of a building makes an investment to improve the energy performance of the building, but the tenant gets the resulting financial savings from reduced energy bills.
Structural Funds	The European Regional Development Fund (ERDF) and the European Social Fund (ESF) are together referred to as the Structural Funds.
Smart grid	A smart grid is defined as an electricity network that uses digital technology to deliver electricity to consumers. Using digital technology helps the grid to operate more efficiently by intelligently integrating the actions of all players connected to it (e.g. generators, consumers). Smart grids also help consumers to save energy and costs while increasing the reliability of the grid and facilitating the integration of renewable energies.
Smart meters	A smart meter is an electronic device that records energy consumption (electricity or gas generally) in intervals of an hour or less and sends the readings to suppliers automatically for monitoring and billing purposes. They also display energy usage to the consumer.
Technical assistance	In the context of this report, this term is used to describe activities that aim to support the authorities which administer and use ESI Funds to perform the tasks assigned to them under the various regulations (CPR and fund-specific). Any TA activity needs to be clearly justified and the direct link with improved Funds management demonstrated.
Variable speed drive	A variable speed drive is an electronic power converter, which continuously adapts the electrical power supplied to the motor in order to control its mechanical power output.
U-Value	The U value is a measure of heat loss in a building element such as a wall, floor or roof. The lower the U-value, the better the insulation. It is indicated in units of Watts per metre squared per Degree Kelvin (W/m^2K).

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EXECUTIVE SUMMARY

1 Objectives of the guidance

Tackling energy consumption in European buildings is vital. Nearly 40% of final energy consumption is attributable to housing, offices, shops and other buildings across the public and private sector. Consequently, a major and sustained increase in public and private investment in buildings is needed for the European Union (EU) to meet its 2020 climate change and energy objectives and to take forward its 2050 decarbonisation agenda.

In the 2014-2020 programming period, the European Structural and Investment Funds (ESI Funds), and specifically Cohesion Policy Funds[1], are expected to play a major role in relation to the refurbishment and construction of buildings with the allocation of a minimum of €23bn to sustainable energy (SE) in this period. These funds are governed by the Common Provisions Regulation (CPR) as well as fund-specific regulations[2].

Under the European Regional Development Fund (ERDF), a minimum percentage of funding will be directed to the shift towards a low-carbon economy in all sectors (Thematic Objective 4), including energy efficiency (EE), renewable energies (RE), smart distribution systems and sustainable urban mobility: 20% in the case of more developed regions, 15% for transition regions and 12% for less developed regions[3], which receive more funding overall. As a result, a greater amount of funding will be available for the energy renovation of buildings.

This guidance document aims to help Cohesion Policy Managing Authorities (MAs) plan and deploy SE investments in buildings within Operational Programmes (OPs). It provides a list of good practice approaches and case studies and informs MAs about the European requirements on buildings and EE. It also explores the different financing mechanisms that MAs can use to support SE projects within an OP, with the objective of launching large scale investments in the energy renovation of buildings and attracting greater levels of private-sector investment.

2 Key steps addressed by the guide

The guidance is set out in a form of practical steps (see diagram below), as part of a roadmap of action, which can be easily navigated by the reader depending on their needs and experience of each topic. This includes:

- Guidance to identify priority intervention areas and appropriate strategies to deploy SE projects in buildings within the Operational Programmes (see Steps 1 & 2 of the roadmap);
- A framework to assess the economic, social, energy-related and environmental impacts of SE projects in buildings (see Step 3);
- Information to understand the array of potential and appropriate financing mechanisms that can be used to achieve optimal outcomes and impacts (see Step 4);
- Insights and good practices on the design and implementation of SE programmes and projects (see Steps 5, 7, 8 & 9); and
- Support in designing an effective monitoring framework for SE projects and programmes (see Steps 6, 10 & 11).

Figure 1 provides an overview of the key steps that are described in this guide. These steps are based on the different stages of development and implementation of the OPs and the projects they finance and are aimed to provide high-level guidance to MAs and project promoters.

[1] Cohesion Policy Funds comprise the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). The European Structural and Investment Funds (ESI Funds) refer to the three Cohesion Policy Funds as well as the European Agricultural and Development Fund (EARDF) and the European Maritime and Fisheries Fund (EMFF).

[2] Official Journal of the European Union, L 347, Volume 56: http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2013:347:SOM:EN:HTML

[3] Cohesion Fund resources can be used by less developed regions to achieve the minimum fund allocation to Thematic Objective 4, in which case the minimum percentage of funding directed to this objective shall increase to 15% for these regions.

Figure 1 Roadmap to implement a programme for financing the energy renovation of buildings using Cohesion Policy funding

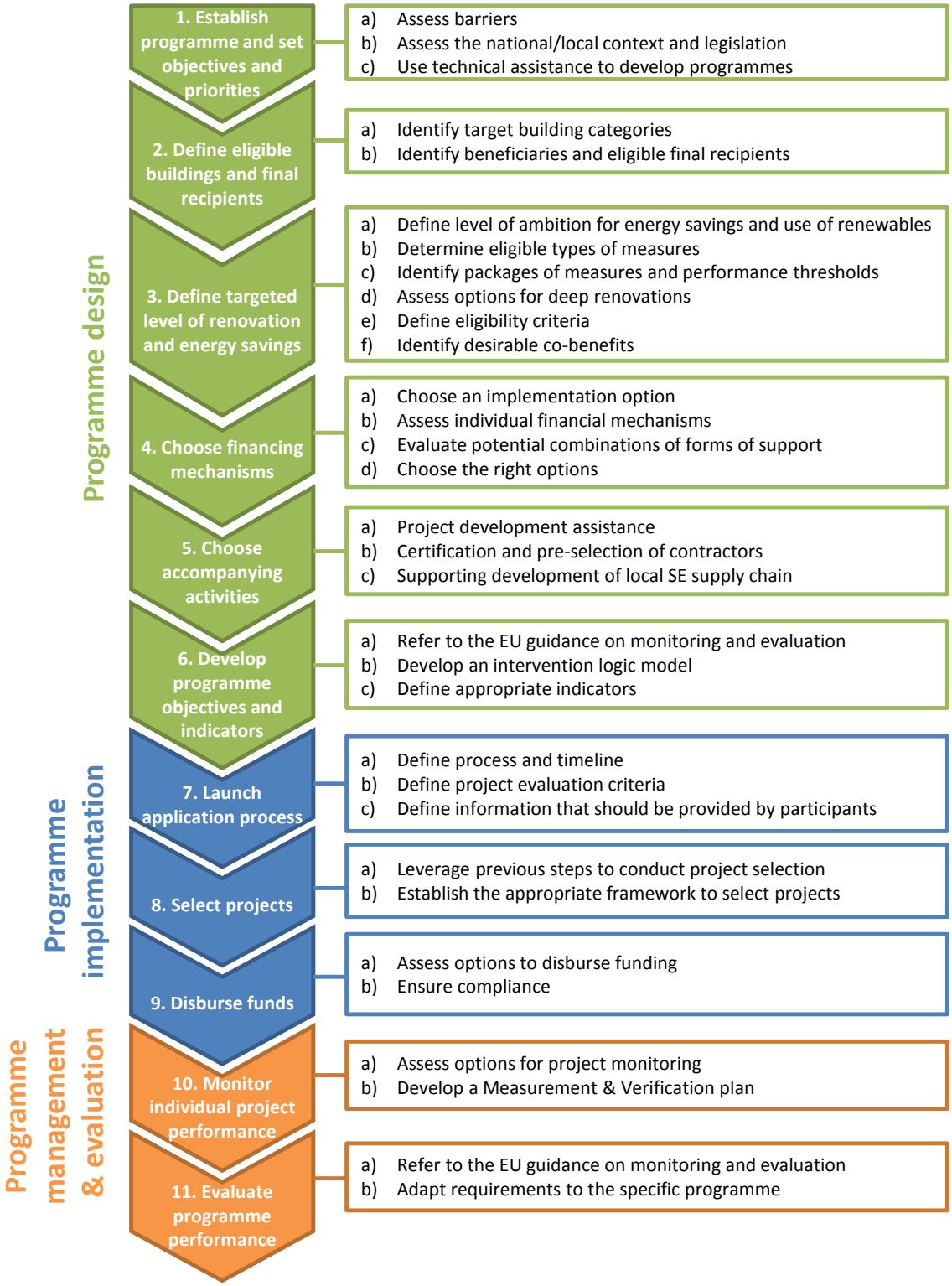


Table 1 is a summary of the main considerations and conclusions for each step. More extensive explanations and illustrative examples can be found in the main report.

Table 1 Summary roadmap – key messages

1. Establish programme and set objectives and priorities	
1.1. Assess barriers	• In designing programmes, managing authorities (MAs) should assess the barriers affecting the renovation market in their region or country (e.g. financial, institutional & administrative, information & awareness or "split incentive").
1.2. Assess the national / local context and legislation	• Partnership agreements (PAs) and operational programmes (OPs) must take into account the current EU, national and regional regulations and strategies including: National Reform Programme (NRP), National Energy Efficiency Action Plans (NEEAPs), Annual Reports under the Energy Efficiency Directive[4], National Renovation Roadmaps for buildings (in line with Article 4 of the Energy Efficiency Directive), national targets to implement Europe 2020, Country-specific Recommendations (CSRs), National Renewable Energy Action Plans (NREAPs), Biannual progress reports under the Renewable Energy Directive. • MAs also need to understand the regional context for SE financing and consult with relevant stakeholders to identify the market needs. • OPs should, where possible, link with other EU-wide initiatives such as the Covenant of Mayors to exploit synergies and ensure a co-ordinated approach.
1.3. Use technical assistance to develop programmes	• The Common Provisions Regulation (CPR) allows MAs to use ESI Funds to support actions for preparation, management, monitoring, evaluation, information and communication, networking, complaint resolution, and control and audit. The Funds may be used by the Member State to support actions for the reduction of administrative burden for beneficiaries, including electronic data exchange systems, actions to reinforce the capacity of Member State authorities and beneficiaries to administer and use these Funds, as well as actions to reinforce the capacity of, and exchange best practices between relevant partners. • JASPERS ('Joint Assistance to Support Projects in European Regions'), a technical assistance partnership which helps specific countries prepare major infrastructure projects can also be of relevance for certain OPs or projects.
2. Define eligible buildings and final recipients	
2.1. Identify target building categories	• All types of buildings (public, residential and commercial) are in principle eligible for ERDF and Cohesion Fund (CF) funding for SE investments; however large commercial buildings are not a policy priority. • MAs should leverage the on-going work on buildings renovation roadmaps (pursuant to Article 4 of the Energy Efficiency Directive) to identify priority targets. In addition, MAs can also decide to provide support to projects aligned with local sustainable energy action plans (SEAPs) as developed, for instance, in the context of the Covenant of Mayors. • Energy Performance Certificates can be used to define the target building categories (for instance the E, F or G rated buildings where the energy saving potential is the highest).
2.2. Identify beneficiaries and eligible final recipients	MAs can set conditions as to what type of final recipients or beneficiaries should be eligible to receive funding and to what level, although once target building types are defined final recipient will be to some extent determined. For instance, they can: • Select public and/or private beneficiaries; • Select public and/or private final recipients; • Identify specific final recipients (e.g. ESCOs, homeowners, tenants, specific target groups); • Determine a specific geographical area if desired.

[4] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:315:0001:0056:EN:PDF

3. Define targeted level of renovation and energy savings	
3.1. Define level of ambition for energy savings and use of renewables	• The Energy Performance of Buildings Directive (EPBD)[5] and Renewable Energy Directive (RED)[6] set minimum energy performance requirements and renewable energy levels for new buildings, renovation of existing buildings and specific building elements. MAs should consider these requirements to be a baseline. Cohesion Policy funding should primarily be allocated to projects that go beyond these requirements, in particular for public buildings. • MAs should adopt a long-term perspective to avoid the lock-in effect and aim for deep renovation where possible. • Cohesion Policy funding should generally not be used to support the implementation of single measures only but rather comprehensive packages with clear and long-term objectives. The level of support should increase with the level of ambition.
3.2. Determine eligible types of measures	• Numerous measures are available to improve the energy performance of buildings including the building shell. They include thermal insulation, space heating, space cooling, domestic hot water, ventilation systems, lighting as well as renewable energy and renewable heat technologies.
3.3. Identify packages of measures and performance thresholds	• The building type and level of ambition will determine the performance thresholds and/or eligibility criteria for packages of measures that need to be established. • Performance thresholds can be defined at building or component level. • Any MA that wishes to use Cohesion Policy funding for an SE programme must stipulate a requirement for an energy audit and/or an Energy Performance Certificate; ideally both pre- and post-installation. The complexity of this assessment needs to be adapted to the size and scope of the project. For example, detailed energy audits are required for deep renovation projects. • Energy audits and Energy Performance Certificates and their recommendations should be used to identify energy saving opportunities. • The scope of an energy audit, in line with the EED, does not only include an assessment of the technical characteristics of the building but also an analysis of the amount of energy consumed per end-use and the impact of behavioural changes. As such, Energy Performance Certificates can provide important inputs to an energy audit. In the case of Energy Performance Contracting, energy audits provide a mechanism to evaluate energy savings including those linked to consumer behaviour. Furthermore, for deep renovation projects which imply higher grant intensity, detailed energy audits allow the monitoring and verification of EE improvements, including long-term cost and energy savings. • For less complex projects such as the combination of single standard measures, the recommendations in the Energy Performance Certificate can be used to identify the SE measures to be implemented as part of the building renovation. Nonetheless, an energy audit may be useful to monitor and verify the project's energy savings and to understand possible discrepancies between the energy performance rating and the actual energy consumption of the building. • Cohesion Policy funding should incentivise the supported projects to go beyond minimum energy performance requirement levels (which should in principle be achieved by the market). As a general principle, the deeper the renovation is, the higher the grant support intensity that should be made available.
3.4. Assess options for deep renovations	• Deep renovations can take place either as a one-stage project or through multiple-stage projects. A staged approach may free up capital for investment into other projects. However, it might also be more costly to return to a building later on to add more measures.

[5] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF

[6] Directive 2009/28/EC on the promotion of the use of energy from renewable sources, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT

3.5. Define eligibility criteria	• MAs must use a set of eligibility criteria to allocate funding including cost-effectiveness and level of energy performance of the building or of building elements. • Requirements should be adapted to the project size. • The net present value (NPV) is generally recommended for assessing cost-effectiveness. • Energy performance levels can also be set for buildings (through the energy performance certificates for instance) or building components. Minimum requirements set by MSs as part of the EPBD and RED can be used as a minimum threshold for eligibility for Cohesion Policy support. • Other requirements can also be defined. For instance, conducting an energy audit should be a pre-requisite to access Cohesion Policy funding for more complex renovation projects. However, MAs must make sure that Cohesion Policy funding is not used to finance energy audits that are mandatory according to the Article 8 of the EED (i.e. for large enterprises). Energy Performance Certificates in line with the EPBD should be used by programmes to establish benchmarks or eligibility criteria within incentive schemes.
3.6. Identify desirable co-benefits	• Cohesion Policy is an integrated policy, and sustainable energy is one of its multiple objectives. Therefore, an integrated approach is needed to ensure energy renovations in buildings are not carried out in isolation. • As such, co-benefits such as economic, social and environmental impacts should also be taken into account when selecting projects and allocating funding.
4. Choose financing mechanisms	
4.1. Choose an implementation option	• There is a strong rationale for implementing innovative financial instruments (FIs) and the new EU multiannual financial framework aims to increase the use of such instruments. • To benefit from ESI funding via FIs, MAs need to carry out an *ex-ante* assessment to identify market failures or sub-optimal investment situations and respective investment needs, amongst other things. • A range of new implementation options are available to MAs including: (1) FIs set up at Union level (managed directly or indirectly by the Commission); and (2) FIs set up at national, regional, transnational or cross-border level (managed by or under the responsibility of the MA). In the case of financial instruments consisting solely of loans or guarantees, the MA may undertake implementation tasks directly.
4.2. Assess individual financial mechanisms	• Table 6 provides a detailed breakdown of the characteristics, advantages and disadvantages for each of the financial mechanisms.
4.3. Evaluate potential combinations of forms of support	• Financial instruments may be combined with grants, interest rate subsidies and guarantee fee subsidies. • Grants can be used to cover the initial costs of project implementation, such as eligible energy audits (see 3.5 above) or feasibility studies. • Generally, the level of grant funding (grant intensity) should increase with the ambition level of SE improvements or the social objectives of the project.
4.4. Choose the right options	• Depending on the local context, the type of buildings and final recipients targeted and the objectives of the programme, MAs should evaluate the appropriateness of using certain financial mechanisms versus others (see Section 3 of the Executive Summary below).

5. Choose accompanying activities	
5.1. Project development assistance	• Project development assistance (PDA) facilities can be established by MAs to support the development and launch of bankable projects and assist project developers throughout the various stages of the project development cycle. The support is provided in the form of grants to final recipients, with a mandatory leverage factor (grant/investment launched). • The EU has set up a number of PDA facilities in the 2007-2013 period. Under the 2014-2015 Work programme of the Horizon 2020 programme (Energy Challenge, Energy Efficiency focus area, topic EE20[7)], PDA will be provided to public and private project promoters for the development of SE investments ranging from €6 million to well above €50 million. These PDA activities will be complemented by the continuation in the 2014-2020 period of the ELENA facility implemented by the EIB, addressing large-scale investment projects.
5.2. Certification and pre-selection of contractors	• Certification schemes and pre-selection of contractors can ensure that programme resources support high quality installations.
5.3. Supporting development of local SE supply chain	• Certain activities can be undertaken to help develop the local SE supply chain, including engaging with local businesses through communication events, directing support to raise awareness, developing skills and building networks.
6. Develop programme objectives and indicators	
6.1. Refer to the EU guidance on monitoring and evaluation	• The European Commission (EC) has produced a guidance document on monitoring and evaluation for the 2014-2020 programming period, which sets out how to define appropriate indicators among other things. http://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf
6.2. Develop an intervention logic model	• A logic model can be used to set out the objectives of a programme and how they are expected to be achieved.
6.3. Define appropriate indicators	• As per the CPR, an OP should set common and programme-specific output indicators. Appendix C lists mandatory and optional indicators that can be used by MAs.
7. Launch application process	
7.1. Define process and timeline	• Two main types of processes can be used to receive and select project applications: calls for project proposals and open applications. • Calls for proposals can be particularly appropriate for relatively large-scale projects and/or situations where there are relatively few applicants or funding is limited. • If the number of applications is high and/or projects are relatively small in scale, open application processes are generally more appropriate.
7.2. Define project evaluation criteria	• Evaluation criteria should be in line with the eligibility criteria developed for project selection (see section 3.5) and should generally be set to encourage deep renovation.
7.3. Define information that should be provided by participants	• Information to be requested at the application stage can fall under four categories: general, technical, financial and administrative. Suggested minimum information requirements in each category are outlined in Table 9.
8. Select projects	
8.1. Leverage previous steps to conduct project selection	• Project selection is based on all the activities and parameters defined in the previous steps.
8.2. Establish the appropriate framework to select projects	• A number of steps need to be considered by MAs to facilitate the project assessment and selection process including: the formation of an assessment committee, the establishment of a timetable, the implementation of suitable communication and information exchange channels, the development of a project evaluation framework, the development and maintenance of a project selection database, the set-up of a channel to provide feedback to unsuccessful applicants, and the establishment of a clear appeals protocol.

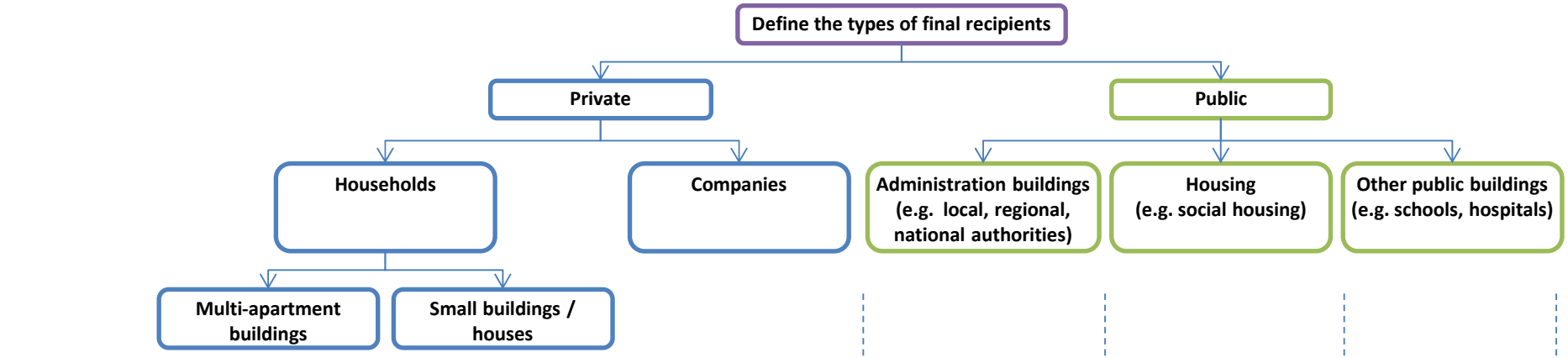
[7]Horizon 2020 Work Programme 2014-2015. 10. Secure, clean and efficient energy, http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-energy_en.pdf, p34

9. Disburse funds	
9.1. Assess options to disburse funding	• The choice of financial instrument selected under Step 3, will largely dictate the process through which funds are disbursed and the type of bodies involved. A number of different actors can be involved in the disbursement of funding such as EU financial institutions (e.g. EIB, EBRD), national public financial institutions and Special Purpose Vehicles (SPVs). • Typically, MSs have directly contributed OP resources to either a venture capital fund, loan or guarantee fund, or through holding funds set up to invest in several funds.
9.2. Ensure compliance	• All transaction must comply with the laws of the MS in which they take place as well as EU law. EU law prevails in situations where there is a conflict. In particular, any funding operation needs to comply with *State aid rules* and anti-money laundering rules.
10. Monitor individual project performance	
10.1. Assess options for project monitoring	• Given the variety of building type, age, size and construction styles, and the level of integration and sophistication of their technical systems, the Measurement and Verification (M&V) approach taken can vary. The chosen approach should also be adapted to the size of the project being financed and the expected levels of savings. • The International Performance Measurement and Verification Protocol (IPMVP) is a widely recognised M&V procedure that can be used by MAs as good practice.
10.2. Develop a Measurement & Verification plan	• An M&V plan should be prepared for every project applying for ESI funding, since it is central to assuring the transparency of the process, the quality and credibility of savings determination and is the basis of verification.
11. Evaluate programme performance	
11.1. Refer to the EU guidance on monitoring and evaluation	• The EC has produced a guidance document on monitoring and evaluation for the 2014-2020 programming period, setting out a series of concepts and recommendations for activities supported by ESI funds. http://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf
11.2. Adapt requirements to the specific programme	• Planning evaluations requires consideration of factors such as administrative burden, timing, and granularity.

3 Choosing the appropriate financing mechanism

Figure 2 provides a summary of the financing options available to MAs depending on the type of final recipient (further described in Step 4): preferential loans, renovation loan (off-the-shelf instrument), a combination of grants and loans, guarantees, equity, and energy performance contracting (EPC). Depending on the local context, the type of buildings and final recipient targeted, and the objectives of the programme, MAs should evaluate the appropriateness of using certain financial mechanisms versus others. The following decision-support diagram illustrates where financial mechanisms can be deployed to ensure an efficient use of Cohesion Policy funding and optimal project and programme outcomes.

Figure 2 Decision-support diagram



	Multi-apartment buildings	Small buildings / houses	Companies	Administration buildings (e.g. local, regional, national authorities)	Housing (e.g. social housing)	Other public buildings (e.g. schools, hospitals)
Optimal financing instruments	Preferential loans Renovation loan Grants + loans Guarantees	Preferential loans Grants + loans Guarantees	Preferential loans Guarantees Equity EPC	Preferential loans Guarantees Equity EPC	Preferential loans Grants + loans	Preferential loans Guarantees Equity EPC
Project examples	KredEX (Estonia) Jessica Fund (Lithuania) REECL (Bulgaria) Retrofit South East (UK) SlovSEFF (Slovakia) Enegies POSIT IF (France) CEEF (Hungary)	KfW (Germany) REECL (Bulgaria) CEEF (Hungary)	BgEEF (Bulgaria) SlovSEFF (Slovakia) FIDAE (Spain) CEEF (Hungary) EESF (Bulgaria)	Re:FIT (UK) BgEEF (Bulgaria) REDIBA (Spain) ELENA-Modena EESF (Bulgaria)	Use of ERDF for social housing, France	Re:FIT (UK) BgEEF (Bulgaria) EESF (Bulgaria)

Case studies featured in the guidance:

Kredex (Estonia): Box 34, Appendix D
Jessica Fund (Lithuania): Box 1, Box 24, Box 30
REECL (Bulgaria): Box 35, Box 36, Appendix D
Retrofit South East (UK): Appendix D
SlovSEFF (Slovakia): Box 26
Energies POSIT'IF: Box 28
CEEF (Hungary): Box 22
KfW (Germany): Box 11, Box 15, Box 19, Appendix D
BgEEF(Bulgaria): Box 26, Box 37, Appendix A
EESF (Bulgaria): Box 8
RE:FIT (UK): Box 27, Appendix A
Use of ERDF for social housing, France: Box 1, Box 9

INTRODUCTION

This guidance document aims to provide Cohesion Policy Managing Authorities (MAs) with a coherent and comprehensive, yet simple to navigate, list of good practice approaches and case studies to help plan and deploy sustainable energy (SE) investments in buildings within Operational Programmes (OPs). The guidance will help MAs to be better informed about the current requirements of European building and energy efficiency (EE) regulations including mandatory targets that will start to take effect over the next programming period (2014–2020). It also seeks to explore the different financing mechanisms that MAs can use to provide a more innovative and ambitious set of SE projects within an OP, with the ultimate objective of achieving step changes in energy and carbon savings in buildings and attracting greater levels of private-sector investment.

The guidance is set out in a form of practical steps, as part of an overall roadmap of action, which can be easily navigated by the reader depending on their needs and overall experience of each topic.

1 Context of the guide

BUILDINGS ARE CENTRAL TO EU POLICY AS THEY CONSUME AROUND 40% OF TOTAL ENERGY CONSUMPTION

Tackling energy consumption in European buildings is vital. Nearly 40% of final energy consumption–as well as 36% of all greenhouse gas (GHG) emissions–is attributable to housing, offices, shops and other buildings across the public and private sector.

A major and sustained increase in public and private investment is needed for the European Union (EU) to meet its 2020 climate change and energy objectives and to take forward its 2050 decarbonisation agenda. To achieve the 20% EE target by 2020 requires investment of €100bn per year[8], 70% of which needs to be directed to buildings. However, the EU is currently at around half that level of investment so considerable progress needs to be made.

COHESION POLICY CONSTITUTES A KEY DELIVERY MECHANISM FOR SUSTAINABLE ENERGY MEASURES IN BUILDINGS

Cohesion Policy investments to improve EE in public, commercial and residential buildings have been carried out in the 2007-2013 programming period. However, in the 2014-2020 programming period, the budget that has been set aside for investments in both EE and renewable energy (RE) measures – collectively termed sustainable energy (SE) measures in this guide – is significantly higher. In particular, under the European Regional Development Fund (ERDF), a minimum share of the funding will need to be allocated to supporting the shift towards a low-carbon economy, including EE and RE, by MSs.

As such, Cohesion Policy will continue to be a key instrument for implementing SE measures in buildings and achieving policy objectives in this area moving forward. Notably, a lot more funding will be available for implementing activities related to the Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED). In addition to Cohesion Policy funding, public funding will also be made available through MS government budgets.

PLENTY OF OPPORTUNITIES EXIST TO MAKE SUSTAINABLE ENERGY INVESTMENTS IN BUILDINGS

The building sector (both residential and non-residential buildings) presents the second-largest opportunity, after the energy sector itself, to make cost-effective energy savings. Applying mature, off-the-shelf technologies such as modern lighting, insulated windows and advanced heating and cooling systems could help to reduce total energy demand by a third.

Buildings also represent an excellent potential location for RE generation. Roof-top solar photovoltaic and thermal installations, ground and air source heat pumps, and biomass energy boilers are some of the prominent small-scale RE solutions now being deployed across European buildings. Renewable energy based district heating (where available) is another interesting technical solution.

The 2014-2020 programmes will have to be designed based on the experience acquired by MAs and the lessons learned during the previous period.

[8] Quoted by Paul Hodson, DG ENER, speaking at Environmental Finance Energy Efficiency Financing Conference, 19 March 2013

WIDESPREAD BENEFITS RESULT FROM MAKING SUSTAINABLE ENERGY INVESTMENTS IN BUILDINGS

Important co-benefits arise from making buildings more energy efficient and exploring small-scale renewable generation opportunities. At the local and regional level, these include health improvements to residents, alleviation of fuel poverty (an issue which has become more problematic as a result of the European economic downturn), as well as job creation and retention for tradesmen and service engineers. Nationally, better energy security and industrial competitiveness arise from investing in SE in buildings–for example, the potential to stimulate supply chains and manufacturing within MSs.

THE RIGHT INVESTMENT CHOICES WILL YIELD LONG-TERM SAVINGS

Considering the current rates of construction, demolition, and renovation across Europe, the city of 2050 is now more than 70% built. It is essential, therefore, that the right technological and investment choices are made now, when renovating the existing building stock, to help pave the way for a step-change in EE and to reduce the future cost of retrofits.

Policy and regulatory certainty coupled with the right financial incentives – such as tailored debt and equity instruments and grant support for ambitious or innovative solutions – are the ingredients that policy makers and MAs need to consider to help trigger the required level of private sector investments into this area.

A voluntary standardised and harmonised method of measuring buildings energy performance (in development by CEN) complementing national systems for building standards, will also provide confidence in the market which should in turn encourage investors to take greater stakes in EE projects across their European portfolios.

The economic downturn has tightened public finances and has focused attention on how to unlock the investment potential of the private sector. While the dramatic decline in long-term finance available from banks has finally started to improve (helped by international finance institutions, such as the European Investment Bank), it is still more difficult to obtain bank loans for projects considered less commercially viable or associated with high risks. The public sector can play a key role in mobilising private-sector investment through its signalling effect: through the OPs it chooses to develop and through innovative financial instruments that it establishes to help achieve these programme objectives. Well-managed and designed public support can help overcome some of these barriers, bridge gaps and share risks and rewards.

This guidance is designed to introduce MSs and their Cohesion Policy MAs, project developers and other stakeholders to the concept of sustainable energy investments (SEI) in buildings, to the opportunities that are available and to the financing and deployment mechanisms that are available in the context of Cohesion Policy funding to make such investments a reality.

2 Objectives and structure of the guide

To respond effectively to the anticipated rise in financial allocations for SEI for buildings through Cohesion Policy Funds, it is important to provide responsible authorities with a coherent set of guidelines on what constitutes good SE projects.

The main objectives of this guidance are to provide MS and Cohesion Policy MAs with:

- Guidance to identify priority intervention areas and appropriate strategies to deploy SE projects in buildings within the Operational Programmes (see Steps 1 & 2 of the roadmap);
- A framework to assess the economic, social, energy-related and environmental impacts of SE projects in buildings (see Step 3);
- Information to understand the array of potential and appropriate financing mechanisms that can be used to achieve optimal outcomes and impacts (see Step 4);
- Insights and good practices on the design and implementation of SE programmes and projects (see Steps 5, 7, 8 & 9);
- Support in designing an effective monitoring framework for SE programmes and projects (see Steps 6, 10 & 11).

Secondary objectives are to help project promoters develop effective investment projects based on economically rational assumptions, and also to enable EC officials to set an effective programming framework, develop clear guidance on the implementation of Cohesion Policy Funds and identify main intervention areas.

UNDERSTANDING THE POLICY CONTEXT

1 Overall EU policy context

CLIMATE CHANGE AND ENERGY HAVE LONG BEEN PRIORITIES FOR THE EU

In 2007, the EU Member States (MSs) committed themselves to achieving by 2020:

- 20% reduction of GHG emissions compared with 1990 levels;
- 20% share of renewables in EU energy consumption; and
- 20% reduction in energy consumption by improving energy efficiency.

The general EU 2020 policy objectives have been translated into National Targets so that each MS can check its own progress towards these goals. National indicative EE targets have been identified by each MS in April 2013 as required by Article 3 of the EED. The targets taken together show that, currently, the EU is not on track to achieve the energy efficiency goal.

Looking beyond 2020, the EU presented in 2011 a "Roadmap for moving to a competitive low carbon economy in 2050"[9], which provides a long term pathway to achieving an 80% cut in domestic emissions compared to 1990 by 2050, and the "Energy Roadmap 2050"[10], which sets indicative priorities for the longer-term and illustrates three 'no regrets' options: EE, RE and better energy infrastructure to connect markets. In March 2013, the EC adopted a Green Paper entitled "A 2030 Framework for Climate and Energy Policies"[11], which sets out a framework for action in the medium term.

THE EC HAS INTRODUCED SEVERAL DIRECTIVES TO DRIVE FORWARD SE INVESTMENTS IN BUILDINGS

Several key pieces of legislation have been introduced by the EU to help achieve the 20% EE target, including the recast Energy Performance of Buildings Directive (EPBD) and the recent Energy Efficiency Directive (EED). The Renewable Energy Directive (RED) is also an important piece of legislation driving the deployment of RE in buildings and their integration in local energy infrastructures[12]. These three Directives seek to focus resources on SE in buildings and to mobilise investment.

From 5 June 2014 – transposition deadline of the EED – the EED will repeal the Directive on energy services and the Directive on cogeneration. The EED contains a number of mandatory measures designed to deliver energy savings across all sectors and prescribes that MSs establish a long-term strategy for mobilising investment in the renovation of residential and commercial buildings. The strategy must include an overview of the national building stock, identify cost-effective approaches to renovations, and encompass policies and measures to stimulate cost-effective deep renovations of buildings and a forward-looking perspective to guide investment decisions.

Alongside the EED, the recast EPBD sets out numerous requirements including the roll-out of energy performance certification for buildings, inspection regimes for boilers and air conditioning plants, and requirements for new buildings to be nearly zero-energy. Under the EPBD, new public buildings are to be nearly zero-energy by 2019 and all new buildings by 2021. The EPBD also requires MSs to set minimum energy performance requirements for new buildings and buildings undergoing renovation with a view to achieving cost-optimal levels.

Together, EED and EPBD provide a framework for MSs to drive the reduction of energy use in buildings, thereby delivering a range of economic, environmental, societal and energy security benefits.

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[9] COM(2011) 112 final, A Roadmap for moving to a competitive low carbon economy in 2050, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0112:FIN:EN:DOC

[10] COM(2011) 885 final, Energy Roadmap 2050, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011DC0885:EN:NOT

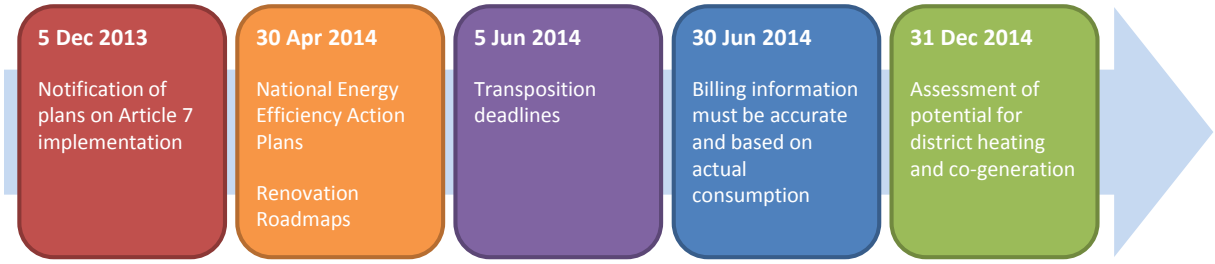
[11] COM(2013) 169 final, A 2030 framework for climate and energy policies, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0169:FIN:EN:DOC

[12] Article 13 of the RED requires that Member States recommend to local and regional bodies the use of renewable energy technologies for electricity, heating and cooling and district heating, when planning, designing, building and renovating industrial and residential areas. Building regulations and codes shall also contain appropriate measures to increase the share of RE in the building sector and to mandate the use of minimum levels of renewable energy in new buildings and buildings undergoing renovation. Public buildings shall play an exemplary role in this respect.

THE EED REQUIRES MEMBER STATES TO IMPLEMENT A NUMBER OF ACTIVITIES IN THE COMING YEARS

Figure 3 shows the timeline for the transposition of measures related to SE in buildings under the EED.

Figure 3 EED Transposition & implementation schedule for energy efficiency in buildings



National Energy Efficiency Action Plans

Cohesion Policy funding forms the principal source of public funding for SEI under the EU budget. However, public funding is also made available through MS government budgets.

National strategies are established through various provisions of the EED and, in particular, through the National Energy Efficiency Action Plans (NEEAPs), which – according to Article 24(2) of the EED, need to be prepared by 30 April 2014 (and every three years thereafter) and submitted to the EC. NEEAPs shall cover significant EE improvement measures and expected and / or achieved energy savings[13]. As part of the NEEAPs, MSs shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. A template adopted by the Commission on 22 May 2013 specifies the information that MSs are required to provide in their NEEAPs on measures adopted or planned to be adopted to implement the main elements of the directive, although the actual format of the reporting remains non-binding. MSs were already required to submit NEEAPs under the Energy Services Directive. They therefore submitted their first and second NEEAPs to the Commission in 2007 and 2011, respectively.

A 2013 review of the second round of NEEAPs[14] found that, in the buildings sector, there is a clear recognition in many MSs of the benefits of introducing economic incentives for EE measures to reduce the risks associated with lengthy payback periods. Many of the policy packages established for the buildings sector across several MSs are already quite advanced, at least compared with other sectors. This is attributed to the impact of the EPBD.

National renovation roadmaps

Under Article 4 of the EED all MSs are required to *"establish long-term strategies for mobilising investment in the renovation of the national stock of residential and commercial buildings both public and private"*. Article 4 specifies that one of the elements of these long-term strategies must be a *"forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions"*. The principal mechanism for achieving this is the preparation of **"National Renovation Roadmaps",** which will be published and submitted to the Commission as part of the MS's NEEAP. Each Roadmap requires MSs to provide (see Figure 4):

- An **overview of their existing building stock based on statistical data**–this might include a detailed assessment of building categories and age bands, type of ownership and tenure, and location split. For each building category, the roadmap might assess the energy use and performance characteristics.
- **A package of cost-effective renovation measures both for energy efficiency and renewable energies**, based on an appraisal of the existing building stock.
- An appraisal of the **required investments to implement such measures.**

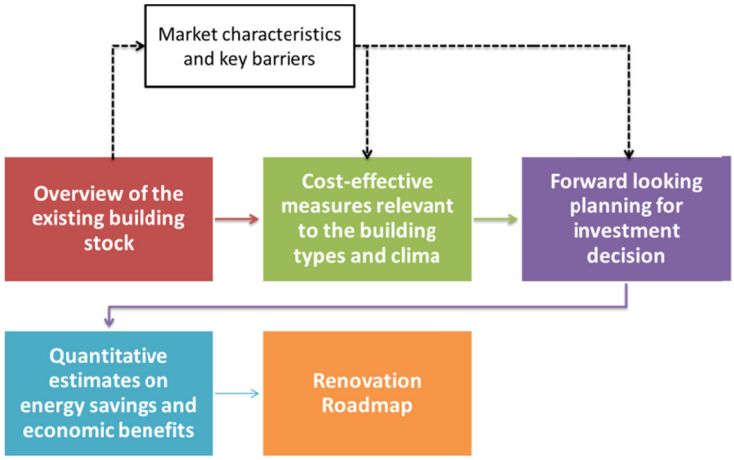
[13] This follows an earlier, intermediate national indicative savings target, as set out in Directive 2006/32/EC on 'energy end-use efficiency and energy services', which should have been met in 2010

[14] Wuppertal Institute, Ecofys, ESV O.Ö. Energiesparverband, for Energy Efficiency Watch (2013), Improving and implementing National Energy Efficiency Strategies in the EU framework, http://www.energy-efficiency-watch.org/fileadmin/eew_documents/images/Event_pictures/EEW2_Logos/EEW-Final_Report.pdf

A specific requirement of the EED for the implementation of the roadmaps mandates that renovation strategies must include policies and measures to incentivise cost-effective deep renovations, including staged deep renovations, for which the National Energy Efficiency Funds (Article 20) can be designed[15].

To operationalise their respective roadmaps and ensure adequate financial resources for the implementation of cost-effective measures, MSs should consider working in close collaboration with stakeholders from the building and finance sectors. In this process, it is important to take into account the key characteristics and barriers identified in the initial stage of the roadmap preparation.

Figure 4 Key component of the Renovation Roadmaps for Buildings (article 4, EED)



Article 5 of the EED also sets, starting from 2014 onwards, a 3% annual renovation target for public buildings owned and occupied by a MS's central government. Buildings should be renovated to meet at least the national minimum energy performance requirements set out in Article 4 of the EPBD. Should MSs decide to go beyond these requirements, public-building renovations could contribute significantly to the achievement of the indicative national and energy end-use savings targets.

Financial support for the implementation of both the Roadmaps and the renovation of public buildings needs to be conceived in such a way as to correctly address building stock characteristics and specific market barriers.

Furthermore, Article 7 of the EED requires MSs to have in place concrete policy measures (e.g. energy efficiency obligation schemes, innovative financial mechanisms, voluntary agreements) to stimulate individual EE improvements and reach certain amount of energy savings in final energy use sectors over the 2014-2020 obligation period. The amount of energy savings to be achieved is considerable and, to realise it, MSs could set policy instruments that are also supported by Cohesion Policy Funds. The first deadline for this Article was the 5th of December 2013. MSs had to notify the Commission of their plans and proposals for policy measures to be used for compliance and proposed detailed methodologies for the implementation of the Article. The majority of MSs complied with this deadline[16].

To tackle the information gap which is one of the main barriers to EE, Article 8 of the EED requires enterprises other than Small and Medium Enterprises (SMEs) to carry out an energy audit at least every four years, with a first energy audit by the 5th of December 2015. Further to this mandatory requirement, Article 8 recognises that energy audits are an essential tool to achieve energy savings and requires MSs to promote the availability of high quality and cost-effective energy audits. MSs must also ensure the development of programmes to encourage SMEs to undertake energy audits and implement their recommendations and programmes to raise awareness among households about the benefits of energy audits. The scope of an energy audit (in line with Article 8) goes beyond the assessment of the technical characteristics of the buildings and includes an analysis of the amount of energy consumed per end-use and the impact of behavioural changes. In practice, Energy Performance Certificates can provide a basis for the energy audit. To guarantee high quality energy audits, MSs must establish minimum criteria for energy audits based on Annex VI of the EED.

[15] http://eedguidebook.energycoalition.eu/national-renovation.html

[16] The national notifications received are available here: http://ec.europa.eu/energy/efficiency/eed/article7_en.htm

2 Cohesion Policy

COHESION POLICY AIMS TO STRENGTHEN THE ECONOMIC, SOCIAL AND TERRITORIAL COHESION OF THE EU AND TO SUPPORT THE IMPLEMENTATION OF THE EUROPE 2020 POLICY OBJECTIVES

EU Cohesion Policy seeks a comprehensive investment strategy that is aligned with Europe 2020, a strategy for smart, sustainable and inclusive growth. The European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF) are the financial instruments of EU Cohesion Policy[17]. The ERDF aims to reinforce economic, social and territorial cohesion in the EU by redressing the main imbalances across EU regions through support for the sustainable development and structural adjustment of regional economies. The ESF missions include promoting high levels of employment and job quality, supporting the geographical and occupational mobility of workers and facilitating their adaptation to industrial change and changes to production systems needed for sustainable developments. The CF, which targets MSs whose Gross National Income (GNI) per inhabitant is less than 90% of the Community average, aims to strengthen economic, social and territorial cohesion of the EU in the interests of promoting sustainable development, and invests in the environment, including SE, and trans-European networks in the area of transport infrastructure.

2.1 2007-2013 programming period

35% OF THE COMMUNITY BUDGET WAS ALLOCATED TO COHESION POLICY FOR THE PERIOD 2007-2013

In the 2007-2013 Multiannual Financial Framework (MFF) the budget allocated to Cohesion Policy was around €347bn (€277bn for Structural Funds – ERDF and ESF – and €70bn for CF), of which around €10bn (i.e. almost 3%) was allocated to SE projects.

SUSTAINABLE ENERGY INVESTMENTS FOR THE PERIOD 2007-2013 HAVE BEEN MIXED

During the 2007-2013 period, some MSs and regions embraced the potential for SE in buildings and used Cohesion Policy funding far more than others, particularly for public and private housing. To respond to the economic crisis, the ERDF regulation was amended in May 2009 to allow for up to 4% of national ERDF amounts to be invested in EE and RE in existing residential buildings across the 27 MSs, so as to support social cohesion[18]. A second regulatory amendment came into effect in June 2010 to clarify the eligibility and use of financial engineering instruments to promote SE in buildings, including residential buildings. Investment in EE and RE can now take place in all types of buildings in the EU.

GRANTS HAVE BEEN THE MAIN FINANCING MECHANISM FOR SUSTAINABLE ENERGY TO DATE, BUT PREFERENTIAL LOANS ARE INCREASINGLY BEING USED

During the 2007-2013 financing period, grants were commonly used to support the development of SE projects in the building sector and in some countries they represented the only form of support. Non-refundable grants have proven to be successful mechanisms to incentivize homeowners, public companies and corporations to invest in SE projects. However, concerns have been raised regarding the efficiency of such instruments (in particular regarding the selection of the most cost-effective measures), their sustainability and their overall reach. As such, MAs should increasingly aim to combine non-refundable grants with other types of financing mechanisms such as loans and credit guarantees.

THE FOCUS OF SUSTAINABLE ENERGY INVESTMENTS IN OPERATIONAL PROGRAMMES TO DATE HAS BEEN ON EXISTING BUILDINGS, PARTICULARLY HOUSING AND PUBLIC BUILDINGS

A wide range of projects was financed under the 2007-2013 financing framework. The partial refurbishment of the existing building stock and the promotion of RE were key areas of focus. However, funds were also used to support research and technological development (e.g. pilot projects for zero-emission buildings) as well as awareness raising and educational campaigns.

Projects related to the renovation of the existing building stock most commonly supported measures such as efficient heating and cooling systems (including cogeneration); wall, roof and floor insulation; window double-glazing; and roof-top solar panels for the off-grid production of renewable electricity.

[17] The European Structural and Investment (ESI) Funds also include the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF).

[18] EE improvements and use of RE in existing housing became eligible for the first time in 2007 for those MSs who joined the EU since 2004 and for the whole of the EU in 2009 with this change of the ERDF Regulation.

Countries that decided to allocate ERDF funding to EE projects have generally focused on housing, including social housing, and public buildings (such as schools and municipal buildings). In the case of social housing, a major success factor has been the assistance provided by third parties such as social housing associations, which have simplified interactions with final recipients and facilitated the implementation of the application process.

Box 1 Examples of renovation projects during the 2007-2013 period[19]

In **Bulgaria**, the city of Dobrich undertook the refurbishment of seven municipal buildings and nine schools using a grant disbursed by the ERDF. Around 84% of the total investment was covered by the ERDF grant, with co-financing from the state and municipality's budget accounting for the remainder. The municipality was able to adopt all necessary measures proposed by initial energy audits, including window replacement, roof and wall insulation along with renovation of the surrounding areas.

In **France**, projects focused on the existing building stock and only two types of buildings were eligible: social housing and run-down co-ownership with social occupation. Projects targeted the most inefficient buildings and ERDF funding was used to contribute to achieving the government's target of retrofitting 800,000 energy-inefficient social dwellings.

In **Lithuania**, the Joint European Support for Sustainable Investment in City Areas (JESSICA) Holding Fund offers a combination of subsidized loans and grants for the full renovation of multi-apartment buildings and student residences. The loan length can be up to 20 years with a two-year grace period and the interest rate is fixed at 3%.

INNOVATIVE FINANCIAL MECHANISMS PRESENT AN OPPORTUNITY TO INCREASE LEVERAGE OF PRIVATE FINANCE AND EXTEND THE REACH OF INVESTMENTS

Financial instruments (FIs), known as Financial Engineering Instruments (FEIs) in the 2007-2013 period, are considered to be more efficient than simple grants because (1) they generally incentivize individuals or organisations to invest in the most cost-effective SE measures; (2) by leveraging private investment or other public sources of financing, FIs can greatly increase the overall impact of the OP; and (3) thanks to the "revolving" nature of many FIs, they are more sustainable than grants as revenue streams arising from the initial investment can be returned to the operation and reinvested in other projects and activities.

Financial instruments are defined in Article 130 (1) of the EC Financial Regulation as *"Union measures of financial support provided on a complementary basis from the budget in order to address one or more policy objectives of the Union. Such instruments may take the form of loans, guarantees, equity or quasi equity investments, or other risk sharing instruments, and may, where appropriate, be combined with grants."*

MAs have had the ability for some time to create FEIs or to use broader urban development funds to invest in SE in buildings specifically[20]. By the end of 2012, a total of 870 FEIs had been established for all Cohesion Policy priorities across the EU through 178 OPs. The total value of contributions from the ERDF was €8.3bn, 52% of which was allocated to Holding Funds and the remaining 48% directly to FEIs. However, of all the 870 FEIs, only 16 were dedicated to EE or RE, of which 9 specifically targeted SE measures in buildings.

2.2 2014-2020 programming period

Under the EU's 2014-2020 budget, Cohesion Policy will invest €325bn in EU MSs, their regions and cities, to deliver the EU-wide goals of growth and jobs, as well as tackling climate change, energy dependence and social exclusion. The Cohesion Policy reform will ensure maximum impact for these investments, adapted to the individual needs of the regions and cities. Although the core principle of reducing regional disparities and promoting economic, social and territorial cohesion remains, the new regulatory framework aims to establish an even more targeted and result-oriented approach, focusing on fewer priorities, and translating the Europe 2020 Strategy into concrete investments in MSs and regions. An essential element of the new regulatory framework is the definition of 11 thematic objectives[21], subdivided into 'investment priorities' derived from the three general priorities of Europe 2020 (smart, sustainable and inclusive growth).

[19] Ten Donkelaar, M., Heinze, C., Structural and Cohesion Funds for Sustainable Energy Investments - Technical Input and best practices for Managing Authorities (and potential beneficiaries), SF Energy Invest, 2012 http://www.sf-energyinvest.eu/uploads/media/SF-D2_2_Evaluation_SCF_financed_projects_final.pdf

[20] Based on rules stipulated under Article 44c of Council Regulation (EC) No 1083/2006, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:210:0025:0025:EN:PDF

[21] Common Provisions Regulation, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0320:0469:EN:PDF

In line with the Europe 2020 targets, the 2014-2020 Cohesion Policy is built around a reinforced focus on sustainable growth, including climate change and SE, as well as on innovation. The aim is to further help regions and cities to develop their own local opportunities for growth and jobs linked to the green economy. In this context, Cohesion Policy will place even further emphasis on supporting investments linked to the energy targets of the EU in the next programming period. Thus, there will be a significant concentration of efforts on supporting the shift towards a low-carbon economy in all sectors, i.e. a large focus on RE, EE and smart grids at the distribution level, on sustainable urban mobility, and on research and innovation in these areas. This will lead to significantly larger amounts for Cohesion Policy SE investments over 2014-2020, representing more than a doubling of the 2007-2013 amounts.

Table 2 indicates the key legislation relevant to the 2014-2020 programming period.

Table 2 Key legislation relevant to the 2014-2020 programming period

Name
Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006. Full text available here.
Regulation (EU) No 1300/2013 of the European Parliament and of the Council of 17 December 2013 on the Cohesion Fund and repealing Council Regulation (EC) No 1084/2006. Full text available here.
Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006. Full text available here.
Regulation (EU) No 1304/2013 of the European Parliament and of the Council of 17 December 2013 on the European Social Fund and repealing Council Regulation (EC) No 1081/2006. Full text available here.

Within the new programming period, each MS is required to prepare a Partnership Agreement (PA) outlining its main funding priorities, which will help it achieve its national targets and contribute to smart, sustainable and inclusive growth. As per Article 15 of the Common Provisions Regulation (CPR), PAs should provide, amongst other things, an analysis of the needs and disparities in the country, a list of the selected thematic objectives, a description of the expected results from each of the ESI Funds, and an indicative allocation of ESI Funds to each thematic objective. They should also indicate measures to ensure an effective implementation of the ESI Funds, including arrangements to ensure good co-ordination between the ESI Funds and other funding instruments at EU or national level, the fulfilment of ex ante conditionalities, as well as actions to reduce the administrative burden for beneficiaries. In addition, PAs should outline an integrated approach to territorial development including, where appropriate, a strategy to address the specific needs of geographical areas or target groups[22].

In parallel, MAs are required to develop OPs which set specific priorities at regional or national level based on selected thematic objectives. As per Articles 27 and 96 of the CPR, the OPs need to set out a strategy in line with the EU objectives and the priorities identified in the PA. The OPs shall ensure an effective co-ordination with the ESI Funds and aim to reduce the administrative burden. When setting priorities, the OPs shall identify the level of ESI funding and national co-financing, set out common and programme-specific indicators and targets, and define indicative amounts to be used for climate change objectives.

THE 2014-2020 PROGRAMMING PERIOD SEEKS TO ACHIEVE A STEP CHANGE IN SUSTAINABLE ENERGY INVESTMENTS IN BUILDINGS

There is a strong case for the application of Cohesion Policy Funds for EE and RE in buildings, particularly in some of the newer MSs, with the intention of:

- Raising living conditions and reducing the cost of energy;
- Creating new jobs or retaining existing ones (mainly at local level and in SMEs) and promoting sustainable economic activities;
- Promoting research and innovation; and
- Reducing energy consumption and achieving 2020 energy and climate targets.

[22] Taking into account the country position paper elaborated by the Commission services in 2012

While the EU as a whole is, so far, on track to reach its renewable energy 2020 target, further efforts are necessary by almost all MSs. As regards meeting the 20% EE goal, at present, MSs are collectively working towards a target of approximately 16.4% for primary energy and 17.6% for final energy and additional efforts are needed. Cohesion Policy Funds can therefore play an important role in achieving national indicative EE targets that will collectively allow the EU to reach the 20% target by 2020.

Regulations for the 2014-2020 period demonstrate an increased focus on climate and energy, with the financial resources of the EU Cohesion Policy firmly aligned to reduce GHG emissions and promote SE, including in buildings. In particular, Thematic Objective 4 *"Supporting the shift towards a low-carbon economy in all sectors"*, will support investment priorities for SE projects. The EED also states that: *"Member States and regions should be encouraged to make full use of the Structural Funds and the Cohesion Fund to trigger investments in energy efficiency improvement measures."* As such, wherever relevant, and depending on the national and regional context and what is already in place in terms of national schemes, policy makers and MAs must co-operate to ensure that an appropriate share of the EU Cohesion Policy Funds is used to finance projects and activities related to the implementation of the EED and EPBD. These key pieces of legislation and the organisations involved in their implementation should be taken into account and involved from the very beginning of the process (Step 1).

Under the ERDF, a minimum percentage of funding is directed to Thematic Objective 4: 20% in the case of more developed regions, 15% for transition regions and 12% for less developed regions[23], which receive more funding overall (see Box 2 for Investment Priorities in ERDF and Cohesion Fund).

Box 2 Investment priorities within the ERDF and the Cohesion Fund

Under Thematic Objective 4, the ERDF shall contribute to the following investment priorities to support the shift towards a low-carbon economy in all sectors (Article 5 of the ERDF-specific regulation):

(a) Promoting the production and distribution of energy derived from renewable sources;

(b) Promoting energy efficiency and renewable energy use in enterprises;

(c) Supporting energy efficiency, smart energy management and renewable energy use in public infrastructures, including in public buildings, and in the housing sector;

(d) Developing and implementing smart distribution systems at low and medium voltage levels;

(e) Promoting low-carbon strategies for all types of territories, in particular for urban areas, including the promotion of sustainable multi-modal urban mobility and mitigation relevant adaptation measures;

(f) Promoting research in, innovation in and adoption of low-carbon technologies;

(g) Promoting the use of high-efficiency co-generation of heat and power based on useful heat demand.

Under Thematic Objective 4, the Cohesion Fund shall contribute to the following investment priorities to support the shift towards a low-carbon economy in all sectors (Article 3 of the Cohesion Fund-specific regulation):

(i) Promoting the production and distribution of energy derived from renewable sources;

(ii) Promoting energy efficiency and renewable energy use in enterprises;

(iii) Supporting energy efficiency, smart energy management and renewable energy use in public infrastructures, including in public buildings, and in the housing sector;

(iv) Developing and implementing smart distribution systems at low and medium voltage levels;

(v) Promoting low-carbon strategies for all types of territories, in particular for urban areas, including the promotion of sustainable multi-modal urban mobility and mitigation relevant adaptation measures;

(vi) Promoting the use of high-efficiency cogeneration of heat and power based on useful heat demand.

The new Cohesion Policy package proposes that support measures for EE and RE are primarily delivered along the following principles:

- EU funds should support policy implementation, but the majority of climate-related investment should be private-sector funded, and/or through energy providers;

[23] Cohesion Fund resources can be used by less developed regions to achieve the minimum fund allocation to Thematic Objective 4, in which case the minimum percentage of funding directed to this objective shall increase to 15% for these regions.

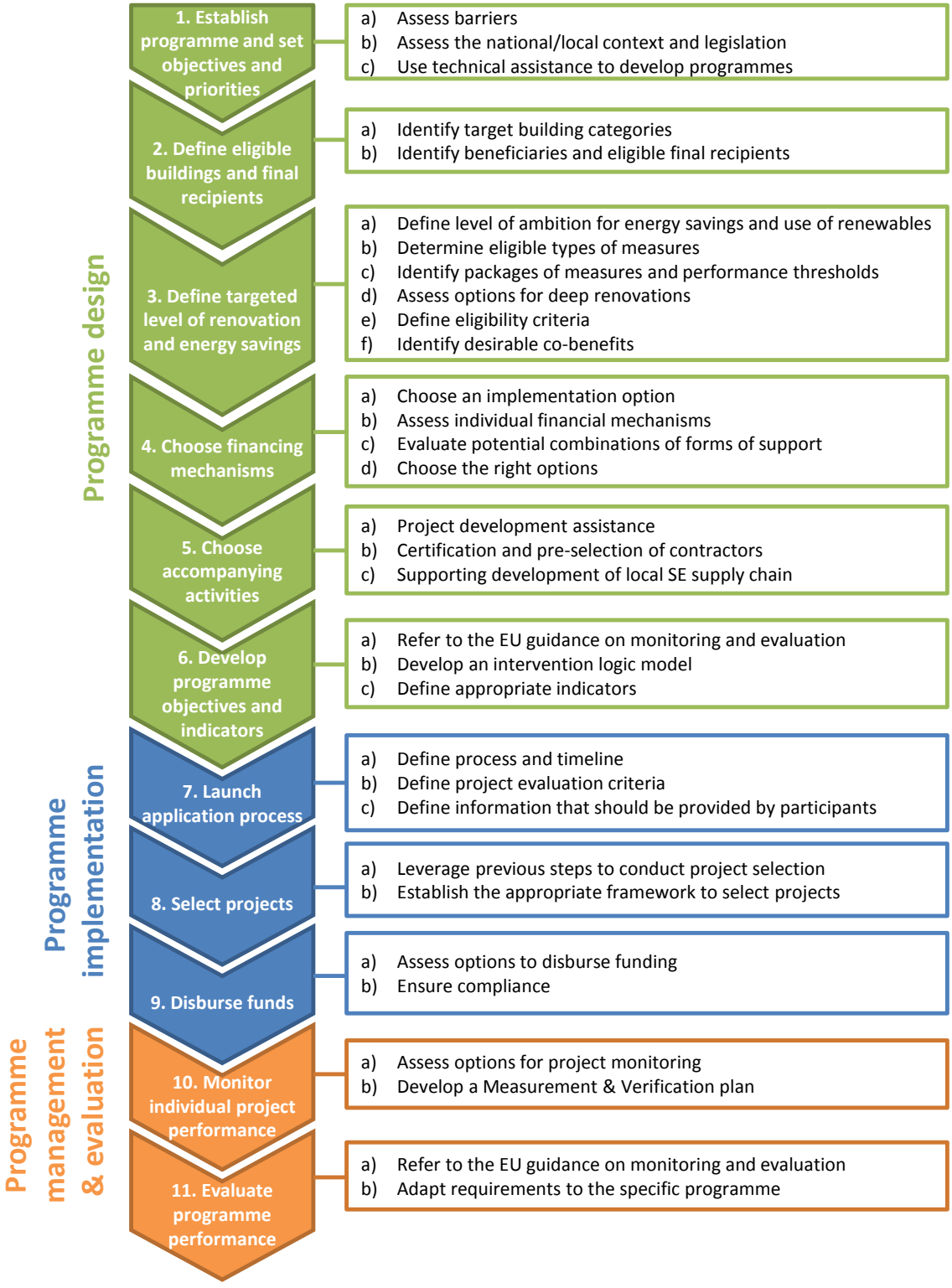
- MSs and regions should ensure that public funding complements and leverages private investments and does not crowd them out; and
- Market mechanisms–such as energy efficiency obligations schemes, energy service companies, etc.–should be considered before public funding as an option to create value for energy savings.

In this context, 'Financial instruments' (FIs) could be more widely used as an innovative delivery mode for Cohesion Policy Funds at national and/or regional level. As defined above, FIs are a generic term to describe a measure of financial support taking the form of equity or quasi-equity investments, loans or guarantees or other risk-sharing instruments. Conversely, grants should be used primarily to address market failures or to support innovative technologies and investments that go beyond minimum legal requirements for energy performance so that reductions in energy usage and greenhouse gas emissions are greater than the savings achieved through "business-as-usual". Where appropriate, FIs can be combined with grants to achieve optimal results and outcomes. All these forms of financial support are referred to as financing mechanisms in this report.

DEVELOPING A ROBUST SUSTAINABLE ENERGY PROGRAMME FOR BUILDINGS

The following diagram presents the key steps MAs should consider when setting up an Operational Programme that contains a strong focus on SEI and selecting cost-effective SE projects.

Figure 5 Roadmap to implement a programme for financing the energy renovation of buildings using Cohesion Policy funding



1 Step 1 – Establish programme and set objectives and priorities

Significant opportunities exist for saving energy in buildings up to very high energy performance levels (e.g. nearly zero-energy buildings (NZEB)) as well as generating low or zero-emission energy. The scale of the potential market for EE and RE in buildings is considerable across the EU28. However, various barriers prevent this market opportunity from being fully realised. A variety of strategies and financing mechanisms can be used to overcome some of these barriers and stimulate the market for SE investments. In particular, demonstrating the viability of EE and RE projects to investors (through the energy savings realised and revenues generated from RE) is a crucial step in this process.

In addition, SE activities in the building sector generally cover a wide range of organizations and stakeholders and it is often difficult to identify them all and to understand their specific needs. As such, establishing the right priorities is key to ensuring that the use of available programme resources achieves maximum effect.

Objective and priority setting entails answering questions such as:

- What are the key barriers to the implementation of SE projects in the building sector?
- Who are the key stakeholders? What is their role and what are their needs?
- What has already been achieved in this area?
- What is the programme aiming to address or achieve?

Generally, Cohesion Policy funding should be used to finance programmes and projects that aim to go beyond the minimum requirements (e.g. energy performance requirements, energy audits, etc.) set at MS level and the level of funding provided should increase with the level of ambition.

Step 1 provides indications on the actions to be carried out in order to select the most suitable priorities at the inception of the programme for the implementation of SE projects in the building sector.

1.1 Assess barriers

IN DESIGNING PROGRAMMES, IT IS ESSENTIAL THAT MANAGING AUTHORITIES ASSESS THE PARTICULAR BARRIERS AFFECTING THE RENOVATION MARKET IN THEIR REGION OR COUNTRY

While the EU policy context is creating strong legislative drivers for action, a large number of barriers exist to SE financing in buildings. These need to be understood and resolved at the local and regional level if sustained investment levels to improve the building stock are to be achieved.

Main barriers include:

- **Financial barriers** such as limited access to finance, high upfront costs, relatively long pay-back periods, higher perceived credit risk associated with SE investments, and competing priorities for property owners;
- **Institutional and administrative barriers** such as regulatory and planning issues, and complexities due to the variety of stakeholders involved;
- **Information and awareness barriers** due a general lack of understanding and expertise regarding SE financing and its benefits amongst the various players (MAs, financial institutions, public and private final recipients); and
- **The issue known as the "split incentive"** facing landlords and their tenants as well as other investors and which leads to a disconnect between those making the investment and those benefiting from the energy savings.

The exact nature of these barriers varies between MSs and is highly dependent on local and/or regional circumstances, including the type of building stock, legislative and regulatory frameworks, the scale and maturity of the financial sector and SE market and the overall level of education and awareness amongst public decision makers.

Properly understanding these barriers will help MAs define the right strategies and implement innovative approaches to address them including helping to resolve local/regional problems within Operational Programmes. Existing initiatives put in place by MSs include introducing home energy labelling and assessments, using innovative financial instruments, establishing a certified contractor market, developing local supply chains, training installers, and creating awareness campaigns and project assistance programmes.

1.2 Assess the national / local context and legislation

For the 2014-2020 programming period, MAs (both at the regional and national level) need to work in close collaboration with their national governments in preparing the OPs. Due to the shared management principle, important variations exist amongst MSs regarding the procedures used for the preparation of the OPs and their set-ups. For instance, large MSs tend to develop OPs at a regional level while smaller MSs may be more inclined to opt for OPs at a national level, aligned with the thematic objectives selected.

PARTNERSHIP AGREEMENTS SET PRIORITIES AT NATIONAL LEVEL

The first step for the appropriate selection of priorities and financing mechanisms is a careful consideration of the relevant normative and policy framework at the European and national levels.

Of primary importance are the partnership agreements (PAs) that outline how the five ESI funds will be spent at national level. Partnership agreements are expected to be strongly aligned with the national documents for the implementation of Europe 2020 (the EU's flagship strategy for economic development) and with national development strategies.

As such, priorities and activities defined in an OP should reflect the orientations outlined in the PA. MAs must ensure that the objectives and investment priorities selected are in line with the national legal framework but adequately adapted to the regional context.

In the case of SE measures in the building sector the PAs and OPs should take into account the following:

- National Reform Programme (NRP);
- Priorities, objectives and measures established in the NEEAPs;
- Annual Reports under the Energy Efficiency Directive;
- National Renovation Roadmaps (as required under the EED) *(due by 30 April 2014)*;
- Articulation of gap in performance between current practices and those set out in national targets to implement Europe 2020;
- Country-specific Recommendations(CSRs) relevant to each MS;
- Sectoral targets, technology mix and objectives established in the NREAPs; and
- Biannual progress reports under the Renewable Energy Directive.

UNDERSTANDING THE REGIONAL CONTEXT AND CONSULTING WITH STAKEHOLDERS ARE KEY SUCCESS FACTORS

MAs should develop a detailed understanding of the regional and local realities of the SE sector, its degree of maturity, local market needs as well as the extent to which support measures are already in place. Through such analysis and benchmarking, MAs should be able to identify obstacles and opportunities.

The following steps outline good practices to conduct this process:

1. **Analyse local context:**
   - Identify existing and past SE initiatives in the region and assess outcomes (including through formal evaluations and stakeholder discussion).
   - Map existing support measures that target the SE supply and demand side, including across different building types.
   - Based on this analysis, map active stakeholders and develop an understanding of how they operate (e.g. ESCOs, building contractors and installers, commercial banks, research centres and universities).
2. **Set up working group:**
   - Create a specialised Working Group (WG) on EE and RE composed of key experts and stakeholders, including representatives of government, MAs, industry, research and civil society.
   - The working group should collaborate with the MA in the preparation of a local context analysis.
3. **Conduct a stakeholder consultation**
   - The local context analysis should be developed and tested with relevant stakeholders through targeted consultation.
   - In collaboration with the working group, identify key questions to be discussed with stakeholders.
   - Distribute a discussion report via a public platform (e.g. website).
   - Organise one (or more) stakeholder workshops to gather feedback on key areas and priorities.

- Ensure that all stakeholders are given the opportunity to provide feedback even if they are unable to participate in the workshop(s). An online platform could be created on the MA website to receive responses to the consultation.
- Gather stakeholder feedback and analyse it. The results of the consultation should be made public.

4. **Draft a final report**
   - Integrate final results into a report in collaboration with the WG.
   - Work with WG to integrate the results of the stakeholder consultation into the ex-ante evaluation.

Box 3 Building partnerships in Italy to set priorities for RE and EE in the OP, Italy

On the basis of the Community strategic guidelines on cohesion, which set out the thematic priorities for 2007-2013, different Working Groups (WGs) were set up to prepare Italy's National Strategic Reference Framework (NSRF) for 2007-2013. These WGs were composed of representatives of the central and regional government, provinces and municipalities. As a result of an initial round of discussions, a specific partnership for EE and RE was created, led by the then Directorate-General for Energy and Mineral Resources of the Ministry of Economic Development. The partnership also comprised the Ministry of Environment and various regional representatives, who contributed technical and sectoral knowledge. This partnership worked throughout 2007 to define the strategy and priorities of the OP. This example shows the importance of involving all stakeholders in the policy implementation side to ensure that OPs are well suited to the prevailing policy context.

LINKING WITH OTHER EU-WIDE INITIATIVES CAN LEAD TO SYNERGIES AND A MORE CO-ORDINATED APPROACH TO SUSTAINABLE ENERGY FINANCING

As a result of the EU-wide promotion of RE targets and carbon emission reductions, a large number of EU-wide and national initiatives have sprung up in recent years. It is often difficult to keep track of all EU initiatives and policies. However, close interaction with the different stakeholders involved is very important to the successful implementation of an OP.

EU-wide initiatives often encourage knowledge sharing and collaboration across different MSs and stakeholders. MAs must maintain awareness of active stakeholders in their area of operation and engage in discussion with them to select OP priorities and funding mechanisms suitable for the activities being planned by municipalities and local players. MAs should launch public consultations with these stakeholders to get their views on the existing needs of a specific area.

An interesting example of such an initiative is the successful **Covenant of Mayors** (CoM), a pan-European initiative coordinated by the European Commission DG Energy. It oversees the commitment of over 4,000 municipalities to achieve and even exceed the EU's CO_2 emission reduction target of 20% by 2020 (see Box 4).

Box 4 Covenant of Mayors (CoM)

By signing up to the CoM, signatories commit to taking the necessary EE and RE measures through the adoption of "Sustainable Energy Action Plans" (SEAPs). In order to present their SEAP, municipalities are required to prepare a "Baseline Emission Inventory" that quantifies the energy-related CO_2 emissions that occurred in the territory of a signatory within a given period of time. This exercise allows the signatories to identify the principal sources of CO_2 emissions in their territory and select the most suitable SE measures. Signatories are free to select the format and measures included in the SEAP; however, these must cover a series of priority target sectors, including the building sector that has seen the most activities linked to SEAP implementation. This is because smaller municipalities have less responsibility and freedom of action within other sectors such as transport and energy production. The CoM is now widely adopted across MSs and has promoted the systematic planning of SE policy for large and small municipalities alike that are now seeking funding to implement their SEAPs. MAs should seek to ensure that they identify both CoM signatories in their areas and the types of project that could be financed to implement their SEAP.

Other similar initiatives through which relevant stakeholders can be identified and local experience leveraged include the **Pact of the Islands**, which is very similar to the CoM but focuses on the needs of islands, the **CONCERTO Initiative**[24], a cluster of EU-funded projects promoting the adoption of EE and RE in cities (see Box 5 below), and the **SMART Cities and Communities Innovation Partnership**.

Box 5 The CONCERTO initiative

Running since 2005, the CONCERTO initiative aims to demonstrate the merits of improving the energy performance of districts and communities as a whole compared with optimising buildings individually. It comprises 58 cities and

[24] http://concerto.eu/concerto/

communities that have implemented innovative EE and RE measures such as smart grids, renewables-based cogeneration, district heating or cooling systems and energy management systems in larger building settlements. These sets of innovative technologies and measures have been optimised locally, based on the specific characteristics of sites, climate as well as cultural conditions or local political aspects. They provide good practice benchmarks and project exemplars for MAs.

MAs should also make sure that they follow all recent developments in research and innovation. Research in the built environment will be fundamental in the coming years in order to overcome the barriers to SE (including reducing unit costs), improve technical expertise, and promote knowledge exchange between researchers and businesses.

In particular MAs will have to follow closely the activities developed under the EU's new framework research and innovation programme, **Horizon 2020**, which incorporates the previous FP7 and Intelligent Energy Europe (IEE II) Programmes and addresses the whole innovation chain, from research to deployment of innovation. The Energy Challenge of the H2020[25] will complement the TO4 of the Cohesion Policy Funds and will provide additional resources for the deployment of innovative low-carbon technologies and solutions. Under its Energy Efficiency Focus area, a range of activities will be implemented that are directly connected with the TO4 (e.g. PDA facilities, capacity building and planning activities, support to policy implementation), while under its LEIT Work Programme, the **Energy Efficient Buildings Public-Private Partnership** (EeBPP, see Box 6) will be implemented, increasing the involvement of the building industry supply chain in the deployment of more efficient and affordable solutions.

Public authorities, which are expected to take an exemplary role in the area of SE renovation in buildings, are encouraged to build on results from research projects under the EeB PPP as well as other relevant EU and national research programmes and projects (e.g. smart cities), including Research, Technological Development and Innovation (RTDI) financed by Cohesion Policy Funds.

Further, SE use in SMEs will be addressed through the new Framework Programme for Competitiveness of Enterprises and SMEs (**COSME**).

Box 6 The Energy Efficient Buildings Public Private Partnership

The Energy Efficient Buildings European Initiative (E2B EI) was founded in 2008 to help the construction industry reach the EC 2020 climate and energy targets and achieve energy neutral buildings and districts by 2050. E2B EI has sought to deliver, implement and optimise radical concepts to reduce energy consumption and carbon emissions. The Initiative was set up by the European Construction Technology Platform and steered by a private, international, not-for-profit Energy Efficient Buildings Association (E2BA)[26]. It was originally envisaged that E2B EI manage a €2bn R&D programme from 2009 until 2019. Under Horizon 2020, E2B EI will prepare and manage the E2B Public Private Partnership (E2B PPP) in collaboration with the EC. E2B PPP is intended to drive R&D and innovation across the EU. Investments will be based on a Research and Innovation Roadmap, which has been developed to the year 2030[27]. E2B EI will promote industry engagement and help to represent and co-ordinate members' interests within E2B PPP.

Finally, EU-wide actions, such as **BUILD UP Skills** (Box 7) and **ManagEnergy** promote cross-countries knowledge sharing and can help MAs to support their local businesses to develop additional skills.

Box 7 The BUILD UP Skills initiative

BUILD UP Skills is an initiative developed by Intelligent Energy Europe (IEE) that aims to increase the number of qualified workers in Europe's building workforce. This initiative focuses on the continuing or further education and training of craftsmen and other on-site workers in the building sector so as to deliver renovations with a high energy performance and foster the construction of nearly zero-energy buildings. The initiative targets skills in relation to EE and RE in all types of buildings.

In each EU country, national teams have been formed. Each team has conducted a detailed analysis of the national status quo in order to asses needs in the building sector until 2020 and beyond, and to identify specific barriers and skills shortages by craft occupation. This analysis will lead to the elaboration of a national roadmap of priority measures to up-skill the qualification of workers in the building sector.

[25] Horizon 2020 Work Programme 2014-2015. 10. Secure, clean and efficient energy

[26] http://www.e2b-ei.eu/default.php

[27] Energy-efficient Buildings PPP beyond 2013, Research & Innovation Roadmap (2012) DRAFT, http://www.ectp.org/cws/params/ectp/download_files/36D2263v1_E2B_Roadmap_Infodays_V.pdf

1.3 Use technical assistance to develop programmes

In the context of this report, the term technical assistance (TA) is used to describe activities that aim to support the authorities which administer and use ESI Funds to perform the tasks assigned to them under the various regulations (CPR and fund-specific).

1.3.1 Make use of ESI funding to develop the programme and build capacity

It is critical that MAs have staff with the right skills and competencies, and appropriate management systems in place, to develop, draft and implement robust OPs (including the use of financial instruments) that are able to embrace and facilitate more progressive approaches to SE investments in buildings.

The Common Provisions Regulation[28] (CPR) allows MSs to use ESI funding to improve their institutional capabilities and to help develop and implement their OPs. Article 58 and 59 of the CPR indicates that ESI funds can be used to finance a variety of technical assistance (TA) activities: Article 58 covers TA measures developed at the initiative of the EC; Article 59 covers TA measures at the initiative of the MSs.

Article 59 allows for actions covering: "preparation, management, monitoring, evaluation, information and communication, networking, complaint resolution, and control and audit". These activities are limited to:

- Actions related to the functions necessary for the administration and use of the ESI Funds;
- Actions that reduce the administrative burden of beneficiaries; and
- Capacity building of MS authorities and beneficiaries to use the ESI Funds. TA should not be used for capacity building actions which are not linked to the implementation of the ESI Funds.

These actions can cover all stages of the preparation and implementation of programmes, including e.g. project selection and other day-to-day implementation tasks of the authorities in charge of programmes.

Funds that can be allocated by MSs to TA activities are capped under the CPR (Article 119):

- TA shall not exceed 4% of the total amount of ERDF, ESF and CF allocated to OPs in an MS under each category of region for the Investment for growth and jobs goal. If the total amount of these funds allocated to an MS under the Investment for growth and jobs goal is lower than €1 billion, the amount allocated to TA may increase up to 6 % of the total amount or €50 million, whichever is lower.
- Each of these three funds may support TA operations eligible under any of the other funds; however, the allocation for TA from any of these funds shall not exceed 10% of the total allocation of that fund to OPs in an MS under each category of region for the Investment for growth and jobs goal.

TA may be programmed as a specific priority axis within an OP or as a specific OP dedicated specifically to TA, or as a combination of the two options.

Generally, TA measures have the same requirements in terms of performance monitoring and target setting as any other priority axis. In particular, MAs should ensure that the activities undertaken are "result-oriented" and aim to address the key weaknesses and issues that have been identified by using clearly defined results indicators (e.g. reduction in error rates, reduction in time to disburse funding, etc.). Financed measures should result in concrete improvements of the administrative capacity to manage the ESI Funds.

1.3.2 JASPERS – Technical Assistance

JASPERS ('Joint Assistance to Support Projects in European Regions') is a technical assistance partnership between the European Commission, the EIB, and the European Bank for Reconstruction and Development (EBRD). It provides advice and technical assistance to the 12 EU countries which joined the EU in 2004 and 2007 as well as to Croatia, Greece, the former Yugoslav Republic of Macedonia, Montenegro and Serbia to prepare major infrastructure projects (of more than €50 million) financed by the Structural and Cohesion Funds. JASPERS provides assistance for various types of projects, including roads, rail, water, waste, urban transport and energy projects, including EE in buildings.

JASPERS' technical expertise can be made available throughout the project cycle, from the early stages of project conception through to the final application for EU funding, which covers, amongst others:

- Project development and structuring;

[28] Regulation (EU) No 1303/2013, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0320:0469:EN:PDF

- Project preparation (e.g. cost-benefit analysis, financial analysis, environmental issues, procurement planning);
- Review of documentation: feasibility studies, technical design, grant application.

JASPERS' input can also address horizontal issues, the development of strategy documents, as well as capacity building through its Networking Platform. Horizontal support can be particularly appropriate for assistance needed at the level of the OP. For instance, JASPERS supported the development of a funding gap approach for energy efficiency projects in Poland under priority 9.3 of the OP Industry and Environment[29].

JASPERS can be relevant for projects targeting the energy renovation of buildings and can also provide assistance for bundles of projects or large funding schemes for EE investments in buildings (e.g. set up of a funding scheme for the thermal rehabilitation of residential buildings in Romania).

If project promoters are interested in getting support from JASPERS, they need to submit an application through the relevant MA. The MA will identify potential eligible projects and can then request assistance directly from JASPERS' regional offices or contact JASPERS' headquarters in Luxembourg as part of an annual work programme for the country.

2 Step 2 - Define eligible buildings and final recipients

Under this step, MAs should start by identifying the specific needs in their area of operation based on the different types of buildings, potential final recipients and ownership structures in their region.

Since sustainable energy will in many cases be only one of the objectives of a given programme or project, MAs should aim to develop an integrated approach aligned with national and EU objectives and tailored to the local context. In particular, issues such as local urban planning and social and economic priorities should be considered when defining target buildings and final recipient.

Such an exercise can be done in conjunction with on-going actions at MS or more local level such as the establishment of National Renovation Roadmaps under the EED and the SEAP under the Covenant of Mayors (see Step 1).

The steps below outline some key considerations that MAs should aim to follow when developing their OPs.

2.1 Identify target building categories

Identifying the building types that will be eligible to receiving funding is generally one of the first steps in the MA decision-making process. In principle, all types of building are eligible under Cohesion Policy Funds. For the purpose of this guide, buildings can be classified into three main groups: public, residential and commercial. Public and commercial buildings are often referred to as non-residential buildings. Public and residential buildings have benefited from Cohesion Policy funding during the 2007-2013 period and are likely to remain key areas of focus of most MAs. However, Cohesion Policy funding can also be used to support the renovation of different building types occupied by both SMEs and large companies, especially for projects with a high level of ambition[30].

Within each building category, MAs can then select specific building types, as this will condition the type of intervention that can be applied. For instance, for public buildings, SE measures and financing mechanisms that can be used will vary depending on whether the programme targets offices or educational buildings. Similarly, for the residential sector, it might be appropriate to distinguish between single-family houses and blocks of flats or apartments (or other multi-residential dwellings).

After deciding what type of buildings should be targeted, MAs can further specify the particular target group of buildings in terms of age band or energy performance rating for instance.

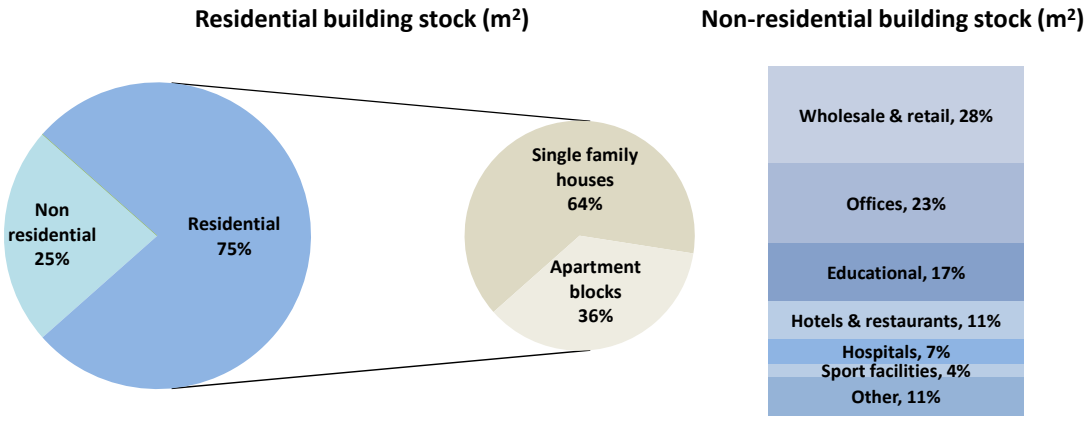
[29] http://www.jaspers-europa-info.org/images/stories/project_fiches/91.pdf

[30] Although it should be noted that large companies are not a priority under Cohesion Policy Funds

BOTH RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS ARE ELIGIBLE FOR COHESION POLICY FUNDING BUT SOME BUILDING TYPES MAY BE MORE APPROPRIATE THAN OTHERS DEPENDING ON LOCAL PRIORITIES

Residential buildings offer significant potential for SEI as they account for the majority of the building stock in Europe: 75% of the total stock in terms of surface area[31]. In this sector, energy is mainly consumed through space heating (up to 70% of total energy use), hot water production, lighting and electrical appliances. The relative share of each end-use varies depending on the country and climate conditions. Within the residential building stock, single family houses represent about 64% of the total surface area, while apartment blocks account for 36%.

Figure 6 European buildings by building type[32]



Non-residential buildings account for the remaining 25% of the European building stock and they constitute a more complex and heterogeneous portfolio compared to the residential sector. Buildings from the retail and wholesale sectors cover the largest portion of the non-residential stock, followed by office buildings. Variations in usage pattern (e.g. warehouse versus schools), energy intensity (e.g. surgery rooms in hospitals versus storage rooms in retail) and construction techniques (e.g. supermarket versus office buildings) are some of the factors adding to the complexity of the sector and, therefore, the design of SE projects. This should be taken into account when designing a programme, although most MAs have to date focused on offices in public buildings and schools.

MANAGING AUTHORITIES CAN LEVERAGE THE ON-GOING WORK ON RENOVATION ROADMAPS TO IDENTIFY PRIORITY TARGETS

Under Article 4 of the EED, MSs are required to establish long-term national strategies or 'Roadmaps' by the 30th April 2014 in order to help mobilise investment for the renovation of the national stock of residential and commercial buildings, both public and private. As such, MSs are currently conducting a number of activities to develop national strategies which encompass:

- An overview of the national building stock based, as appropriate, on statistical sampling;
- An identification of cost-effective approaches to renovations relevant to the building type and climatic zone; and
- Policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations.

This work should provide a strong basis for identifying suitable building types and intervention options in the context of the OPs.

MANAGING AUTHORITIES CAN PROVIDE SUPPORT TO PROJECTS THAT ARE ALIGNED WITH LOCAL SUSTAINABLE ENERGY ACTION PLANS (SEAPS)

A number of municipalities are implementing measures through their participation in the CoM initiative and the development of local SEAPs. Using Cohesion Policy Funds to support projects aligned with the SEAPs could leverage initiatives implemented locally and maximize the number of local authorities opting for a strategic

[31] The Buildings Performance Institute Europe, 2011. *Europe's Buildings under the Microscope* http://www.bpie.eu/uploads/lib/document/attachment/21/LR_EU_B_under_microscope_study.pdf

[32] The Buildings Performance Institute Europe, 2011. *Europe's Buildings under the Microscope*

approach to local SE development. It would also be a very positive signal for those local authorities that have already prepared and implemented a SEAP.

TARGETING SPECIFIC AGE BANDS OF BUILDINGS AND UNDERSTANDING THE MAIN TYPES OF FINAL RECIPIENT THAT OCCUPY THESE BUILDINGS CAN HELP OPTIMISE ENERGY SAVINGS

The average energy performance of a building is strongly influenced by the age of the building, in particular for residential buildings. Indeed, many buildings from the same period will present similarities in the types of measures and savings potential that can be realised. In addition, since most buildings undergo major renovation only every 20 or 30 years, the age band will be crucial in determining which constructions are good candidates for deep renovation.

Building type is also strongly correlated with final recipient types. Consequently, where relevant, MAs should consider these factors in parallel to ensure renovation strategies target the right age band of building and provide positive outcomes for target final recipients.

Whilst there are many ways of characterising the building stock, and every MS will have its own set of age bands which reflect the evolution of the stock (see Table 3), the following generic classification illustrates the broad categories which may be applied to the European building stock:

- Pre-1975: Traditional constructions and buildings prior to energy performance regulations;
- 1975 -1990: Early phase building regulations in some MSs, brought about by the 1973-75 oil shocks;
- 1991-2012: More recent buildings and tighter building regulations including EU-wide standards.

Table 3 MSs classify their domestic building stock using different age bands[33]

Austria	England	Poland	Slovenia
pre 1919 1919-44	pre 1919 1919-44	 pre 1945	 pre 1945
1945-60 1961-80 1981-90	1945-64 1965-80 1981-90	1946-66 1967-85 1986-92	1946-70 1971-80 1981-01
1991-00 2001-09	post 1990	1993-02 2003-08 2009-	2002-08 2009-

Countries with the largest share of buildings older than 50 years include Bulgaria, Czech Republic, Denmark, France, Sweden and the UK, all of which are characterised by a significant lack of sufficient insulation within the building envelope.

A large share of the building stock in Europe was built before the 1960s when building regulations were limited. The largest energy-saving potential is generally associated with the older building stock (1960s and before). In some instances, buildings from the 1960s have been found to be less efficient than buildings from earlier decades[34].

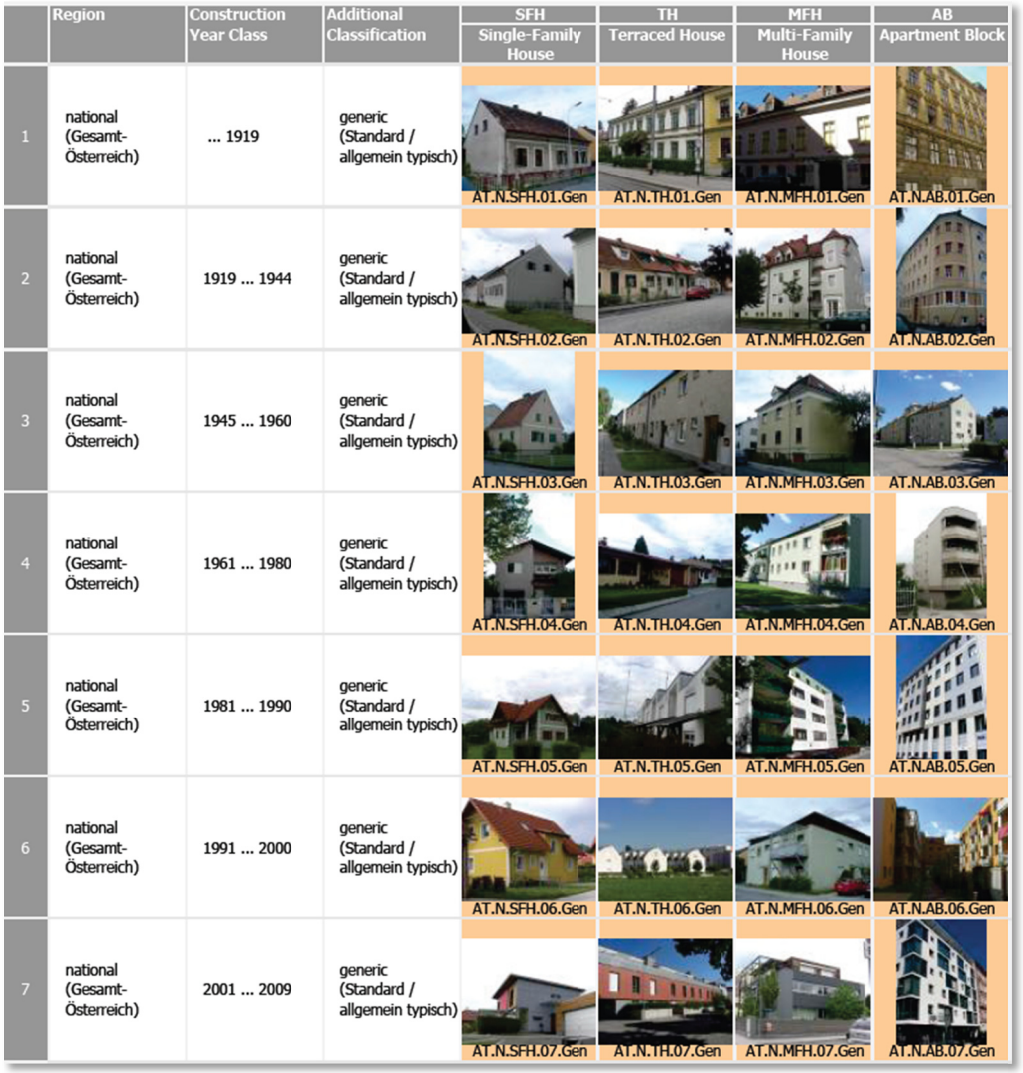
Under the IEE programme, the TABULA project[35] has developed a "Building Type Matrix" for 15 MSs in order to illustrate the variety of buildings that can typically be associated with age bands in different MSs. Such information can help to rapidly build a picture of appropriate building types to target. The following example is from Austria:

[33] TABULA project and English Housing survey

[34] The Buildings Performance Institute Europe, 2011. *Europe's Buildings under the Microscope*

[35] *Typology Approach for Building Stock Energy Assessment - Main results of the TABULA project*, October 2012, http://www.building-typology.eu/downloads/public/docs/report/TABULA_FinalReport.pdf

Figure 7 TABULA project, Austria



TARGETING SPECIFIC ENERGY PERFORMANCE RATINGS OF BUILDINGS WILL INCREASE TRANSPARENCY AND HELP FOCUS RESOURCES WHERE THEY ARE MOST NEEDED

In addition to building type and age, MAs can choose to focus on buildings with a certain energy performance rating. Energy Performance Certificates should be used in this context to establish benchmarks or eligibility criteria. For example, by targeting levels E, F and G of the Energy Performance Certificate, MAs can focus resources on the worst performers, i.e. where needs are the greatest and the savings potential is the highest. This is further described under step 3.5.

2.2 Identify beneficiaries and eligible final recipients

Once MAs have identified the building categories, ages and/or energy performance ratings to be targeted, they can set conditions as to what type of final recipients (e.g. homeowner) and/or beneficiaries (e.g. holding fund, urban development fund) should be eligible to receive funding and to what level.

As mentioned above, once target building types are defined, the final recipients will be to a large extent determined (e.g. whether funding should go to public or private recipients). However, this may not always be straightforward, so it will be important, depending on local situations, to consider the following approaches in order to establish a robust set of qualifying criteria:

Under the Common Provisions Regulation[36]:

'beneficiary' means a public or private body […] responsible for initiating or initiating and implementing operations; in the context of State aid schemes (as defined in article 2(12) of this regulation), the term 'beneficiary' means the body which receives the aid; in the context of financial instruments under Title IV of Part II of this Regulation, the term 'beneficiary' means the body that implements the financial instrument or the fund of funds as applicable;

'final recipient' means a legal or natural person that receives financial support from a financial instrument.

- Select public and/or private beneficiaries;
- Select public and/or private final recipients;
- Identify specific final recipients (e.g. ESCOs, homeowners, tenants, specific target groups);
- Determine a specific geographical area if desired.

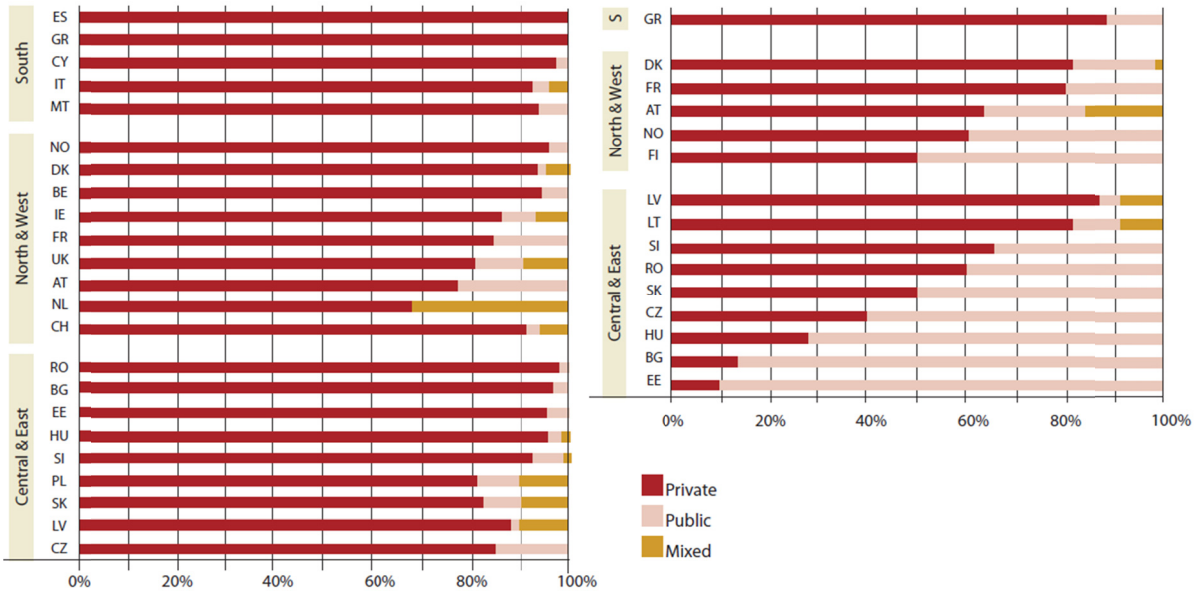
The last three points listed above are described in more details in the following sub-sections.

2.2.1 Select public and/or private final recipients

THE MAJORITY OF RESIDENTIAL BUILDINGS ARE PRIVATELY OWNED. AS SUCH, THERE IS A LARGE UNTAPPED POTENTIAL TO SUPPORT SUSTAINABLE ENERGY PROJECTS IN THIS SECTOR

As shown in Figure 8, the share of the residential stock held in private ownership is above 80% in most MSs. Historically, social housing has been principally owned by the public sector but there is an increasing trend towards more private or shared ownership[37], for example in Austria, Denmark, England and France[38].

Figure 8 Ownership profile of buildings in selected countries: residential (left hand) and non-residential (right hand)



Source: BPIE, 2011

[36] Regulation (EU) No 1303/2013, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0320:0469:EN:PDF

[37] Shared ownership allows a person to buy a share in their home when they cannot afford a mortgage on the whole property value (e.g. in social housing). The remaining equity share can come from the house builder, a private investor or a landlord such as a housing association.

[38] The Buildings Performance Institute Europe, 2011. *Europe's Buildings under the Microscope*

IN THE NON-RESIDENTIAL SECTOR, PUBLIC BODIES WILL LIKELY REMAIN THE FOCUS OF MANY OPs, BUT MORE SUPPORT CAN BE PROVIDED TO THE PRIVATE SECTOR, IN PARTICULAR TO SMEs

The ownership profile in the non-residential sector is more heterogeneous and private ownership can span from 10% to almost 90% from country to country, depending on the development of the commercial sector.

The public sector has traditionally received a large share of Cohesion Policy funding and will likely remain the focus of many MAs, notably to comply with the provisions on their exemplary role. In particular, the EPBD requires MSs to develop policies and take measures such as setting targets in order to stimulate the refurbishment of buildings into NZEB. There is a strong link to research, technological development and innovation, in particular where public authorities are engaging in state-of-the-art renovations of public buildings to improve EE and use RE. Through their OPs, MAs can help demonstrate such innovations at scale and stimulate the growth of regional and national supply chains of innovative technologies and solutions.

Cohesion Policy funding can also contribute to targets and requirements such as the nearly zero-energy target for new public buildings by 2019 and could be used to demonstrate zero-emission and positive-energy buildings.

In addition, the EED sets specific renovation targets for public buildings. From the beginning of 2014, MSs will be required to renovate 3% of the public buildings owned and occupied by their central government and ensure that they meet at least the minimum energy performance requirements laid out in the EPBD. As such, the public sector will play a leading role in developing the renovation market and public building renovations can act as good practice examples, testing and developing new building techniques and financing models that can be then applied to the whole building stock.

However, in the 2014-2020 period, more support is also expected to be provided to the private sector, in particular to SMEs investing in EE and RE measures in their premises in the form of financial instruments.

2.2.2 Identify specific final recipients

MANAGING AUTHORITIES CAN USE ENERGY PERFORMANCE CONTRACTING AND CHANNEL FUNDS THROUGH ESCOs

By encouraging the development of energy performance contracting (EPC), MAs can overcome some of the obstacles inhibiting the implementation of SE investments. These may include: a lack of confidence in a manufacturer or supplier's EE claims; budget availability issues; and/or limited access to finance. The promotion of energy services by MSs is required in the Energy Efficiency Directive (see Article 18).

ESCOs aim to provide an end-to-end EE solution, with services that include: developing and designing energy conservation projects; installing and maintaining the installed equipment; and measuring, monitoring and verifying the project's energy savings. ESCOs are a well-established industry in some MSs, and typically operate and manage buildings in the public sector, such as facilities owned by municipalities, universities, schools and hospitals. These buildings have the advantage of stable energy loads, while the organisations generally have good credit, and well-developed procurement methods.

Project financing depends on the general access to finance on the market. The ESCO either arranges financing, in which case the owner is the borrower of the project debt, or provides financing for the EE project. For the latter, the ESCO or its financial partner borrows the project debt and incorporates repayment of that debt into the energy service fee, which is based on guaranteed energy savings. Thus, remuneration is directly linked to a project's performance. For most ESCOs, finance is a cost centre because it is simply a means of facilitating their project sale; energy savings are the primary basis for their earnings. Consequently, many ESCOs develop partnerships with financial institutions to provide financing solutions.

In Western Europe, financing is generally provided through loans to the ESCO or to the building owner, ESCOs' and owners' internal funds, and state funds. In Eastern Europe, projects are mainly financed with ESCOs' own funds and through financial institutions (e.g. commercial banks and EBRD's credit line to industry).[39]

In the context of Cohesion Policy funding, financial instruments can also be structured using an Energy Performance Contracting (EPC) market-based model. Under such an arrangement, an energy efficiency fund

[39] Marino A., Bertoldi P., Rezessy S., Boza-Kiss B., A snapshot of the European energy service market in 2010 and policy recommendations to foster a further market development (2011)

can provide financing to either the building owner or the ESCO, depending on the particular market conditions and the design of the OP. An energy efficiency fund can also provide a credit line to an ESCO which as a result takes on the debt repayment and performance risk.[40]

Box 8 Energetics and Energy Savings Fund (EESF), Bulgaria

The EESF was established in 2006. The programme received financial support from the EBRD: a €7 million loan in 2008 and a €10 million loan in 2012. EESF supports SE projects based on energy performance contracts. Energy Performance Contracts are primarily implemented by Enemona, a Bulgarian engineering and construction company. Enemona was one of the first Bulgarian ESCOs and among the pioneers implementing EPC with guaranteed results in municipal buildings.

Through this scheme, the EESF buys from ESCOs the future receivables from the EPCs (i.e. the energy savings). The loans from the EBRD, enable EESF to release the ESCOs from the burden of debt and allow them to develop more projects.[41]

Energy efficiency improvements are implemented in public buildings (including schools, kindergartens, hospitals and administrative offices) as well as state-owned companies.

THE SPLIT INCENTIVE IS A KEY CHALLENGE THAT MANAGING AUTHORITIES SHOULD CONSIDER WHEN DEVELOPING A PROGRAMME

The separation of expenditure and benefit known as the "split incentive" is one of the most complex and long-standing barriers relating to SE financing in existing buildings. The problem originates from the fact that the building owner may not be the one that benefits from reduced energy bills (after SE measures have been implemented) where the premises are occupied by a tenant (unless the landlord pays the energy bills, which may sometimes be the case). On the other hand, since the tenant does not own the facility, it may not be in a position or willing to finance energy improvements in a building it occupies. This situation often results in inaction from both parties. The analysis and the elimination of such barriers by MSs is required in the Energy Efficiency Directive (see Article 19).

There are many examples where the party investing in a building may not be the party reaping the financial returns (in full or in part). For instance:

- Landlords investing in a property where tenants pay the energy bill and where the rent cannot be increased after renovation;
- Developers renovating an existing building, where market prices do not reflect the energy performance of the building.[42]

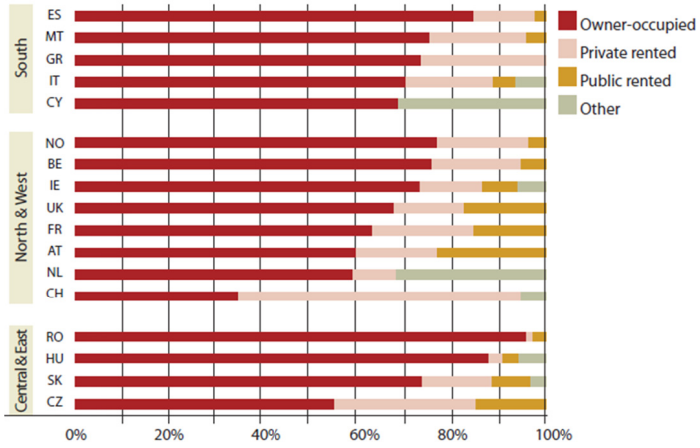
Figure 9 highlights that generally up to 40% of the residential building stock is rented across EU countries. This has consequences for the design of SE projects, particularly the type of financial measures that can be applied. For instance, when there is a "split incentive" issue, the provision of loans to the building owner might not be sufficient to stimulate investment.

[40] ARUP (December 2012), Energy Focused Urban Development Funds
http://ec.europa.eu/regional_policy/thefunds/instruments/doc/jessica/jessica_horizontal_study_energy_focused_ud_en.pdf

[41] Bullier, A., Milin, C., Alternative financing schemes for energy efficiency in buildings,
http://www.managenergy.net/lib/documents/868/original_3-221-13_Bullier_-_Alternative_financing.pdf

[42] The Buildings Performance Institute Europe, 2011. *Europe's Buildings under the Microscope*

Figure 9 Tenure of residential buildings



Source: BPIE, 2011

MANAGING AUTHORITIES CAN IDENTIFY SPECIFIC TARGET GROUPS AND/OR DEFINE DIFFERENT LEVELS OF SUPPORT DEPENDING ON THE TARGET GROUP

MAs have the possibility to define specific target beneficiaries or recipients based on local priorities and specific development objectives. For instance, in the 2007-2013 period, the French regions reprogrammed their OPs in order to allocate the maximum possible share of ERDF funding to social housing (see Box 9)[43]. In the Greek EXOIKONOMISI KAT' OIKON programme, the size of the grant and the interest rate applied to the loans varies depending on the household income (see Box 25).

Box 9 Using ERDF funds in France for EE in social housing

France has a large social housing stock, which amounts to about 16% of the population. The country has set ambitious objectives under the Grenelle Law (2009) to improve the overall energy performance of this building category.

The initiative was instigated at the national level. In 2009, ERDF mobilisation for EE was integrated into the objectives of social housing organisations and national minimum requirements were set (including on the energy consumption levels before refurbishment, the energy savings to be achieved and the reproducibility of the projects). It was then left to the discretion of each region to decide how funding should be disbursed (whether through grants on a first come, first serve basis and with a level of subsidies increasing with the level of ambition, and/or through calls for proposals targeting ambitious energy performance levels).

The ERDF allocation had a significant leverage effect, generating over €1bn of investment, seven times the amount of the ERDF resources committed. This initiative created thousands of jobs locally and took the share of the dwellings with A to C energy ratings from 1% to almost 80% of the dwellings.

This is one of the most successful examples of the large-scale use of ERDF resources in EE/RE projects in housing.

2.2.3 Determine a specific geographical area

In some cases, MAs may identify specific needs for a given region or particular geographical area. As a result, they may choose to define specific eligibility criteria based on the location of the projects.

For instance, MAs can decide whether Cohesion Policy funding should be used in urban, suburban or more rural areas. In the urban environment, economies of scale will come into play with large-scale renovation programmes able to act on larger buildings and in more concentrated areas. There is also more scope in urban areas for interconnected projects such as district heating or cooling schemes. In rural environments, projects may be more widespread and hence be unable to benefit from economies of scale to any great extent. However, they can help achieve other objectives such as local social or economic priorities.

In addition, broader objectives including local urban planning may influence the geographical focus of the OP. For instance, if an entire neighbourhood is planned to undergo renovation, the OP might contribute to ensuring

[43] European PPP Expertise Center, European Regional Development Fund (ERDF) investments in energy efficiency improvements and the use of renewable energy in residential buildings 2007-2013, http://www.eib.org/epec/ee/documents/factsheet-erdf-en.pdf

that the EE aspect is addressed as part of the planned renovation and that relevant synergies at the scale of the neighbourhood are realised.

Some of the good practice examples presented in this guide include programmes that operate at city level (e.g. RE:FIT – London, UK), regional level (e.g. Retrofit South East – UK, Pardubice – Czech Republic, Energies POSIT'IF – France) and at a national level (KfW – Germany, REECL – Bulgaria, Kredex – Estonia).

3 Step 3 – Define targeted level of renovation and energy savings

3.1 Define level of ambition for energy savings and use of renewables

USE NATIONAL REGULATIONS ON BUILDING RENOVATION BASED ON THE IMPLEMENTATION OF THE EPBD TO DEFINE PERFORMANCE REQUIREMENTS

As discussed in Section 1, the EPBD requires that minimum energy performance requirements be set by MSs for new and existing buildings, as well as building elements that form part of the building envelope. Consequently, when defining the desired performance levels for new projects, MAs should first clarify their MS-specific minimum energy performance requirements. Such requirements will be reviewed by MSs regularly (at least every five years), as specified in the EPBD, and might therefore be revised to reflect technical progress in the building sector.

Although the EPBD requirements only apply to specific conditions (such as existing buildings undergoing major renovation[44]), MAs should generally consider minimum energy performance requirements as the baseline requirement for all their project opportunities. That is, project ambition levels should generally be greater than the minimum energy performance targets, in particular for public buildings.

MANAGING AUTHORITIES SHOULD ADOPT A LONG TERM PERSPECTIVE TO AVOID THE LOCK-IN EFFECT

Holistic and integrated approaches to building renovation are needed in order to achieve the EU's ambitious EE objectives. Such approaches should aim to combine a certain number of measures (such as retrofitting insulation and installing RE heating systems). Deploying single measures will generally be insufficient and might result in the "lock-in" effect.

With renovation cycles for existing buildings of at least 25 years, MAs should ensure that each renovation maximizes the savings potential of the building. A typical approach to building retrofits has been to pick the "low-hanging fruit," a process that involves doing the most cost-effective, least invasive measures, which tend to have quick payback periods and yield energy savings of up to 20-25%. However, much higher energy savings are required if the full economic and technical potential is to be realised. Obviously, higher savings target depend heavily on the pre-renovation level of energy performance of specific buildings as well as on the economic viability of more progressive measures. Importantly, it will also depend on the success of other factors such as changes in behaviour by consumers once improvements have been made (see step 3.2).

The "lock-in effect" refers to the fact that once some basic energy efficiency measures have been implemented, it becomes less cost effective to fit more comprehensive measures in the future.

With consideration for the local and national context and broader EU objectives, MAs need to define the target level of renovation and energy savings to be achieved through their programmes. This will then drive the selection of packages of EE/RE options at a building-by-building level.

As show in Figure 10 below, MAs can consider various levels of interventions, but should aim to focus in the first instance on integrated measures. Generally, the level of Cohesion Policy funding provided should increase with the level of ambition.

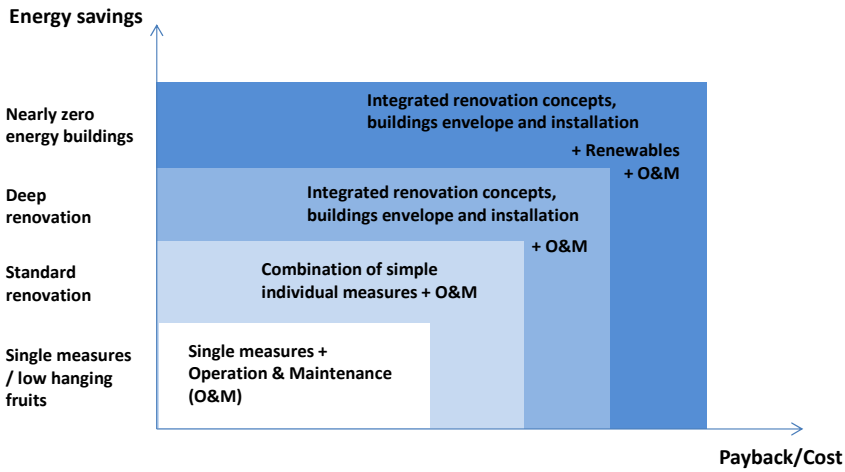
The implementation of single measures (including low-hanging fruit), such as improved operation and maintenance, lighting upgrades, boiler replacements or roof space insulation, constitutes the first level of intervention. Cohesion Policy funding should generally not be used to support the implementation of single measures.

[44] "Major renovation" is when the "total cost of renovation relating to the building envelope or the technical building systems is higher than 25% of the building's value or if more than 25% of the surface of the building envelope undergoes renovation" [EPBD recast]

The combination of single measures (which can be termed "standard renovation") involves the simultaneous and integrated implementation of a few individual energy-saving measures.

Deep renovation or deep energy renovation refers to renovations that capture the full economic EE potential of improvements. This typically includes actions on the building envelope (and not only on the technical building systems) in order to achieve very high energy performance. There is no common definition for deep renovation. A Commission Staff Working Document refers to deep renovations as efficiency improvements typically achieving more than 60% energy savings[45]. However, this is only one definition of deep renovation as the level of achievable savings will vary depending on climate conditions and, in particular, the energy performance of the building prior to renovation. As such, aiming at deep renovation is not necessarily a pre-requisite to allocate funding, in particular for residential buildings.

Figure 10 Categorization of SE measures



Moving towards deep renovation will take buildings closer to being low-energy buildings[46]. There are two ways to approach the target setting – either focusing on a level of energy savings to be achieved (typically 40-60%) or focusing on a particular energy performance level after refurbishment. Both approaches will have to be economically feasible. As a general principle, the deeper the renovation is, the higher the grant support intensity that should be made available. Following the leading example of the public sector, this is particularly important for enabling Cohesion Policy funding to support 'state of the art' renovations in public buildings in order to stimulate the market to not only to replicate such projects but more fundamentally to come up with innovative solutions.

Nearly Zero-Energy Buildings (NZEB): are buildings that have a very high energy performance with the remaining levels of energy required to be covered by energy from renewable sources. As of 1 January 2019, public authorities that occupy and own a new building shall ensure that the building is a NZEB. As of 1 January 2021, all new buildings will have to be NZEB. The EPBD also encourages MSs to "develop policies and take measures such as the setting of targets in order to stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings".

3.2 Determine eligible types of measures

Various measures are available to improve the energy performance of buildings. They can be grouped as:

- Building envelope and thermal insulation
- Space heating
- Space cooling
- Domestic hot water
- Ventilation systems
- Lighting

The following sections provide a high-level overview of each possible area of intervention.

[45] Commission staff working document accompanying the document Report from the commission to the European Parliament and the Council, Financial support for energy efficiency in buildings, COM(2013) 225 final, http://ec.europa.eu/energy/efficiency/buildings/doc/swd_2013_143_accomp_report_financing_ee_buildings.pdf

[46] There is no standard definition for low-energy buildings, but it generally indicates a building that has a better energy performance than the standard alternative or energy efficiency requirements in building codes

BUILDING SHELL AND THERMAL INSULATION: A KEY TARGET

The thermal insulation of a building is one of the most important factors impacting the building's energy performance. Insulation reduces the heating demand in colder regions, the cooling demand in warmer regions and increases considerably the comfort of a building. In this way, the insulation also increases the feasibility of introducing RE sources in buildings, due to a lower heating or cooling demand and temperature regimes.

Thermal insulation of a building shell consists of three main items: 1) insulation of walls, floors and roofs, 2) double or triple glazing and 3) air tightness.

Advanced glazing technology, such as double-glazed or triple glazed windows and low emissivity glass improve thermal efficiency. Triple-glazed units are particularly common in Scandinavian countries. Low emissivity glass has uses in both warmer and cooler climates. The coatings allows visible light to pass whilst helping to maintain warmth within the building by reflecting radiant heat back inside. In warmer areas, the coatings reflect the radiant energy from the sun to help buildings remain cool. Heat losses due to air infiltration may be reduced by using airtight construction and sheltering exposed walls. Some Building Codes have provisions for air tightness, but this is less common than for thermal insulation. Improvements to air tightness can be achieved by a variety of means including caulking, weather-stripping, use of certain insulation materials and installing impermeable barriers.[47]

Building design concepts such as **passive solar**, mean that new buildings are designed and oriented to make optimum use of solar radiation. For example large windows on the south side of the building will lower the heat demand in winter. In renovation projects, efficient sun blocking methods are needed as well, to prevent overheating in the summer.

Box 10 U-value – a key parameter for thermal insulation

The 'U-Value' is a measure of the amount of energy (heat measured in Watts) that is transferred through an area of 1 square metre of material for every degree of difference in temperature either side of the material. The lower the U-value the better the material is at preventing heat loss. Calculating U-values can be quite complicated due to the mixture of materials that can be used in the building fabric. However, it is relatively easy to obtain U-value information for standard building elements either from the manufacturer, trade associations or product testing bodies.[48] In some instances or countries, the R-value is used instead of the U-value. The R-value is the reciprocal of the U-value so that the higher the R-value, the greater the level of insulation.

It is relatively easy to require a certain energy performance on the renovated parts (U-values) or the installed components (usually R-values). In some countries, subset performance levels are imposed which allows special attention to be paid to specific parts of the building that have an important impact on the EE (e.g. an average U-value for the building shell). Requirements at this level are already imposed in Belgium, Denmark, France, the Netherlands and the UK. For example, current limit U-values [area weighted] in England and Wales are 0.35 W/m^{2}K for walls and 0.25 W/m^{2}K for roofs[49], while the passive house standard requires walls to meet a U-value of 0.15 W/m²K.

SPACE HEATING

In most European regions, space heating is the single largest energy demand for households (almost 70% of total energy use on average[50]). The technology used has a significant impact on a building's energy consumption. Fossil-fuel fired heating systems remain the lowest initial capital cost, however, low carbon alternatives are becoming increasingly competitive when incorporating fossil-fuel costs and viewed over a five to ten year timeframe. Key improvements in this area can be expected by utilising technologies such as **condensing boilers**, which are now mandatory in some countries. Heat pumps and air conditioning systems could see efficiency and cost reduction improvements of at least 20% by 2030, according to the IEA.

Fossil-fuel fired heating systems are expected to remain dominant in the years to come with an increasing proportion of low carbon heating systems which have great potential. Three key groups of RE technology can support carbon emission reduction in the area of space heating: heat pumps, biomass heating systems

[47] European PPP Expertise Center, European Regional Development Fund (ERDF) investments in energy efficiency improvements and the use of renewable energy in residential buildings 2007-2013, http://iea-etsap.org/web/ThanksDl.asp?file=R01

[48] Carbon trust, Building Fabric, Energy saving techniques to improve the efficiency of building structures, http://www.carbontrust.com/media/19457/ctv014_building_fabric.pdf

[49] Royal Institute of British Architects

[50] Covenant of Mayors, How to develop a sustainable energy action plan (SEAP) – Guidebook Part 3, http://www.eumayors.eu/IMG/pdf/seap_guidelines_en.pdf

(including district heating), solar thermal technologies. Such technologies can also be combined with low temperature under-floor heating systems.

Heat pumps convert low-grade heat from the air (air-sourced), a body of water (water-sourced), or the ground (ground-sourced) into useful heat within a building. The equipment requires electricity to function but the heat input is renewable. The smaller the temperature difference between the source and the desired temperature, the higher the efficiency of a heat pump. Heat pumps are particularly useful when integrated as part of new or deeply renovated buildings that have low heat demands and low-temperature heat distribution systems.

Biomass (generally in the form of wood pellets or woodchips) can be used to heat buildings, either through a stove or biomass boiler linked to a conventional wet heating system. Systems can be used in individual buildings, building complexes and district heating. Other types of biomass use are mainly restricted to larger scale applications, for example those using anaerobic digestion of organic materials (wastewater plants), waste wood burning (small industrial sites) or straw burning (dedicated biomass power plants). Medium to larger bioenergy plants are often combined with (small or large) district heating systems.

Solar thermal systems involve a rooftop solar collector, which uses solar radiation to heat water. While these are typically used to provide domestic hot water (see below), they can also be configured to pre-heat water for wet central heating systems. Auxiliary heating measures (such as condensing boilers, heat pumps, electrical boilers or district heating) are often needed in winter or in periods when demand exceeds supply.

Overall, combined heat and power (CHP), biomass and heat pumps are projected to be some of the key technologies of the future.[51]

SPACE COOLING

Due to geographical and climatological differences, the cooling demand differs significantly across Europe. In summer time, the demand for cooling for commercial buildings and residential buildings is substantial across most of Europe. In Northern MSs, cooling is mostly used within commercial buildings although a trend towards more domestic cooling is visible in recent years in North-western MSs. The low-cost of individual air conditioning systems is facilitating this shift.

Opposite to passive solar described above, effective **shading** can reduce the cooling demand in summer. This is most efficient in Southern and Central Europe, where summer temperatures are highest. Advanced glazing with low emissivity coatings can play a similar role. Heat pumps can also be used to provide cooling to buildings in summer months.

DOMESTIC HOT WATER

Water heating is typically the third-largest domestic energy end-use after space heating/cooling and lighting. In modern, new build houses, the energy demand for domestic hot water might even be higher than the demand for space heating. Demand for domestic hot water averages at 24 litres per person per day across the EU, although substantial national variations are observed. This demand can be serviced by dedicated water heating systems or by combination systems that also perform a primary space-heating role (e.g. a condensing boiler that provides both space heating and domestic hot water). Dedicated systems can be divided into three categories: storage systems, instantaneous devices or alternative systems, including heat pumps and solar systems. In the EU, electric storage systems dominate the market with approximately 55% of dedicated water heater sales, whilst renewables contribute a small portion. In the commercial sector, water-heating consumption contributes a smaller proportion of total consumption and is concentrated in limited building types.

As well as biomass boiler systems, solar thermal systems represent a RE system capable of contributing significantly to the domestic hot water supply in buildings.

VENTILATION SYSTEMS

Ventilation is an essential part of creating both a healthy indoor climate and a comfortable and safe living or working environment. Without adequate ventilation, levels of harmful air contaminants and humidity can build up. Excess humidity can lead to problems of mould and damage to the building structure; humid air also requires more energy to heat up. Ventilation must be an integral part of the building system, particularly in very well insulated, airtight buildings. A wide range of mechanical and natural ventilation systems are available

[51] IEA ETSAP, Technology Brief 02, Space Heating and Cooling (2012), http://iea-etsap.org/web/ThanksDl.asp?file=R02

for new and renovated buildings. The use of variable speed drives to control fans and pumps in heating ventilation and air conditioning (HVAC) systems helps reduce heat losses in a building and improve the overall energy performance of the HVAC system. Systems with heat recovery also help reduce the heat demand inside a building; they are usually adapted to low energy buildings.

LIGHTING

In the housing sector, at least 10% of electricity is consumed by lighting. In the office and commercial sector, lighting can even account for up to 30% of total electricity consumption. Traditional incandescent light bulbs are still widely used (although will diminish as the 2009 EU-wide phase out of sales of incandescent bulbs takes effect), but efficient alternatives are easily and, often cost-effectively, available including high frequency fluorescent tubes, compact fluorescent lamps (CFLs), and light emitting diode (LED) lamps. In addition, ecodesign and energy labelling requirements for directional lamps, LED lamps and halogen lighting converters entered into force in 2013.

Cohesion Policy funding should not be used to finance lighting projects, which have very short payback times and can be financed on the market without public intervention. Lighting measures should instead be integrated with other efficiency measures in order to be considered for funding.

OTHER MEASURES WITH AN IMPACT ON ENERGY PERFORMANCE

Building automation and control is widely used in commercial buildings to control the indoor climate and lighting. For residential buildings, the concept of *domotics* is gradually attracting more attention. Domotics and building automation can facilitate energy savings, efficient heating systems and optimal use of renewables. For example: lights can be turned off automatically with motion sensors; individual rooms can be heated or cooled as necessary depending on their use; and equipment such as washing machines can be controlled in line with levels of generation from rooftop solar PV panels.

With more integrated solutions for deep renovations, in combination with RE systems, the demand for more automation and control will increase. Although futuristic, the technology for virtual power plants (VPP), in which building automation systems of multiple buildings are combined and communicate for optimal efficiency, is already available. Pilot projects for advanced building automation and control systems are being executed–for example under the LIFE programme.

BEHAVIOURAL CONSIDERATIONS

Energy efficiency has a significant **behavioural** aspect to it. Energy-inefficient behaviour is often not related to reluctance but rather a lack of awareness. SE projects should therefore aim to raise awareness of the benefits resulting from improved building energy performance and include actions to counteract possible rebound effects. The rebound effect, estimated by the International Energy Agency (IEA) between 10% and 30% in the residential sector[52], is when a more efficient home induces a greater degree of comfort. The building occupier invests the savings in services (e.g. a higher use of heating or air conditioning) or products (e.g. electrical appliances) leading to further demand for energy and nullifying in some instances the initial energy savings.

There is a need for behavioural strategies and instruments alongside technologies and measures (e.g. encouraging people to avoid overheating in winter should be supported by effective, intelligible heating controls). Feedback for building owners and users e.g. concerning user behaviour, energy cost and benefits of energy-saving measures and new technologies is being slowly rolled out through the use of smart meters and smart grids.

GENERATION OF RENEWABLE ELECTRICITY

Production of renewable electricity with **solar PV** enables a lower dependency on fossil fuels, by lowering the electricity demand from the central power plants. These systems are typically grid integrated and the energy produced can either be used locally or exported to the grid. The use of solar PV and thermal systems also has a slight dampening effect on the heating up of buildings due to the fact that these systems absorb a large part of the energy in the solar radiation.

[52] Ryan, l., Moarif, S., Levina, E., Baron, R., Energy efficiency policy and carbon pricing, IEA, 2011
http://www.iea.org/publications/freepublications/publication/EE_Carbon_Pricing.pdf

Small-scale and micro-**wind turbines** also present opportunities to generate renewable electricity. However, their low efficiency and integration in an urban environment, particularly given the complex wind patterns within built environments and around buildings, makes their use more difficult and generally more marginal.

3.3 Identify packages of measures and performance thresholds

MAs can decide to either define eligible packages of measures or to establish performance thresholds at building or at component level to select projects and allocate funding. This generally depends on the project size, building type and local context. The establishment of performance thresholds is discussed in Step 3.5.

COHESION POLICY FUNDING SHOULD BE PRIMARILY USED TO FINANCE PROJECTS THAT GO BEYOND BUSINESS-AS-USUAL AND AIM TOWARDS ACHIEVING DEEP RENOVATION

Capital-intensive measures such as the insulation of facades, replacement of windows or upgrades of ventilation systems might not be viable projects or may involve payback periods that are too long for the private sector. As such, Cohesion Policy funding should, as a priority, be used to support such projects that would not happen in a business-as-usual scenario.

To ensure that Cohesion Policy funding is directed where it is most needed, MAs can apply a number of principles and tools:

- Measures that achieve up to the prevailing minimum energy performance requirements (whether at building or building element level) should generally be considered business-as-usual and should not be the main focus of support within OPs. However, this could be seen as a minimum threshold for eligibility;
- The level of support provided by Cohesion Policy Funds should increase in line with levels of ambition and savings achieved (the more ambitious the project, the more funding the project is entitled for). In this regard, the KfW EE loan scheme can be considered as a 'good practice' example (see Box 11);
- Packages of measures can be categorised based on levels of combined savings that could be achieved (the overall goal being to limit the lock-in effect);
- A mechanism to incentivize the uptake of low cost measures could require such measures to be installed as a condition of support for higher-cost measures;
- For residential buildings, social aspects also need to be considered, and higher grant intensities could be considered for example in cases where improving EE helps to address fuel poverty.

Box 11 Grants & loans for EE in residential buildings, KfW – Germany: support increasing with ambition level[53]

The programme "Energy Efficient Construction and Refurbishment" provides financing by way of soft loans and grants for energy efficient construction and refurbishment activities for the German residential sector. The programme is available for all private investors in the residential building sector as well as housing companies at equal conditions.

To be eligible for the programme, it is a precondition that the efficiency standards achieved by the project are better than the requirements as set out in the German Energy Savings Ordinance. Eligibility is based on two key parameters: (1) the annual primary energy demand compared to the demand of a new building (the so-called "reference building") and (2) the structural heat insulation (specific transmission heat loss) compared to the reference building.

The basis for measuring the level of energy efficiency is the so-called "KfW-Efficiency House Standard".

There are three levels of promotional incentives for energy efficient construction activities expressed as Efficiency House Standards 40, 55 and 70. This means that the primary energy consumption of the housing unit in question corresponds to 40%, 55% or 70%, respectively, of what the reference building is allowed to consume according the Energy Efficiency Ordinance.

For all levels, the promotional interest rate is the same. The difference pertains to the level of partial debt relief (in percent), in the form of a repayment bonus, which is granted to the borrower (in addition to the favourable interest rate) once the targeted efficiency level has been reached and verified by an energy expert. For instance, the Efficiency House 40 benefits from a 10% debt relief. The maximum loan amount is €50,000.

[53] http://www.esd-ca.eu/good-practices/good-practice-factsheets/financing/kfw-energy-efficient-construction-and-refurbishment-germany; www.kfw.de

For energy efficiency refurbishment activities, there are in total six promotional levels: starting with Efficiency House 55 as the most ambitious level, followed by Efficiency House 70, 85, 100 and 115 as well as a separate level for monument buildings.

The incentive in terms of partial debt relief starts at 2.5% for the Efficiency House 115 and reaches 17.5% for the most ambitious level Efficiency House 55.

Customers who do not target a deep retrofit of their building or housing unit can benefit from promotional loans for single measures such as windows, heating systems or insulation.

Customers who do not want to apply for a loan also have the option to apply for a grant. The amount available is based on the same energy efficiency levels as for the loans and calculated based on the maximum loan amount applicable. It varies between 10% and 25% of the maximum loan amount of €75,000 (i.e. between €5,000 and €18,750).

The involvement of an energy consultant is mandatory in the application process. The consultant is responsible for checking whether the construction or refurbishment project is properly designed to achieve the targeted efficiency level. An internet-based tool has been developed to compare the technical details of the project with the targeted efficiency level

THE SUITABILITY OF A PACKAGE OF MEASURES WILL DEPEND ON THE BUILDING TYPE AND LEVEL OF AMBITION

Packages of measures can be categorised based on levels of combined savings that could be achieved. Rather than being considered individually, these measures must be integrated into a comprehensive package in which each measure is evaluated in conjunction with other proposed measures to achieve the most effective overall approach to EE.

Because of the diversity of the existing building stock across EU MSs and the various possibilities for combinations of SE measures, it is not possible to prescribe a limited set of packages for the entire building stock. However, several examples or illustrations of typical packages for different types of buildings can be provided. The following list shows possible combinations of individual measures that can be considered in renovations that aim to go beyond business-as-usual.

Residential buildings

- **Blocks of flats:** draught proofing; insulation of outside walls, roof and basement; advanced glazing; central heating and domestic hot water with a condensing boiler (biogas or wood pellets) generating both heat and power (CHP), or district heating; low temperature radiators; solar thermal panels; ventilation with heat recovery; rooftop PV panels.
- **Terraced or row housing:** draught proofing; insulation of outside walls, loft and basement; advanced glazing; condensing boiler (biogas or wood pellets), air-to-water heat pump; low temperature radiators; rooftop solar thermal or PV panels.

Public buildings

- **School:** insulation of outside walls (external insulation), roof and floor; advanced glazing; low temperature heating; heat pump; efficient lighting; rooftop solar thermal or PV panels.
- **Office:** insulation of outside walls (external insulation); advanced glazing; HVAC system with heat recovery and variable speed drives; condensing boiler (natural gas or biomass); efficient lighting; rooftop solar PV; building automation and control; shading.

Commercial buildings

- **Office:** insulation of outside walls (external insulation); advanced glazing; HVAC system with heat recovery and variable speed drives; condensing boiler (natural gas or biomass); efficient lighting; rooftop solar PV; building automation and control; shading.

ENERGY AUDITS OR ENERGY PERFORMANCE CERTIFICATES SHOULD BE USED TO IDENTIFY OPPORTUNITIES AND VALIDATE SAVINGS

Any MA that wishes to use Cohesion Policy funding for an SE programme must stipulate a requirement for an energy audit and/or an Energy Performance Certificate; ideally both pre- and post-installation. The complexity of this assessment needs to be adapted to the size and scope of the project. For example, detailed energy audits are required for deep renovation projects.

An energy audit involves an assessment of the energy use patterns within a building and supports the identification and prioritisation of measures.

Energy audits and Energy Performance Certificates and their recommendations should be used to identify energy saving opportunities.

The scope of an energy audit, in line with the EED, does not only include an assessment of the technical characteristics of the building but also an analysis of the amount of energy consumed per end-use and the impact of behavioural changes. As such, Energy Performance Certificates can provide important inputs to an energy audit. In the cas of Energy Performance Contracting, energy audits provide a mechanism to evaluate energy savings including those linked to consumer behaviour. Furthermore, for deep renovation projects which imply higher grant intensity, detailed energy audits allow the monitoring and verification of EE improvements, including long-term cost and energy savings.

For less complex projects, such as the combination of single standard measures, the recommendations in the Energy Performance Certificate can be used to identify the SE measures to be implemented as part of the building renovation. Nonetheless, an energy audit may be useful to monitor and verify the project's energy savings and to understand possible discrepancies between the energy performance rating and the actual energy consumption of the building (e.g. due to the ineffectiveness of the installed insulation or appliance and lighting characteristics).

Incorporating such a process within a SE programme will help to ensure that the most appropriate packages of EE/RE measures are identified for a particular building. It will also be essential to enable the MA to perform thorough monitoring and verification of the efficacy of installed measures across projects within the programme[54]. Energy audits as well as project monitoring are further described in Steps 3.5 and 10.

It is important that MAs specify precisely what an energy audit involves, so that there is sufficient clarity and comparability across programmes and projects. The EED defines an energy audit as "a systematic procedure with the purpose of obtaining adequate knowledge of the existing energy consumption profile of a building or group of buildings, an industrial or commercial operation or installation or a private or public service, identifying and quantifying cost-effective energy savings opportunities, and reporting the findings". The energy audit provisions of the EED are due to be transposed at national level by the 5th of June 2014.

Box 12 Minimum criteria for energy audits (Annex VI of the EED):

The energy audits referred to in Article 8 shall be based on the following guidelines:

(a) be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles;

(b) comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation;

(c) build, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) in order to take account of long-term savings, residual values of long-term investments and discount rates;

(d) be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities for improvement.

Energy audits shall allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings. The data used in energy audits shall be storable for historical analysis and tracking performance.

However, the exact scope of the audit may vary from country to country. For example, ADEME, the French energy agency, has specified what should be in an energy audit for condominiums qualifying for a mandatory energy audit (see **Box 13**).

[54] Data collected during these audits should be captured on a database in a format suitable for disclosure

Box 13 Mandatory energy audits for condominiums with central heating systems - France[55]

By 1 January 2017, an energy audit must be conducted in all of France's condominiums of 50 lots or more and equipped with collective heating or cooling. Audits are required for buildings for which the application for a building permit was submitted prior to 1 June 2001. Energy audits must include:

- A description of the common and private areas of the building;
- A survey of the building occupants;
- The visit of a sample of dwellings;
- An estimated amount of the energy consumed annually;
- An indication of the energy rating of the building;
- The classification of the greenhouse gas emissions of the building;
- Recommendations aimed at optimizing the utilisation, operation and management of equipment;
- Proposals for works in order to improve the energy performance of the building;
- A report summarizing all the above points allowing the owners to assess the quality of their building and evaluate the relevance of the proposed works.

The EPBD recast defines requirements for energy performance certificates. Such certificates are required to be issued for buildings or building units which are constructed, sold or rented out to a new tenant; and public buildings with a floor area over 500 m^2 (250 m^2 starting July 2015) and which are frequently visited by the public. Energy performance certificates are valid for a maximum of 10 years.

Box 14 Energy performance certificates, EPBD recast[56]

The EPBD requires MSs to establish a system of certification of the energy performance of buildings. Energy performance certificates shall include the energy performance of a building and reference values such as minimum energy performance requirements. They may also include additional information such as the annual energy consumption for non-residential buildings and the percentage of energy used coming from renewable sources.

Energy performance certificates shall include where applicable recommendations for the cost-optimal or cost-effective improvement of the energy performance of a building or building unit. The recommended measures must be technically feasible and energy performance certificates may provide an analysis of the costs and benefits of the measures as well as information on the steps required to implement the recommendations.

Certification for building units or single-family houses may be based on the assessment of another representative building unit or house with similar design and energy characteristics.

Box 15 illustrates how pre- and post-installation assessments are an essential feature of both the German KfW EE programme for homes and the UK Green Deal EE retrofit programme.

Box 15 Pre- and post-installation energy assessments in Germany and the UK

Under the German KfW programme, eligibility criteria for both a grant subsidy and a low interest loan are based on overall energy savings and not on specific measures. Certified technical experts are available (selected from a database) to assess the savings potential for homes and select appropriate technical measures (and related cost effectiveness). Householders receive a grant for this technical advice. The technical expert produces a report at the beginning of the application procedure and after installation. The final report presents the implemented technical measures and theoretical calculated energy savings, to determine whether the measures fulfil the requirements of the subsidy and loan.

Homeowners in the UK Green Deal programme must first undertake a Green Deal Assessment. Only measures identified by a certified assessor are eligible for installation under the programme. Following the assessment the house is assigned an energy performance rating (if it has not already received one). Following installation of the selected measure(s), an Energy Performance Certificate must be produced. The savings estimated by the pre-and post-installation assessment underpin the financing model within the scheme and eligibility for a cashback grant is dependent on the final Energy Performance Certificate being produced.

3.4 Assess options for deep renovations

Given that new buildings only add about 1% to the total European stock each year, deep renovations are needed to improve the performance of the building stock. As mentioned previously, deep renovation projects combine retrofit measures in an integrated approach. These measures include upgrades to the building envelope, mechanical systems, lighting and electrical systems, system controls, etc.

[55] http://ecocitoyens.ademe.fr/mon-habitation/en-copropriete/les-obligations-reglementaires-liees-a-l%E2%80%99efficacite-energetique

[56] EPBD recast, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF

Deep renovations can take place as a one-stage project or through multiple-stage projects. As such, when setting up a programme and identifying the types of projects to finance, MAs should assess the respective merits of conducting deep renovations as a single package or staged over a period of time. A longer term, staged approach may free up capital for investment into other projects. However, unless a deep renovation project is very well planned and designed, it might be more costly to return to a building later on to add more measures.

3.5 Define eligibility criteria

MAs must use a set of eligibility criteria to allocate funding. These criteria can be based on four main categories: cost effectiveness, level of energy performance of the building, level of energy performance of technical systems and other requirements such as conducting an energy audit. Co-benefits such as economic, social and environmental impacts should also be taken into account when selecting projects. These criteria are described in the following sub-section.

The eligibility criteria should be adapted to the capacity of beneficiaries or final recipients to produce the required data to assess the project. For example, large projects should be required to produce detailed energy audits and financial calculations. For smaller projects such as detached housing, it might be more difficult to ask for detailed calculations and be easier to focus on standard packages of measures. A good solution for small projects is to evaluate the average performance of different building typologies through a statistical approach, in order to define the right level of co-funding.

COST EFFECTIVENESS

MAs must use criteria to determine which EE or RE projects are more cost effective and should be prioritised for selection. Cost effectiveness can be determined in multiple ways, but use of the net present value (NPV) approach is generally recommended for the purposes of assessing technology options.

The net present value (NPV) approach is generally recommended for the purposes of assessing technology options as it enables to take into account all the project's cash flows over its lifetime

The **net present value (NPV)** is a standard method for assessing the expected financial performance of a project. It considers the cash inflows and outflows over a defined period of time, calculated at their present value at the start of the project (taking inflation and return into account). A positive NPV means that the benefits outweigh the costs and that the project is worth considering. A negative NPV means that the project will overall lose money. By dividing the NPV over the energy saved in that period, a cost effectiveness in €/GJ (saved) can be obtained. At the selection stage, this value can be estimated by project proponents based on available information for the planned project activity. This needs to cover information about equipment costs, Operation and maintenance (O&M) costs, energy costs and savings, lifespan of building components. NPV is particularly suitable for projects with an important investment volume where it is possible to invest in an energy audit. A template should be provided with consistent parameters (e.g. interest/discount rates) to ensure comparability across all projects.

Alternative methods exist for calculating cost effectiveness but these do have limitations. **Energy saved in relation to funding** involves determining the cost effectiveness of proposed projects by estimating the level of expected energy savings per euro of funding, expressed in GJ/€. Funding can be considered as total project funding, private funding, public funding, or ESI funding. To assess this criterion, information about the amount of funding is needed as well as the anticipated energy savings over a defined calculation period. It is important to clearly specify the period over which the savings are calculated; using a 20-year period favours deep renovation projects whereas a shorter period would favour projects with a shorter payback. This method can result in poor decision making if applied inconsistently. This simplistic measure also does not facilitate comparison of measures with different operational lifespans.

The **payback period** of a project can also be used as an indicator for cost effectiveness. By calculating the simple payback time (additional costs divided by the financial savings) in years, projects can be prioritised according to shortest payback time. A maximum and/or minimum payback time can be defined for projects that are eligible for funding; however, this might result in a lock-in effect with low hanging fruits being financed in priority. This approach does not take into consideration the value of money over time and it does not account for any cash flows after the payback period has finished and the initial investment has been recovered.

LEVEL OF OVERALL BUILDING ENERGY PERFORMANCE

Building energy performance in (kWh/m^2 or GJ/m^2) can be calculated per project and compared to a threshold defined by the programme management team, taking into consideration good practices for the country/region.

In doing so, MAs must take into account the minimum energy performance requirements set by their MS for new and existing buildings based on cost-optimal levels (as per the requirements of the EPBD recast[57]). Measures that achieve up to the prevailing minimum energy performance requirements (whether at building or building element level) should generally be considered business-as-usual and should not be the main focus of support. However, this could be seen as a minimum threshold for eligibility. The level of support provided by Cohesion Policy Funds could increase in line with levels of ambition and savings achieved (the more ambitious the project, the more funding the project is entitled to). Some MSs have already set out more demanding codes for some or all of their building stock.

While cost optimality is a method used by MSs to define minimum energy performance requirements, it should not be used by MAs as a way of selecting projects.

Box 16 Definition of "cost optimal"

The EPBD recast (Directive 2010/31/EU) requires MSs to "assure that minimum energy performance requirements for buildings or building units are set with a view to achieving cost-optimal levels".

The cost-optimal level is defined in Article 2.14 of the EPBD recast as "the energy performance level which leads to the lowest cost during the estimated economic lifecycle." MS will determine this level by taking into account a range of costs including investments, maintenance, operating costs and energy savings.

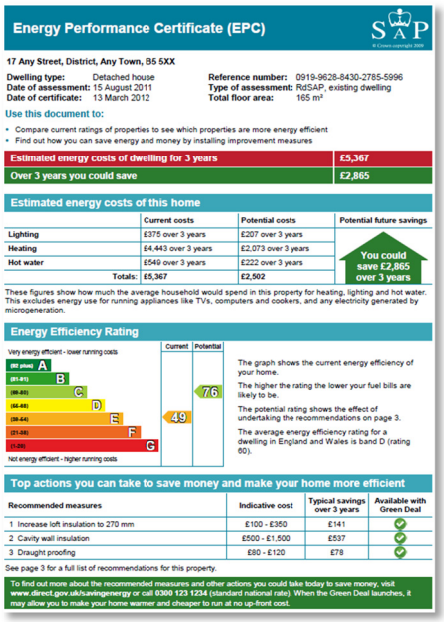
The EC has established a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements with a view to measure gaps between the cost-optimal level and the national energy performance requirements in force. These calculations are country-specific and are not intended to be harmonised across MSs.

A key component of the EPBD, Energy Performance Certificates are required for all properties (homes, commercial and public buildings) when sold, built or rented. Buildings are rated on a scale from A to G (A being the most efficient). Energy Performance Certificates indicate the energy performance of the building and include reference values such as minimum energy performance requirements. They also provide recommendations for cost-optimal / cost-effective improvements.

Existing frameworks for building performance such as **Energy Performance Certificates** (in line with Article 11 of the EPBD) can also be used by programmes to establish benchmarks or eligibility criteria within incentive schemes. For example, a programme could specify that buildings eligible for support must be rated E-G (according to the energy performance certificate) in order to target resources at the worst performing buildings. The programme could also require a project to increase energy performance ratings by at least two or three levels to be eligible (e.g. from F to D). Such a requirement can be adapted based on the existing performance level of a building. For instance, increasing efficiency from class B to A would generally constitute an ambitious target, whereas moving from F to E would likely focus on picking "low-hanging fruit" and more ambitious savings should be required to be eligible for Cohesion Policy support.

[57] EPBD recast, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF

Figure 11 Example of an Energy Performance Certificate, UK[58]



Energy Performance Certificate (EPC)

SAP

17 Any Street, District, Any Town, B5 5XX

Dwelling type: Detached house
Date of assessment: 15 August 2011
Date of certificate: 13 March 2012

Reference number: 0919-9628-8430-2785-5996
Type of assessment: RdSAP, existing dwelling
Total floor area: 165 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years	£5,367
Over 3 years you could save	£2,865

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£375 over 3 years	£207 over 3 years	
Heating	£4,443 over 3 years	£2,073 over 3 years	
Hot water	£549 over 3 years	£222 over 3 years	
Totals:	£5,367	£2,502	

You could save £2,865 over 3 years

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

Current | Potential

Very energy efficient - lower running costs
(92 plus) A
(81-91) B
(69-80) C
(55-68) D
(39-54) E
(21-38) F
(1-20) G
Not energy efficient - higher running costs

Current: 49
Potential: 76

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Increase loft insulation to 270 mm	£100 - £350	£141	
2 Cavity wall insulation	£500 - £1,500	£537	
3 Draught proofing	£80 - £120	£78	

See page 3 for a full list of recommendations for this property.

To find out more about the recommended measures and other actions you could take today to save money, visit www.direct.gov.uk/savingenergy or call 0300 123 1234 (standard national rate). When the Green Deal launches, it may allow you to make your home warmer and cheaper to run at no up-front cost.

LEVEL OF ENERGY PERFORMANCE OF TECHNICAL SYSTEMS

Besides looking at the overall energy performance of buildings, additional criteria can be used to define specific performance levels of technical systems such as heating systems, air conditioning systems, renewable energy systems, as well as specific building fabric components such as insulation and glazing. In the Bulgarian REECL programme for instance, specific eligibility and performance criteria are defined by technology type (e.g. U-values for windows and insulation). Technical eligibility requirements are periodically updated in order to reflect market progress and the update of national regulation requirements related to transposition of the EPBD[59]. The technical requirements by MAs should be at least the minimum requirements of EPBD by component, or higher.

Examples of performance indicators and technical requirements that can be used by MAs to assess particular technical systems or building fabric components are outlined in Table 4 and Box 17.

Table 4 Performance indicators for particular technical systems or building fabric components

Technical system / building element	Performance indicator	Potential technical requirement
Glazing	U-Value (W/(m^2.K)	Double/triple-glazing
Insulation	R-Value (m^2.K/W)	Specific insulation materials
Heat pumps	Coefficient of performance (COP) Seasonal Performance Factor (SFP)	Geothermal units
Boilers	Thermal efficiency (%) or rating	Condensing boilers
Air conditioning systems	European Seasonal Energy Efficiency Ratio (ESEER)	Heat recovery systems, variable speed drives
Solar thermal systems	Optical efficiency curve	Evacuated tube and flat plate systems

Box 17 SEDBUK (Seasonal Efficiency of Domestic Boilers) rating, UK[60]

The SEDBUK rating scheme was developed by the UK Government's Energy Efficiency Best Practice Programme to rate boiler efficiency. The model which was developed in conjunction with boiler manufacturers provides a scale from A to G, A being the most efficient.

[58] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/49997/1790388.pdf

[59] http://www.reecl.org/indexen.php#

[60] http://www.boilers.org.uk/index.htm

OTHER REQUIREMENTS

MAs can also use a number of other requirements to determine the eligibility of a project or of a package of measures. For instance, conducting an energy audit should be a pre-requisite to accessing Cohesion Policy funding for projects above a certain size (for smaller project, energy performance certificates can be used).

Incorporating pre-installation energy audit requirements within a programme can help ensure that the most appropriate packages of EE and RE measures are identified for a particular building. In addition, introducing a requirement for a follow-up assessment post-installation can help quantify the performance improvement achieved.

Box 18 Compulsory energy audits: the KredEX fund, Estonia

Under the KredEX fund, it is compulsory to carry out an energy audit at the beginning of the application process and the loan must be used to finance the measures recommended in the audit. Measures financed include costs related to any type of insulation, replacement of windows and/or doors and the installation of a renewable energy system (off-grid).

Funding support can also be made conditional on agreement to post-installation site assessments or energy monitoring. This can help ensure project quality as well as provide information to support project and programme monitoring and evaluation (see Box 19 below).

Box 19 Energy audits in the KfW programme, Germany

As mentioned in Box 15, audits play an important role in the KfW application process. Households receive a grant for technical advice from a certified expert. The expert conducts a pre- and post-project audit, with the former helping to define the applicable technical measure(s) and their cost effectiveness, and the latter ensuring that subsidy requirements are met. This is achieved through a report that verifies and details the technical measure(s) installed, and the theoretical energy savings.

Energy audits and project monitoring are also addressed in steps 3.3 and 10.

3.6 Identify desirable co-benefits

Cohesion Policy is an integrated policy, and SE is one of several objectives of Cohesion Policy programmes. Therefore, an integrated approach is needed to ensure EE improvements are not carried out in isolation but are considered as part of the overall improvement of a particular building. It makes clear sense to carry out other improvements of a building at the same time as doing EE improvements. This typically also results in more cost-effective projects overall. As such, when making investment decisions, it is also important to look at the project in a broader context and consider other benefits such as economic, social and environmental impacts. Table 5 presents some important co-benefits that MAs can consider.

Table 5 SE project co-benefits[61]

Category		Definition
Direct impact on the welfare	Increased thermal comfort	Improved indoor temperatures, especially in fuel-poor households
	Savings in utility expenses	Benefits mostly realised as reduced energy expenses, but also water
	Improved indoor environmental conditions	Reduced concentration of indoor air pollutants, avoiding sick building syndrome
	Reduction in outdoor noise infiltration	Better protection against external noise through insulation, replacement of windows etc.
	Improved safety conditions and lower maintenance costs	Particularly when old and poorly-maintained space and water heating systems are used
	Enhanced ability to rent or sell the space	Retrofitted buildings have a number of advantages that make them more attractive to the demand of real estate markets
Regional environmental effects	Lower resource consumption and waste disposal	Residential energy efficiency extends the lifetime of dwellings. Efficient housing significantly diminishes construction and demolition wastes.
	Reduced outdoor air pollution	Reduced energy consumption in buildings will lead to lower concentration of regional air pollutants (NO_x, NH_3, SO_2, VOC or Particulate Matter)

[61] Adapted from Ürge-Vorsatz D., Arena D., Tirado Herrero S., Butcher A., Center for Climate Change and Sustainable Energy Policy (3CSEP), Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary (2010), http://zbr.kormany.hu/download/8/82/00000/Study%20Deep%20Building%20Energy%20Retrofit%20Prog.pdf

Category		Definition
Nationwide or system gains	Improved energy security	Reduced dependency of fuel imports, reduced current account deficit
	Employment effects	Net employment creation, taking into consideration employment losses in energy supplying industries
	Productivity effects	Improved worker performance as a result of better indoor environmental conditions
	Lower long-term energy prices	Following a reduction in the demand. Lower prices may incentivise subsequent increases in energy consumption (rebound effect)
	Technology forcing	Stimulation of technological change in the building sector

These co-benefits can greatly help justify the relevance and legitimacy of SE projects for local decision makers, politicians and co-founders, and help address multiple objectives and needs at the same time. As such, they should be considered when selecting and prioritizing projects and be aligned with local development priorities whether of economic, social or environmental nature.

4 Step 4 - Choose financing mechanisms

4.1 Choose an implementation option

THERE IS A STRONG RATIONALE FOR IMPLEMENTING INNOVATIVE FINANCIAL APPROACHES

Large SEI in the building sector cannot be achieved through the use of public resources alone. Indeed, such resources are limited and insufficient to meet the needs of significant market uptake programmes. In addition, public subsidies do not alleviate all the barriers to SE financing (including the need for capacity building and technical assistance) and they do not always make project promoters more financially credible in the eyes of financial institutions[62]. Most importantly, grant funding should generally not be used to finance investments that are viable in the eyes of the private sector and that provide sufficient returns to investors. It should instead play the role of an enabler for instance by showcasing certain types or packages of measures and promoting the development of innovative technologies.

In this context, innovative financial instruments offer some solutions and can represent a more efficient use of public money than grants. They are also able to address existing market failures and issues around access to finance for SE projects [63].

In particular, EE retrofits – unlike other investments – do not produce direct income streams; rather they create avoided costs. Energy savings and associated cost savings are therefore often not considered a tangible revenue stream by financial institutions. This is mainly because of the uncertainty surrounding the scale of the actual savings that can be achieved[64]. Inappropriate design, implementation and operation of the building and its equipment (including potential 'comfort taking' by occupants) can all influence the final savings realised in practice.

The financing of RE also presents challenges to investors for several reasons. Firstly, there are generally higher generation costs for renewables compared with fossil-fuel based generation (although costs are rapidly reducing for some renewables such as solar PV). Secondly, some uncertainties exist regarding the levels of electricity production over time (although manufacturers are now able to offer long term, i.e. 20 year, system performance guarantees to mitigate this risk). Thirdly, and perhaps most importantly, the prevailing levels of market subsidies such as Feed-in Tariffs (FITs) may suffer rapid and unforeseen changes (as already witnessed in Germany, Spain and the UK), which can damage investor sentiment and impact on installer supply chains.

[62] Bullier, A., Milin, C., Alternative financing schemes for energy efficiency in buildings

[63] European Investment bank, "Financial Instruments: A Stock-taking Exercise in Preparation for the 2014-2020 Programming Period Final Report" March 2013, http://ec.europa.eu/regional_policy/thefunds/instruments/doc/fls_stocktaking_final.pdf

[64] Milin, C., Rakhimova, L., Zugravu, N. and Bullier, A., ca. 2011. FRESH- Financing energy Refurbishment for Social Housing. Final Publishable Report. France: I.C.E. (International Consulting on Energy), http://eaci-projects.eu/iee/fileshow.jsp?att_id=23298&place=pa&url=FRESH-WP6-ICE-WD-rev1.0-Final_publishable_report.pdf&prid=1869

THE NEW EU FINANCIAL FRAMEWORK AIMS TO INCREASE THE USE OF INNOVATIVE FINANCIAL INSTRUMENTS

The new Financial Regulation of the EU provides the following helpful definitions:

- **Financial instruments:** "*Union measures of financial support provided on a complementary basis from the budget in order to address one or more specific policy objectives of the Union. Such instruments may take the form of equity or quasi-equity investments, loans or guarantees, or other risk-sharing instruments, and may, where appropriate, be combined with grants*" (Art 2(p) Regulation 966/2012); and
- **Grants:** "*direct contributions, by way of donation, from the budget in order to finance either an action intended to help achieve an objective part of the EU policy or the functioning of a body which pursues an aim of general European interest or has an objective forming part of a EU policy*"[65].

The EC is currently examining the potential for introducing financial instruments (including the potential for blending with grants) for **funds under centralised management** which are directly managed by the EC as well as for **funds under shared management** where management is shared between the EC and MSs – where MSs bear the main responsibility for implementation. The latter concerns for example the ESI Funds.

Financial instruments, grants and other forms of financial support are collectively referred to as financing mechanisms in this report.

For the 2014-2020 programming period, MAs are allowed to allocate budget to FIs within all thematic objectives covered in their OP. The new framework also provides rules to combine FIs with non-refundable grants, which will often be appropriate for investments in SE in buildings.

Overall, the Commission aims to support further expansion of the use of FIs in the next programming period. One proposal in particular[66] aims to streamline the design and management of new FIs around a framework known as the EU equity and debt platforms. These platforms provide a set of common rules and guidance for instruments that utilise equity and debt (such as guarantees, loans and risk sharing). The platforms and their associated Delegated Acts aim to ensure that where instruments are supported by the EU budget, a consistent and transparent approach is taken. They help to establish the overall principles for the use of innovative FIs with the aim of avoiding distortion of competition within the internal market.[67]

FINANCIAL INSTRUMENTS SHOULD BE DESIGNED ON THE BASIS OF AN EX-ANTE ASSESSMENT

To benefit from using ESI funds resources via financial instruments, MAs need to carry out an ex-ante assessment to:

- Identify market failures or sub-optimal investment situations, and respective investment needs;
- Assess the value added of the FIs and the consistency of ESI funding with regards to other forms of public intervention, state aid implications, and possible market distortions;
- Estimate the leverage effect of the FI and evaluate the need for preferential remuneration to attract private investors;
- Assess the lessons learnt from the previous application of similar instruments;
- Propose an investment strategy, including options for implementation, financial products offered, final recipients targeted, and possible combinations with grant support;
- Specify how the FI will contribute to the achievement of the specific objectives; and
- Provide provisions allowing for the ex-ante assessment to be reviewed and updated when necessary.

Such an ex-ante assessment also aims to avoid overlaps and inconsistencies between funding instruments implemented by different actors at different levels[68].

[65] Glossary of the European Commission on financial programming and budget, http://ec.europa.eu/budget/explained/glossary/glossary_en.cfm#g

[66] COM(2011)662 (A new framework for the next generation of innovative financial instruments – the EU equity and debt platforms) and Regulation (EU) No 1303/2013

[67] ibid

[68] The European Commission, Financial Instruments in Cohesion Policy 2014-2020, Factsheet, http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/financial_instruments_en.pdf

Box 20 *Ex-ante* assessment methodology

The EC, in collaboration with the EIB, is preparing guidance to assist MAs in the preparation of effective *ex-ante* assessments. A general guidance will be prepared for the 11 thematic objectives while specific guidance will be prepared for four key areas: research, technological development and innovation (RDI); SMEs competitiveness, including microcredit and agriculture; transition to a low–carbon economy; and integrated approaches to territorial development including urban development. The guidance will include a step-by-step procedure to carry out an *ex-ante* assessment.

GRANTS SHOULD BE USED TO PROVIDE AN ADDITIONAL LEVEL OF SUPPORT TO ACHIEVE HIGHER ENERGY SAVINGS OR FOR SOCIAL REASONS

While FIs with ESI Funds contribution set up under the OP should be used for projects expected to be financially viable, grants could be used as a complement to support deep renovations of buildings going (well) beyond minimum energy performance requirements, to help develop innovative technologies or to address social issues (e.g. fuel poverty). Grants could be typically used as part of a package with FIs (to private home owners or SMEs for instance), in order to generate demand for SE products and reduce the risk perception on the lending side. Grants could for instance support energy audits and verification and be complemented by a preferential loan or a guarantee mechanism.

A RANGE OF NEW IMPLEMENTATION OPTIONS ARE AVAILABLE TO MAs

The Common Provisions Regulation[69] (CPR) builds on past experiences and sets out the main provisions for the implementation of FIs at the regional, national and EU level. Article 38 defines the different implementation options available to MSs and MAs recognising the fact that administrative capacity and technical expertise for implementing FIs varies considerably across the EU.

Financial instruments set up at Union level, managed directly or indirectly by the Commission: Such instruments would be set up by the Commission and managed by EIB and enable OPs to invest part of their ESI funds in ring-fenced units of the larger FI. Any OP's contribution would be ring-fenced for investment in their particular regions and actions. This is known as a joint instrument and would be governed and controlled by the same procedures as for funds under direct management. While detailed information on such instruments is still missing, it is likely that these will be related to programmes such as Horizon 2020, COSME and LIFE+ which would manage ESI Funds on behalf of the specific MA/OP. However, this is less likely to be relevant in the context of EE and RE renovation of buildings.

Financial instruments set up at national, regional, transnational or cross-border level, managed by or under the responsibility of the MA: Under this route, MAs have the option to either create a new FI to serve a particular purpose, use an existing instrument they have previously established or utilise a standardised "off-the-shelf" instrument.

The draft standard terms and conditions for financial instruments pursuant to Article 38(3)(a) of the CPR sets out proposals for an "off-the-shelf" instrument specifically targeting EE in the building sector known as the Renovation Loan. This would target multi-apartment buildings where significant energy-saving potential exists but owners still need additional technical and financial support to prepare and implement "full envelope" building renovation projects[70].

Such an "off-the-shelf" approach would facilitate the set-up of instruments and help ensure compatibility with EU-level instruments. Instruments established under this option would be managed under the rules set out in the CPR and related secondary legislation in line with funds under "shared management", where budget implementation is delegated by the Commission to individual MSs. "Off-the-shelf" instruments will also be designed to be compatible with State aid rules. In particular, they will be structured in such a way that their terms and conditions do not require State aid notification and subsequent clearance from the EC.

Box 21 Renovation loan

The loan for energy efficiency and renewable energies in the residential building sector (commonly called "renovation loan") is an off-the-shelf financial instrument being developed by the EC to provide loans to building owners/private owners (with a particular focus on multi-apartment residential buildings and social housing) at preferential rates to support EE and RE measures. The appropriate conditions for the application of the renovation loan should be determined by the *ex-ante*

[69] Regulation (EU) No 1303/2013

[70] DRAFT Standard terms and conditions for financial instruments http://ec.europa.eu/regional_policy/what/future/pdf/preparation/262709_ia_3_draft_standard_terms_conditions_financial_instruments.pdf

assessment carried out by the MA. According to the draft terms and conditions, the renovation loan "primarily aims at multi- apartment buildings where the energy saving potential of renovation is significant but where apartment owners still need appropriate incentives, in the form of complementary grant assistance, long-term subsidised loan conditions and upfront advisory support. A key objective of the renovation loan is to streamline the delivery of finance to final recipients.

The "off-the-shelf" instruments also include an instrument called the Capped Portfolio Guarantee for SMEs which can be of relevance for SE financing in buildings. This instrument aims to provide credit risk protection (in the form of a first loss portfolio capped guarantee) in order to reduce the barriers that SMEs face in accessing finance and to leverage EU funds to support SMEs financing. Such FI can be particularly relevant in the context of EPC to provide loan guarantees for ESCOs.

Loans or guarantees only instruments: MAs may undertake implementation tasks directly for FIs consisting solely of loans and guarantees, if allowed by national law[71]. MAs directly manage the instrument and are reimbursed on the basis of the actual loans provided or guarantee amounts blocked for new loans. It will not be possible to charge management costs or fees to the structural funds[72].

Box 22 Commercializing EE Finance programme, guarantee fund, Hungary

As part of its Commercializing Energy Efficiency Finance (CEEF) programme, IFC provided banks with guarantee funds for residential EE projects in Eastern Europe. CEEF is the scale up of IFC's energy efficiency lending programs in Hungary (HEECP and HEECP2), that was expanded to the Czech Republic, Estonia, Latvia, Lithuania and Slovakia. Along with technical assistance, CEEF's main objective was to provide guarantee funds for mobilizing commercial funding for EE investments using specialized banking instruments.

The programme involved up to 50% IFC partial credit guarantees for EE investments through selected partner banks, including guarantee products such as individual guarantees, portfolio guarantees and other specialized guarantees.

Under the programme, local banks selected projects and designed their credit facilities, while IFC provided the partial guarantee for the banks' loans for approved EE projects. Global Environment Facility (GEF) grant funding was used to support IFC's guarantee liabilities and to mitigate the banks' risk on portfolios as a "first-loss" cover, while the banks provided loans on commercial terms to project developers, who directed some equity into the project.

In total, 14 financial institutions participated in the scheme, providing over US$135 million in loans to SE projects and leading to total investments of US$240 million in more than 800 projects. No guarantees have been called for under CEEF. [73]

The key factors for the programme's success[74] were a strong cooperation with reputable partner banks, market experience, understanding of market dynamics, heavy marketing activity by the bank, a standardized portfolio product, streamlined project origination and a state grant programme.

4.2 Assess individual financial mechanisms

4.2.1 A variety of financial mechanisms are available to MAs

The main financial mechanisms available to MAs are set out in Figure 12.

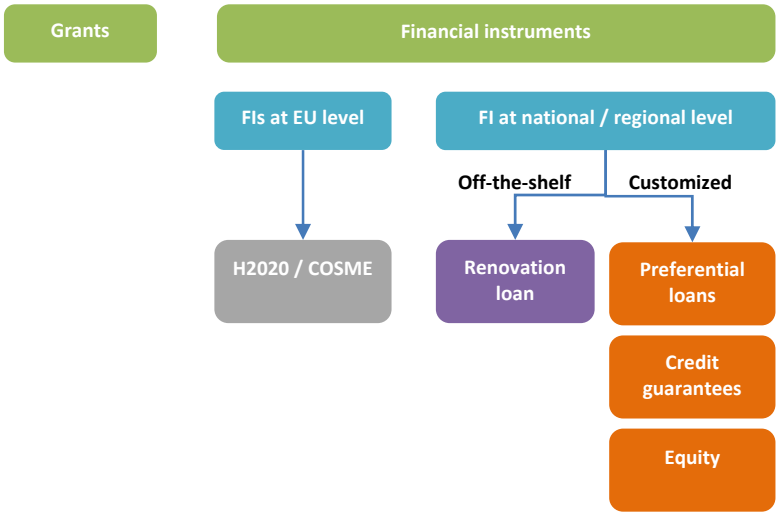
[71] In some MS, parabanking activities may not be authorised.

[72] A framework for the next generation of innovative financial instruments - the EU equity and debt platforms. http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/financial_instruments_en.pdf

[73] World Bank, Case study 21: Central and Eastern Europe - Commercializing energy efficiency finance (CEEF) program, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/03/21/000356161_20130321163159/Rendered/PDF/761490BRI0IFC000Box374367B00PUBLIC0.pdf

[74] http://www.energy-community.org/pls/portal/docs/36330.PDF

Figure 12 Financial mechanisms for sustainable energy financing



4.2.2 Assess the merits and drawbacks of each option

The following table provides a detailed breakdown of the characteristics, advantages and disadvantages for each of the financial mechanisms listed above. Preferential loans, credit guarantees and equity can be provided either to the ESCO via energy performance contracts (EPCs) or directly to the end-user. The detailed description of each option is provided in Appendix A.

Table 6 Advantages and disadvantages of each financing mechanism

	Description	Advantages	Disadvantages
Grants	Grants are non-reimbursable financial contributions for the implementation of specific SE measures 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.	• Versatile and can be used to achieve a variety of policy objectives (e.g. to support innovation and technology development, target 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 or beyond 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 or financially constrained markets	• 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.
Preferential loans	Preferential 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. The loan configuration varies depending on the borrower, lender and the type of measures taken; however it is usually configured in such way as to take into account real payback time. In the context of ESI funding, preferential loans can be originated by a financial intermediary with support from an OP based on a risk-sharing arrangement. Under such a set-up, the loan packages funding from the financial intermediary at market interest rate and funding from the OP at below market interest rate.	• 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.	• EE savings may not always be considered as a cash flow by some financial intermediaries, often extending the pay-back period for the measure. • Final recipients do not always see the advantage of a loan with low interest rates and are less incentivized to take part. • Not very suitable for poorer households who have no income to repay the loan.

	Description	Advantages	Disadvantages
Guarantees	Guarantees refer to a risk sharing mechanism where "the guarantor" entity (e.g., bank, MA) assumes a debt obligation in case a borrower (e.g., ESCO) defaults. Guarantees can be partial, where the guarantor is only liable for part of the outstanding balance at the time of default, usually defined as a fixed percentage. A loan guarantee allows beneficiaries/final recipients to receive a loan at a preferential rate since the guarantee covers the risk run by the bank in providing the loan.	• 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, in relation to technologies or project approaches where they have less experience. • Help project developers (or loan applicants) to access finance and reduce the cost of capital. • 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.	• 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.
Energy performance contracting with ESCO finance	Energy Performance Contracting (EPC) is an arrangement in which a contracting partner (e.g. ESCO) enters into an integrated contract with the end-user and the financing institution to design and implement energy conservation measures with a guaranteed level of energy performance for the duration of the contract. The stream of income from energy savings yielded from the measures is used to repay the upfront investment costs, and payment is based on the achievement of EE improvements and on meeting other agreed performance criteria. An EPC can be arranged with the ESCO borrowing from banks or investors in order to finance the investment. In such a case, in order to reduce its balance sheet debt, the ESCO may sell future payment streams to a bank in a process called forfeiting. Cohesion Policy funding in an EPC can provide preferential loans to ESCOs, guarantees or equity as a tool to encourage end-user participation, access to finance and ensure achievement of energy savings.	• Guarantees a certain level of energy savings and shields the client from any performance risk. • End-user experiences guaranteed project cost, energy and financial savings, and equipment performance. • The ESCO has expert knowledge of technical requirements, permit legislation and support schemes. • Enables facility upgrades to be paid for immediately, bringing forward future energy, carbon 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). • SE measures improve working and living conditions and increase value of the building. • Allows organisations to disconnect project debt from the building owner. • In EPC with ESCO finance, the loan can remain off balance sheet for the building owner and be on balance sheet for the ESCO.	• Complex arrangement - establishing an EPC is time-consuming and requires (external) expertise since each project needs to be assessed individually to estimate potential savings. • After contract is signed the facility owner is tied to one vendor for the term of the contract. • 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. This is particularly interesting in the public sector. • Measurement and Verification (M&V): while the contact is running, the results (energy saved) need to be continuously monitored. • Any failure or shortfall from the expected result requires reconciliation to recover shortfall. • EPCs only concern an agreement on savings, not on the measures to be implemented.

	Description	Advantages	Disadvantages
Energy performance contracting with owner finance	In the case of EPC with owner finance, the contractual arrangement between the ESCO and the building owner regarding SE measure implementation and guaranteed energy performance levels can be the same as for EPC with ESCO finance. The difference is that the building owner provides the money required for the investment (from their own funds or a loan provided by a bank). In this context, Cohesion Policy funding can provide preferential loans to building owners or guarantees.	Generates most of the advantages of an EPC with ESCO financing, including: • Guarantees a certain level of energy savings and shields the client from any performance risk. • End-user experiences guaranteed project cost, energy and financial savings, and equipment performance. • The ESCO has expert knowledge of technical requirements, permit legislation and support schemes. Key difference is that the building owner retains a larger share of the savings realised; the building owner can also take over some of the functions that the ESCO might have performed including ordinary operation management or fault clearance. The EPC package can be tailored to the needs and experience of the building owner. Also, when the building owner has a high credit-rating (e.g. a municipality) and the possibility to take on more debt, they may be in a position to get lower interest rates than an ESCO.	• Building technology measures can be mostly refinanced from future energy cost savings within a project period of 10 years. However, this is not possible for building construction measures, such as building envelope insulation. Consequently the building owner will be required to make any significant upfront investments. • When the building owner finances a SE project with a loan, the loan is capitalised on the owner's balance sheet which then reduces its ability to obtain credit for other projects.

Box 23 The use of financing mechanisms in Italy, Estonia and Bulgaria

Grant based approach, Italy

The Energy Regeneration of Social Housing project in Corso Taranto (Turin) is part of the Region of Piedmont OP 'Sustainability and Energy Efficiency', running in the programming period 2007-2013. The project provided residents of 650 residences grants to implement the following measures:

- Windows replacement,
- Connection of individual flat heating systems to the centralised heating system,
- Renovation of the front façade.

Estimated total expenditure: €7m (5 from ERDF) *Average expected energy saving*: 80% reduction in energy consumption

Loan-based approach: KredEx Fund, Estonia

Under Kredex, the minimum loan amount is 6,400 euros for one apartment building. The loan maturity is up to 20 years and average interest rates in 2012 were at around 3.5% to 4%. Interest rates are fixed for a period of 10 years, while with normal commercial loans they can be fixed for only five years in Estonia. At least 15% of the total amount must be co-financed by the final recipients. Between 26th June 2009 and 30th June 2013, 534 loans for 515 buildings were financed.

The fund represents a successful example of FEI implementation for EE in buildings. There have been almost no cases of unsuccessful projects. Through the system of subsidized loans, final recipients are incentivised to make careful consideration of the measures to be taken, avoiding wasteful use of grants and subsidies.

Estimated total expenditure: €75.4m *Loans disbursed*: €54.4m *Average expected energy saving*: 38%. *Average size of building*: 2,445m²

Different mechanisms combined: Energy Efficiency and Renewable Sources Fund, Bulgaria

The Energy Efficiency and Renewable Sources Fund (EERSF) provides three main categories of financial products: Loans, Partial Credit Guarantees (PCGs) and Portfolio Guarantees to finance services from ESCOs on behalf of municipalities, corporate clients and private individuals. Technical measures covered by the fund include building rehabilitation, street lighting, heating systems and EE measures in industrial processes. Preliminary condition for the application is the performance of an energy audit.

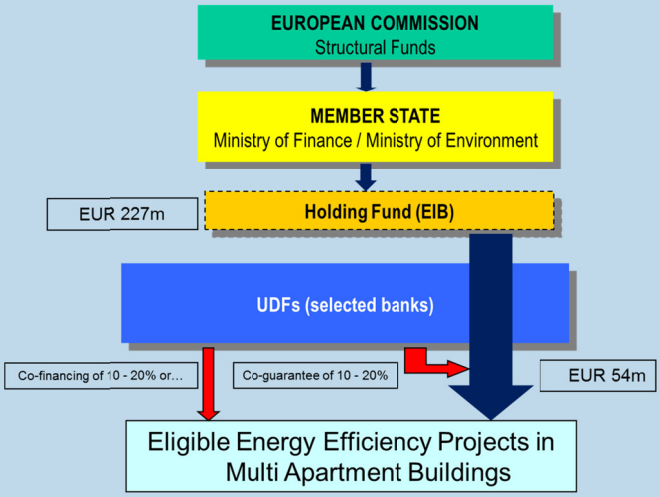
Estimated total expenditure: €24.1m *Projects financed through loans:* 160 *Credit guarantees on ESCO contracts:* 29

In the 2007-2013 period, the Joint European Support for Sustainable Investment in City Areas (JESSICA) supported sustainable urban development and regeneration through financial engineering mechanisms. The initiative allowed EU countries to invest some of their Cohesion Policy Fund allocations in revolving funds to help recycle financial resources and accelerate investment in Europe's urban areas. Up to 2011, 62 JESSICA Evaluation Studies were completed at a national and/or regional level in 21 MSs. Although this initiative will not exist as such in the 2014-2020 period, Box 24 provides an illustration of this mechanism.

Box 24 JESSICA Holding Fund in Lithuania

The JESSICA Holding Fund in Lithuania was set up with an initial structural fund contribution of €127mln (and €100mln from national funding). The set-up of the Fund and implementation of FEIs were already included in the original OP, which covered all sectors.

The Fund is managed by the EIB on behalf of the MA. The MA (the Ministry of Finance) and the Ministry of Environment are directly involved in the decision-making process through the investment committee. The diagram below presents the Fund overarching scheme.



The Fund offers a combination of subsidized loans and grants for the full renovation of multi-apartment buildings and student dormitories. The loan length can be up to 20 years with a two-year grace period and the interest rate is fixed at 3%. Grants and subsidies were initially precluded from the scheme. However, it became apparent that combining loans with non-refundable grants was a much more powerful incentive for homeowners.

From the initial planning to the current implementation, the MA benefited from the support of the EIB including for the preparation of the initial feasibility studies and technical reports. An initial feasibility study was carried by the EIB, which provided detailed suggestions for the selection of final recipients and measures to be taken. After four years of operations, JESSICA in Lithuania is considered one of the most advanced holding funds in Europe.

The peculiarity of the national situation should not be overlooked. In Lithuania, there is a large number of old multi-apartment buildings and improving living conditions for their residents is an important goal. The government and the two involved ministries have kept a close eye on the process. A series of legal acts, often hotly debated, were approved to facilitate its implementation. Overall, the FIs, the technical measures, the beneficiary's role etc. are regulated by national law.

Awareness raising and knowledge sharing are considered key factors for the successful implementation of the Fund. Stakeholders (e.g. homeowners or housing managers) do not have the required knowledge to assess the validity of a project proposal. The training of "housing or project managers" is especially important, as they often face difficulties in dealing with homeowners. For these reasons, workshops and training sessions are held regularly.

4.3 Evaluate potential combinations of forms of support

In order to extract maximum benefits from the implementation of FIs, MAs will be required to assess the best way (or ways) that ESI grants and FIs set up with ESI Funds contribution can be combined with each other. When considering how the different mechanisms can be combined, MAs must bear in mind the territorial specificities and needs identified in the OP, including in the *ex-ante* evaluation.

NON REIMBURSABLE GRANT COMBINED WITH FINANCIAL INSTRUMENTS

MAs can tailor the interventions to the needs and objectives, using for example preferential loans or credit guarantees and combining them with grants. In principle MAs are free to combine more than one type of

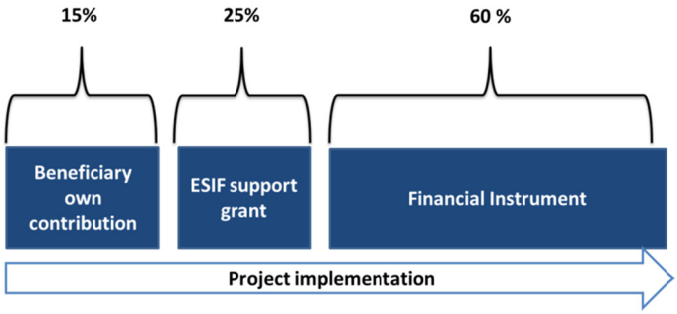
financing mechanism in a particular programme. However, certain factors should be considered when combining them:

- The level of maturity of the local market, the key players and their needs;
- The nature of the instrument and how it best addresses the needs of stakeholders;
- The type of projects to be financed, e.g. if they relate to research, development or implementation.

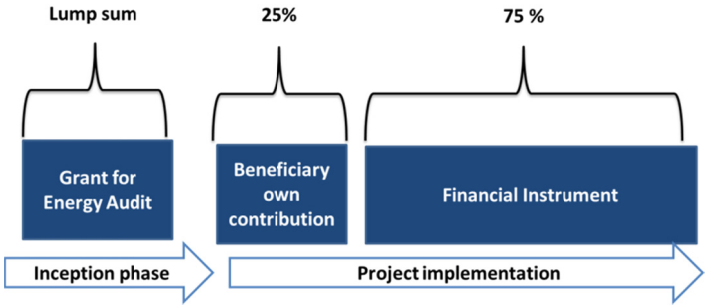
The most common combination is to package soft loans with non-refundable grants. As mentioned in section 4.2, preferential loans alone might not be sufficient to incentivize stakeholders to undertake EE measures, in particular homeowners, and there may also be social policy aspects. While MAs should prioritise the use of preferential loans when disbursing Cohesion Policy Funds for SE projects in buildings, they must also ensure that stakeholders are sufficiently incentivized to undertake projects. In addition, combining grants with loans helps ensure a smooth transition from grant-only systems to the use of innovative FIs.

There are different ways to combine non-refundable grants with FIs. For each combination MAs must adapt the mix of grant and FI depending on the different project typologies and final recipients.

Grants can be an integral part of the support provided for project implementation. In this case, the MA can offer a combination of 1/3 grant and 2/3 loan for instance to any final recipient achieving EE improvements above a pre-established threshold.

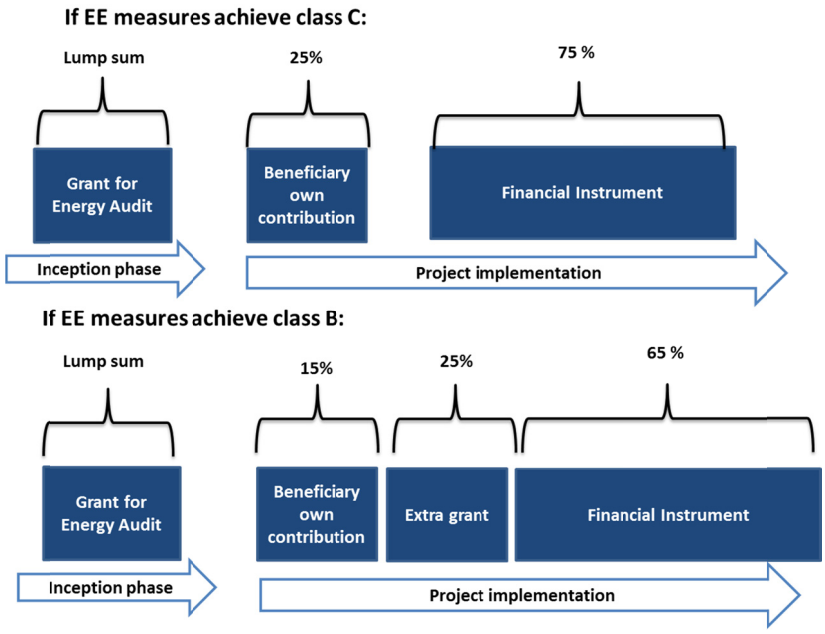


Grants can be used to cover the initial costs of project implementation, such as energy audits (as long as they aim to go beyond the legal requirements set out in the EED)[75] or technical assistance for feasibility studies, or as a credit-enhancement mechanism by reducing the risk and thus the interest rate for the final user.



The intensity of the grant could also be increased as the final recipient's project achieves higher EE targets or for social reasons.

[75] Large enterprises are obliged under the EED to conduct regular energy audits (at least every four years); as such, Cohesion Policy funding should not be used to finance energy audits in this case.



Box 25 A combination of grants and loans to fund EE improvement in housing, EXOIKONOMISI KAT' OIKON, Greece.

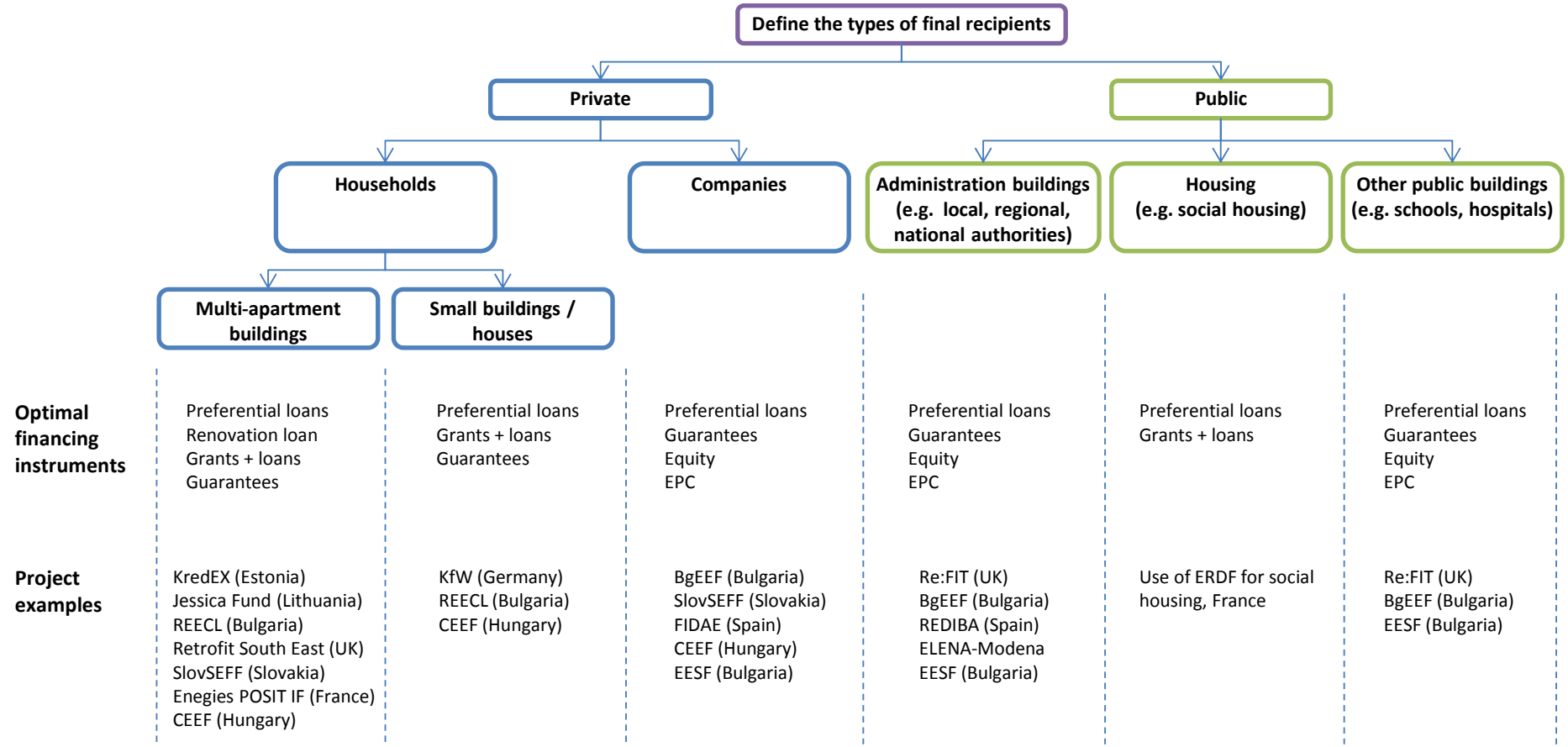
Through a scheme known as EXOIKONOMISI KAT' OIKON, the Greek government has used the ERDF allocation to fund EE improvements in housing. A third party, selected by the national authorities, manages the Fund and loans are disbursed by commercial banks. The main objectives are to reduce the energy consumption of residential buildings and to reduce CO_2 emissions. The initiative addresses approximately 100,000 households and covers the following measures: thermal insulation, external frames, boilers and solar water heaters.

The fund is divided into a revolving fund (€241m) providing loans for the implementation of EE measures and a grant fund (€155m). The size of the grant and the interest rate applied to the loans varies depending on the household income. Low-income households are entitled to a zero interest loan and a maximum 30% complementary grant. Medium and high-income households are entitled to a low interest loan. Medium-income households can also apply for a grant worth 15% of the total project value.

4.4 Choose the right options

Depending on the local context, the type of buildings and final recipients targeted and the objectives of the programme, MAs should evaluate the appropriateness of using certain financial mechanisms versus others. The following decision-support diagram illustrates where financial mechanisms can be deployed to ensure an efficient use of Cohesion Policy funding and optimal project and programme outcomes.

Figure 13 Decision support diagram



Case studies featured in the guidance:

Kredex (Estonia): Box 34, Appendix D
Jessica Fund (Lithuania): Box 1, Box 24, Box 30
REECL (Bulgaria): Box 35, Box 36, Appendix D
Retrofit South East (UK): Appendix D
SlovSEFF (Slovakia): Box 26
Energies POSIT'IF: Box 28
CEEF (Hungary): Box 22
KfW (Germany): Box 11, Box 15, Box 19, Appendix D
BgEEF(Bulgaria): Box 26, Box 37, Appendix A
EESF (Bulgaria): Box 8
RE:FIT (UK): Box 27, Appendix A
Use of ERDF for social housing, France: Box 1, Box 9

5 Step 5 - Choose accompanying activities

In addition to financial mechanisms for the actual investments in the buildings, programmes can incorporate various activities such as project development assistance (PDA) and certification schemes to support local supply chains, develop market capacity and help overcome common issues such as paucity of skilled staff and substandard workmanship concerning building renovation and new-build construction.

5.1 Project development assistance

Project development assistance (PDA) facilities or schemes can be established by MAs to help develop innovative and bankable projects and assist project developers throughout the various stages of the project development cycle. MAs can develop their own PDA programmes or use existing facilities set up in the EU.

5.1.1 Develop PDA packages to help build capacity among stakeholders

PDA incorporates a range of activities provided by the programme management or external experts to support the design, financing and implementation of SE projects. The assistance needs to be targeted at areas where the needs are greatest and can involve the participation of different actors such as financial institutions, project developers, end-users, and local authorities, depending on the specific needs of the programme and the stakeholders and institutions involved.

The 'needs assessment' conducted at the programme design stage should be the first step in identifying areas of weakness in the skills and capacities of the various stakeholders needed to successfully implement the programme activities.

PDA can take various forms. Activities that could fall within the scope of a PDA programme include mobilising relevant stakeholders and building capacity, developing feasibility studies and business cases, and addressing legal issues such as procurement and contracting. Such activities can be co-financed by ESI Funds as described under Step 1.3.

Box 26 Project development assistance in Bulgaria and Slovakia

The **Bulgarian Energy Efficiency Fund (BgEEF)** incorporates PDA in several different areas. Technical support is provided through building energy engineers to determine the EE potential and propose packages of EE measures. Technical support is also provided to the finance community to facilitate risk assessment and project structuring.

The **Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF)** provides PDA to help end-users to identify the most appropriate EE measures free of charge. This involves conducting energy audits, developing efficiency improvement plans and supporting the completion of loan applications.

A number of initiatives have been developed by the EC during the 2007-2013 period, some of which will continue in the 2014-2020 period. These are described in more detail in the following sections.

MAs can use existing PDA programmes as good practice examples to develop their own PDA programmes.

5.1.2 Existing project development assistance (PDA) facilities

During the 2007-2013 period, the EU has set up a number of PDA facilities for public bodies and financial institutions. They cover a share of the costs related to the preparation, structure and launch of the investment project or programme (such as feasibility and market studies), detailed energy audits and data collection, structuring of investments, business plans, monitoring system development and preparation and launch of tendering procedures. The support is conditional on achieving a leverage factor of 15 or 20, i.e. each Euro of EU funding must trigger at least 15 or 20 Euro in investments. In the coming years (until the full use of funds), support may still be available under the European Local Energy Assistance (ELENA) Facility[76] with the EIB, EBRD and KfW[77].

[76] An initiative of the European Commission and the IFIs (EIB, EBRD, CEB and KfW) established as of 2009 under the Intelligent Energy-Europe Programme II. ELENA provides grants covering technical assistance for preparing larger SE projects (above €20million). The required leverage factor is 20 (€20 in investment commitments for every euro provided by the facility).

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

Under the 2014-2015 Work programme of the Horizon 2020 programme (Energy Challenge, Energy Efficiency focus area, topic EE20, which is the continuation of the Mobilising Local Energy Investments – PDA facility funded under the IEE2 programme[78]), PDA will be provided to public and private project promoters (including infrastructure operators, retail chains, cities and SMEs/industry) for the development of SE investments ranging from €6million to above €50million. PDA support does not finance investments directly, as the main objective is to develop a credible project pipeline and demonstrate the financial viability and sustainability of large-scale SE investments. These PDA activities will be complemented by the continuation in the 2014-2020 period of the ELENA facility implemented by the EIB, addressing large-scale investment projects.

Similar facilities could be implemented with Cohesion funding at the MS level; the requirement of a leverage factor is a key element to ensure the efficient use of the funds.

Box 27 RE:FIT, Public procurement support through ELENA funding, UK

RE:FIT is a public procurement initiative launched by the UK's Greater London Authority (GLA), which provides technical assistance and support for the public sector to retrofit existing buildings through energy performance contracting. Under Re:FIT, the initial investment by the building owner is offset by the guaranteed savings offered by the ESCOs, thus providing a cost neutral solution over the term.

The London Green Fund (LGF) provides one potential source of funding through the London Energy Efficiency Fund (LEEF). The LGF includes funding from the London Development Agency (LDA), the London European Regional Development Fund (ERDF) Programme and the London Waste and Recycling Board through the Joint Energy Support for Sustainable Investment in City Areas (JESSICA) initiative.

To manage the RE:FIT programme and facilitate the uptake by public sector organisations, the GLA set up the Programme Delivery Unit (PDU). To do so, the GLA applied for funding from the EC under the ELENA programme, which covered 90% of the total sum of the application (the rest was financed by the GLA). The PDU provides direct support and technical assistance to public authorities to implement an efficient public procurement procedure for the selection of an ESCO. The PDU has selected a restricted number of ESCOs that can be used by public-sector organisations.

Box 28 Energies POSIT'IF, France

The Ile-de-France region in France set up, with support from MLEI, an initiative called "Promote, Organize, Support, Imagine the energy Transition in Ile-de-France territory (POSIT IF)" at the beginning of 2013. This initiative is a public-private venture which aims to develop an Energy Service Company (ESCO) offer focusing on SE refurbishments for collective housing and public buildings.

The venture is set-up as a semi-public company, called Energies POSIT'IF, with 85% of capital held by the Ile-de-France region and several local authorities and 15% of capital held by partner financial institutions (Caisse des Dépôts et Consignations and Caisse d'Epargne). The project targets deep refurbishment of private condominiums and includes advisory activities to individual co-owners (before and after refurbishment).

The Energies POSIT'IFs team focuses on contract negotiations and financing offers while the technical implementation is subcontracted. Investments are financed through equity, debt, preferential loans (such as from Caisse des Dépôts or EIB), and the sale of energy savings certificates (white certificates).

5.2 Certification and pre-selection of contractors

CERTIFICATION SCHEMES CAN ENSURE THAT PROGRAMME RESOURCES SUPPORT HIGH QUALITY INSTALLATIONS

Certification schemes present an effective mechanism for ensuring the quality of equipment and workmanship. Such schemes ensure that only equipment meeting specified standards of quality and efficiency is eligible for support. Energy auditors and equipment installers can also be covered by such schemes as a way of ensuring that suitably qualified individuals participate in the programme.

Appropriate sizing of SE equipment and the quality of installation can have a significant impact on the level of performance and the EE improvements seen in practice. The objective of such schemes is therefore to make sure that the most appropriate package of measures is identified and that it is installed correctly.

Box 29 Ensuring the quality of the works or equipment

KredEX fund, Estonia. Monitoring the quality of the works has at times been difficult. To overcome this, KredEx relies on the support of a local NGO to collect and evaluate feedback from previous projects.

[78] http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-energy_en.pdf, p34

Green Deal, UK. Under the Green Deal scheme, only approved equipment, specified by a certified assessor and installed by an installer certified under the Microgeneration Certification Scheme (MCS)[79] is eligible.

PRE-SELECTING CONTRACTORS CAN BE AN EFFECTIVE WAY TO ENSURE QUALITY OF WORKS AND TO REDUCE ADMINSTRATIVE BURDEN

The programme management can elect to conduct a single tendering exercise, on the basis of which a pool of approved contractors can be identified and made available to participating projects. By placing the requirement on projects funded through the programme to use these approved contractors, the programme can help ensure that all work meets pre-defined quality standards. In addition, individual project managers do not need to individually conduct potentially burdensome open tendering and contractor selection exercises. This can be of particular benefit to smaller project activities.

Box 30 Determine eligible options in practice, Lithuania

The JESSICA Holding Fund in Lithuania was set up with support from the ERDF and EIB. At the programme inception, final recipients were free to select any type of measures included in the national legal act on energy efficiency. The legislation is very broad and includes a wide variety of measures. The EIB, which is currently managing the Fund on behalf of the MA, realised that it was too burdensome to evaluate appropriately proposals with such a multitude of technology options and suppliers. Recently, it has been ruled that final recipients are allowed to choose from a pre-selected list of service providers offering services delivered through approved working methods. The list of eligible measures remains quite broad. There has been considerable interest in the programme (amounting to 2,000 buildings) and 130 projects are currently being financed.

5.3 Supporting development of local SE supply chain

Depending on the scope of a programme and its particular objectives, certain activities can be undertaken to support the development of the local SE supply chain. Actively involving local supply chain stakeholders can help maximise its impact in terms of generating local jobs and establishing a skills base that can support SE activities in the future, beyond the life of the original programme.

Working within the framework of EU state aid and competition rules, activities can include engaging local businesses through communication events, directing support to raise awareness, developing skills and building networks. This can take the form of workshops, seminars, support for local apprenticeships, training courses as well as development of an online community. For example, under the Green Deal Pioneer Places fund in the UK, Local Authorities were awarded funding to help develop a strong network of approved assessors and installers, linking where appropriate with local training colleges.

Box 31 "Duurzame vraag? Dito aanbod!" Ghent, Belgium

The city of Ghent has launched the project “Sustainable demand? Meet sustainable supply!” to meet the demand of the household sectors with a better offer from the construction sector. The project was initially funded through ERDF funds for a period of four years. It was so successful that it has been prolonged with the city’s own funds while most of the services provided are still for free.

The main scope of the project is to provide on the one hand free technical assistance to households for the selection of adequate EE measures. On the other hand, it provides continuous training to building companies to ensure the best and most recent techniques are used. The team in charge of the projects has developed contacts with the business sector in the field (contractors, suppliers, industry representatives etc.) to foster knowledge sharing and the establishment of sustainable supply models.

6 Step 6 - Develop programme objectives and indicators

6.1 Refer to the EU guidance on monitoring and evaluation

PROGRAMME PERFORMANCE MUST BE EVALUATED USING APPROPRIATE QUALITATIVE AND QUANTITATIVE INDICATORS

To monitor the progression of a programme to implement SE projects, and to report effectively on the results, it is important to establish an appropriate set of indicators. Well-defined indicators underpin effective

[79] http://www.microgenerationcertification.org/

programme monitoring and evaluation; they also enable programme design and management to be adapted over time to ensure objectives are fully met.

For programmes employing innovative financing mechanisms such as the Energy Performance Contracting (EPC) model, it is essential to accurately assess individual project performance using a measurement and verification (M&V) protocol since actual energy savings underpin the financing model (see Step 10). Project performance indicators collectively feed up into programme level indicators to facilitate management and evaluation of the programme as a whole. It is therefore critical that standardised approaches are employed across projects so that results are reliable and comparable. The European Commission has produced a guidance document on monitoring and evaluation for the programming period 2014-2020. This document, discussed in more detail under Step 11, sets out concise guidance for establishing monitoring and evaluation frameworks, including the definition of appropriate indicators[80].

6.2 Develop an intervention logic model

DEVELOPMENT OF AN INTERVENTION LOGIC MODEL IS A GOOD STARTING POINT FOR PROGRAMME EVALUATION

A logic model can be used to set out the objectives of a programme and how they are expected to be achieved. Key components of the logic model are outlined in Table 7.

Table 7 Definition of logic model terminology with examples for a hypothetical residential energy efficiency programme

Term	Definition	Example
Rationale	Rationale for intervention	SE investments bring significant environmental, social and economic benefits. Financial, institutional and informational barriers exist and inhibit investments
Inputs	Resources required to achieve the programme objectives	EU funding and leveraged private funding Administrative time in establishing, delivering, monitoring and reporting on the programme
Activities	What is delivered on behalf of the programme to the recipient	Awareness-raising campaigns to boost uptake of measures Use of innovative finance mechanisms to support SE improvements in public and private buildings Establishment of training programmes to improve skill base of local contractors
Outputs	The immediate effect of the delivered activities	Greater awareness of SE amongst householders Installation of RE technology and EE measures Trained local or regional supply chain
Results	The results (or intermediate outcomes) of the programme produced by the recipient	Reduced energy consumption and lower domestic heating costs Jobs created within EE/RE industry Loan repayments from households for measures

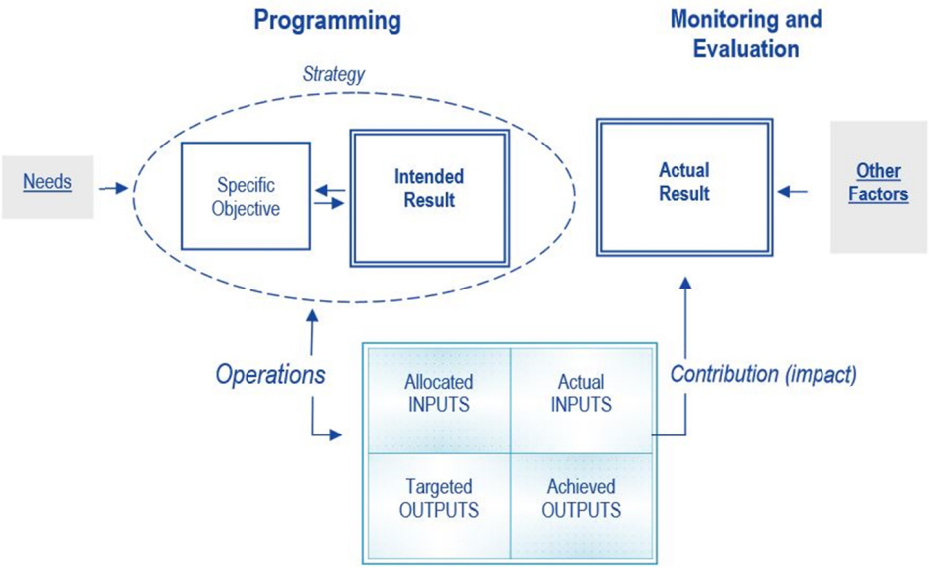
A programme logic model informs and relates to a 'theory of change', i.e. an assumption or hypothesis of why an intervention will succeed in producing the desired outputs, results and impacts. The logic model provides a basis against which evidence of the achievements of a programme can be tested. It also allows the programme manager to determine whether the stated outputs and results have been delivered and, thus, whether the objectives have been achieved.

It is therefore important to establish the objectives of the programme at the earliest opportunity. These objectives (often referred to as specific objectives) should typically be expressed in terms of intended results.

Once defined, these can be used as the basis for determining appropriate indicators. The objectives, inputs, outputs and results of a programme can be linked as in Figure 14.

[80] Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014.
http://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf

Figure 14 Basic evaluation framework and the use of indicators[81]



Programme monitoring is primarily concerned with ensuring that programme delivery is on track. Monitoring focuses on tracking inputs and outputs. Outputs are the direct products of a project or programme and can be defined through **output indicators,** which need to be closely aligned with the intervention. Poorly defined output indicators will mean that changes will not be visible to managers.

Result indicators describe the direct effects of a programme (formed by the sum of the projects within it). These may occur after some time but need to be directly linked to the activities undertaken. Selecting clear result indicators facilitates understanding of the problem and the policy need and will facilitate a later judgement about whether or not objectives have been met.

The Guidance Document on Monitoring and Evaluation provides advice on factors to consider when setting output and result indicators.

6.3 Define appropriate indicators

SPECIFIC INDICATORS AND EVALUATION REQUIREMENTS MUST BE USED BY THE PROGRAMMES AND PROJECTS SUPPORTED BY ESI FUNDING

The CPR sets out the evaluation requirements for activities supported under the ERDF, ESF and the CF. These include the requirement for evaluations before, during and after the programming period. For activities supported through the ERDF and the CF, the Commission has stipulated a series of output indicators that, where relevant, must be used to support monitoring under Article 6 of the ERDF regulation and Article 5 of the CF Regulation. A number of these "common indicators" are applicable to activities related to SE in buildings. This set can also be expanded with additional programme-specific indicators according to the nature of the programme. Appendix C sets out details of potential output indicators that can be used and adapted by programme managers. Mandatory output indicators set out in the regulation are also highlighted.

Under the new framework, MAs are required to send the Commission a specific report on operations comprising FIs. This forms an annex to the annual implementation report.

Box 32 Indicators used by the ELENA-EIB facility

The ELENA-EIB facility uses the following set of indicators[82]:

- The number of bankable projects identified;
- Investment mobilised;
- The cumulative energy savings achieved from the financed projects;

[81] Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014.

[82] Intelligent Energy – Europe II, Implementation Report 2012 (2013), http://ec.europa.eu/energy/intelligent/files/library/reports/iee-2-impl-report-2007-2012.pdf

• The cumulative reductions of greenhouse gas emissions from the financed projects;
• The cumulative RE production from the financed projects and contribution to the overall share of RE in energy consumption achieved from the financed projects.

Key considerations when determining appropriate indicators include:

Use the SMART principle (i.e. Specific, Measurable, Achievable, Relevant, and Timely) which is a well-recognised method of developing a set of uniform quantitative and qualitative indicators.

Optimise the use of reporting resources. Indicators should be carefully selected to obtain the optimum balance of reporting rigour and administrative burden. Programme managers should consider the data gathering and administrative burden associated with each indicator. The list of indicators should be minimised as far as possible to a level that enables effective programme management whilst meeting the reporting requirements of funding bodies.

Consider what is the smallest practicable reporting unit that should be used while taking into account the implications for data gathering and reporting burdens. For example, in the domestic sector, defining an indicator for energy performance improvements at a household level is preferable to one defined at a building level. The ability to analyse data at a more precise level can reveal important lessons for programme management and design.

Seek consistency. Clearly defined indicators help to ensure that data gathering requirements are interpreted consistently across the range of actors within a programme.

7 Step 7 - Launch application process

7.1 Define process and timeline

Two types of processes can be used to receive and select project applications: calls for project proposals and open applications. Calls for proposals can be particularly appropriate for relatively large-scale projects and/or situations where there are relatively few applicants or funding is limited. In such cases, a relatively limited number of applicants can compete and the MA can select the best offer. If the number of applications is high and/or projects are relatively small in scale, the administrative costs may become disproportionately high and/or the selection of projects may become too complicated. In such circumstances, open application processes are more appropriate. This is often the case with large-scale (national) programmes aimed at the residential sector, which can generate a large number of applications from homeowners. While calls for proposals enable the MA (or consultant authorized by the MA) to select the best project, in an open application process, the MA can define eligibility criteria and the applicant can select the most suitable technical measures.

CALL FOR PROJECT PROPOSAL

Description: A tendering process is an effective approach for selecting the best projects based on the desired outcomes (whether it be cost-effectiveness, level of energy performance, outreach, co-benefits, etc.). Applicants can compete with each other to offer the best project outcomes for a certain amount of public funding. Tendering parties can have the freedom of how to realize the savings, for instance by selecting the most cost effective measures and/or by bringing in private money to scale-up the initiative (increasing the leverage effect). The MA can then select the most effective measures in terms of savings achieved for a given amount of public funding.

Financing instrument: grant combined with loan, ESCO contract, preferential loan.

Type of final recipient: ESCOs, social landlords, public authorities, commercial buildings.

Applicability: Standard renovation, deep renovation, NZEB.

Box 33 Call for project proposals, Czech Republic

A call for proposal process was used for a building renovation project in the Pardubice Region of the Czech Republic. The local government hired a consultancy to facilitate the process on behalf of the local authorities. The consultancy organized the whole tender including development of public tender documentation and evaluation of proposals.

Tenderers were given responsibility for achieving energy savings and had the freedom to propose sets of measures to be deployed. The projects did not involve public funding and no quantitative objectives were set. As such, there was a strong incentive to select the most cost effective measures (low-hanging fruit) rather than undertaking deep renovations (with longer payback periods and higher upfront investment). Nevertheless, tendering processes can be suitable for deep renovations if quantitative objectives are established and public funding is available for bridging financial gaps.

OPEN APPLICATION PROCESS

Description: Open application processes support the distribution of funding or loans to projects that meet a set of eligibility criteria. If funding or loans are limited, projects can be selected on a first-come first-serve basis until funds are exhausted. In situations where the budget is not capped, all projects meeting the eligibility criteria can be selected. Many recent energy renovation support programmes for buildings have adopted an open application process. Such process is especially appropriate where there is a large number of applicants, in which case a call for proposals may become too complicated.

Most successful examples of application processes with a high number of applicants (be they for residential, public or commercial buildings), have decentralized application and selection processes. In such cases, the selection of technical measures often relies on the expertise of local technical advisors and installers and this aspect of the process needs to be managed carefully. To ensure optimal selection, lists of eligible (authorized and accredited) installers can be established (e.g. as in the KfW and REECL programmes). In case of fraud/underperformance, installers can be removed from the list. This system has been successful in building trust between customers and installers and ensuring that the most appropriate technical measures are implemented.

It is also important to minimise any barriers that may deter applicants from applying for loans and grants. A successful feature of large-scale national programmes has been the involvement of banks with local offices. This increases the level of publicity of the programme and lowers the barriers to homeowners and businesses applying for loans and grants. The internet is also increasingly being used to facilitate the application process.

Financing instrument: Grant combined with loan, preferential loan, guarantee.

Type of final recipient: Private householders, social landlords, commercial buildings.

Applicability: Individual SE measures, standard renovation, deep renovation, NZEB.

Box 34 Open application process, Estonia

The **KredEX Fund** in Estonia applies an open application process for the selection of projects. The basic requirement for a loan is that the project achieve energy savings of at least 20% in apartment buildings up to 2,000 m² (closed net area) and of at least 30% in apartment buildings larger than 2,000 m². Final recipients are free to select the measures to be implemented and the service providers.

7.2 Define project evaluation criteria

Evaluation criteria should be in line with the eligibility criteria that have been developed to select projects (see section 3.5). In order to stimulate deep renovations, it is important to set proper evaluation criteria. A key criterion for deep renovation projects is the amount of energy saved compared with a baseline scenario.

Box 35 Project monitoring – the REECL programme, Bulgaria

The REECL programme employs a comprehensive auditing strategy whereby 100% of the application forms (both financial and technical) are audited by the project consultant managed by EBRD. In addition, installers need to draw up documents to prove that measures have been installed at the costs indicated in the application forms. Around 17% of projects then receive a site visit by the consultant to verify that measures have been properly installed.

Project evaluation can be based on a set of standard criteria valid for all projects financed through the OP and a set of more specific criteria related to SE financing. Table 8 provides a list of criteria used by an Italian OP.

Table 8 Italy OP "Renewable Energy and Energy Efficiency": selection criteria

Category	Description	Criteria type
Action	Actions to improve the energy efficiency of buildings and the use of energy utilities	
Activities covered	Energy audit	
	Partial and deep refurbishment	
	Public lighting	
Related indicator	Consumption reduction (kilowatt-hours per year)	Specific - Quantitative
Eligibility criteria	Final result and degree of replicability of the project	General - Qualitative
	Ratio between the reduction in energy consumption and the financial participation	Specific - Quantitative
	Use and dissemination of eco-friendly materials for the construction industry	Specific- Qualitative
	Integration of energy savings and use of solar energy	Specific- Qualitative
	Plan for monitoring results and interventions	General - Qualitative
	Enhancement of the energy used per square meter	Specific - Quantitative

7.3 Define information that should be provided by participants

As selection processes and applicants differ, it is not possible to prescribe a detailed set of documents that applicants need to deliver. This will be case dependent, taking into account transaction costs and the relative size of the funding for each project. For instance, the level of documentation required may be more extensive for large projects than for small-scale residential projects. However, in all cases it is important that applicants prove that they have the financial and technical capacity to implement the project.

Information to be requested at the application stage can fall under four categories: general, technical, financial and administrative. Suggested minimum information requirements in each category are outlined in Table 9.

Technical information should cover the pre-installation situation, the nature of the measures or renovation proposed and estimates of the likely post-installation energy performance characteristics of the building. For residential schemes, more detail may be required. Technical application forms should include technical specifications and details (including prices) of the eligible equipment and materials installed as well as the name and address of the supplier/installers.

Financial application forms should include details that are required for normal loan applications, such as income, age and outstanding debts.

An example of the information required within the REECL programme is presented in Box 36.

Box 36 Information requirements – the REECL programme

The application, together with a written quotation from a supplier/installer for any eligible EE home improvement project, must be submitted to a participating bank's branch or the relevant eligible installer's retail outlet for processing.

When the eligible EE project is successfully completed, householders should submit an Incentive Grant Application Form to their participating bank with the required supporting documents including a completion statement and an original invoice that contains at least: date, name, address of the supplier/installers; technical specifications and details (including prices) of the eligible equipment and materials installed; the name and address of the householder and the status of payment.

For larger projects or contracts more typically suited for "call for project proposal" processes, application forms may also encompass standard administrative requirements including legal entity forms, bank reference forms, declarations of eligibility (such as the absence of conflicts of interest) and proof of economic and financial capacity.

Table 9 List of potential information to be requested at application stage

Category	Description	Documents where the information can be found
General	- Location - Type of building - Number of buildings - Total gross surface area (M^2)	e.g. land registry / cadastre, tenancy agreement
Technical	***Pre-implementation***	
	- Pre-implementation average annual primary energy consumption (KWh/M^2) ○ Specify what is included / excluded. (e.g. heating, domestic hot water, lighting, ventilation…) - Pre-implementation EPC rating	e.g. energy performance certificate, energy bills
	Proposed actions	

	- Details of proposed EE/RE measures
	  ○ Technology, certifications/standards, installing organisation
	  ○ Scope (building envelope or equipment/systems)
	  ○ Anticipated energy generation (KWh/year) (RE only) and details of whether grid-connected
	- Details of associated renovation
		e.g. energy audit report, energy performance certificate, manufacturer documentation

	Post-implementation	
	- Post-implementation EPC rating - Estimated primary energy savings (%) - Estimated GHG emission reductions (tCO_2)	e.g. energy performance certificate, energy audit report
Financial	- Total project cost - Details of any co-financing arrangements - NPV	e.g. feasibility study, quote from installer, loan application
Administrative	- Name and contact details for point of contact - Legal entity forms - Proof of economic and financial capacity - Declarations of eligibility	e.g. financial statements, company registration number (if applicable)

When establishing the list of data to be requested, MAs should aim to liaise with national ministries to understand what type of information they could be interested in collecting. Indeed, this is an opportunity to create datasets about building renovation, which are usually not available. As such, data-collection requirements should be discussed with the relevant players.

8 Step 8 - Select projects

8.1 Leverage previous steps to conduct project selection

Project selection is based on all the activities and parameters defined in the previous steps, including the definition of target buildings and final recipient, the choice of packages of measures or performance thresholds as well as of appropriate financial instruments, the establishment of project selection criteria and the nature of the application process.

8.2 Establish the appropriate framework to select projects

A number of steps need to be considered by MAs to facilitate the project assessment and selection process. These can include:

- **Forming an assessment committee.** The size and membership needs to be appropriate to the scale of the programme but contain sufficient building energy and finance expertise to be able to adequately assess applications.

- **Establishing a timetable.** This step needs to consider issues such as coordination with the accounting periods of applicants and funding bodies, interaction with other programmes or funding sources as well as availability of assessment committee.
- **Implementing suitable communication and information exchange channels** such as the set-up of a share-point to establish a secure method of sharing documents among the assessment committee.
- **Developing a project evaluation framework or scoring matrix based on the selection criteria.** This can help facilitate a consistent and transparent approach to project assessment.
- **Developing and maintaining a project selection database** including a checklist of documents submitted, the identification of gaps or queries, and the tracking of communications with other parties and requests for clarification.
- **Setting up a channel to provide feedback to unsuccessful applicants.** This can ensure that lessons can be learned from unsuccessful applications and, overtime, the quality of bids submitted can be improved.
- **Establishing a clear appeals protocol.** In the case of disputes or appeals, the use of a transparent appeals protocol is an important way of building confidence and encouraging participation.

Box 37 Project approval process – the Bulgarian Energy Efficiency Fund

When selecting projects, the Bulgarian Energy Efficiency Fund (BgEEF) takes the following steps:

- Application for credit
- Initial assessment of technical and financial viability and preliminary approval
- Assessment of credit risk (project and client) and specification of credit parameters
- Project approval by Credit Committee
- Project approval by Management Board
- Credit disbursement

9 Step 9 - Disburse funds

9.1 Assess options to disburse funding

The choice of financial mechanism selected under Step 3, will largely dictate the process through which funds are disbursed and the type of bodies involved. As discussed in Step 4, a number of different actors can be involved in the disbursement of funding. These can include EU financial institutions such as the EIB Group and the EBRD, as well as national public financial institutions, Special Purpose Vehicles (SPVs), also known as Dedicated Investment Vehicles (DIV), and private financial institutions.

Most MSs have implemented a range of equity and/or debt (loan and guarantee) instruments through various channels. MSs have directly contributed OP resources to either a venture capital fund, loan or guarantee fund, or through holding funds set up to invest in several funds. Instruments are implemented through a variety of governance models and legal structures specific to each MS or region.

Box 38 Special Purpose Vehicles (SPVs)

SPVs are legal entities (e.g. corporations, trusts or partnerships) established to perform a clearly defined or temporary purpose and can be used to support a range of transactions. SPVs enable an investor to avoid any associated assets or liabilities on its own balance sheet and are commonly used to support project financing. For instance, ESCOs can use SPVs in order to organise financing for a particular activity, drawing resources from a range of public and private sources. Local conditions in each particular MS or region will determine the specific governance models and legal structures utilised.

To facilitate and accelerate the start-up of new FIs while ensuring harmonisation of general conditions of co-operation, implementing body agreements should be standardised as far as possible. Where relevant, these agreements should be preceded by framework agreements covering issues such as implementation, management, trust accounts, accounting, monitoring and evaluation, audit, reporting or anti-fraud clauses.

Instruments have frequently been implemented through investment into holding funds. Under the JESSICA initiative for instance, holding funds have been managed by the EIB, which can receive a mandate to establish holding funds through the direct award of a contract by MSs or MAs. Other financial institutions can also be

selected to implement operations organised through a holding fund, either by way of public procurement or by way of a grant[83].

For the off-the-shelf Renovation Loan (see Step 4), the proposed eligible implementation bodies are public or private financial institution (including IFIs). A requirement is that the bodies selected have appropriate management capacity and a suitable track record in financing operations in the energy and construction sector and follow professional best practices.

9.2 Ensure compliance

All transaction must comply with the laws of the MS in which they take place as well as EU law. EU law prevails in situations where there is a conflict. In particular, any funding will need to respect State Aid rules or remain under the *de minimis* thresholds.

In addition, the applicable public procurement and anti-money laundering rules should be duly respected, particularly when considering selecting fund managers and implementing bodies.

In order to receive EU support, the financial intermediaries and final recipients must accept the possibility that the European Anti-Fraud Office (OLAF) may carry out on-the-spot checks and inspections. This condition is in place so as to protect the EU's financial interests[84]. The intervention should also comply with the requirements of various other bodies including the European Court of Auditors, EC auditors, MAs, Audits authorities, etc. as in the 2007-2013 period.

The proposed "off-the-shelf" instruments described in Step 4, aim to provide a standardised platform to assist MAs in the delivery of finance to final recipients. As such, they will need to be designed and set up such that State aid notification or clearance is not required from the EC by either the fund manager, private investors or final recipient.

10 Step 10 - Monitor individual project performance

Measurement and verification (M&V) of project performance can play a number of important roles. It can support effective project management and help optimise the savings from a particular measure. It can also enhance transparency and underpin the financing model of some innovative financing mechanisms such as EPC. It can also support broader programme management and evaluation as indicators of project performance flow upwards into programme-level indicators.

10.1 Assess options for project monitoring

MEASURING RESULTS CONSISTENTLY AND ACCURATELY ACROSS PROJECTS CAN BENEFIT FROM THE USE OF STANDARDISED PROTOCOLS

Energy savings represent the absence of energy use and, as such, cannot be measured directly. Instead, savings are determined by comparing measured use before and after implementing a project, while making appropriate adjustments for changes in conditions.[86] Measurement and verification (M&V) provides a key step in evaluating the energy savings achieved by a project.

"Measurement and Verification" (M&V) is the process of using measurement to reliably determine actual savings created within an individual facility by an energy management program.[85]

Given the variety of building type, age, size, and construction styles, and the level of integration and sophistication of their technical systems, the M&V approach taken can vary. The chosen approach should also be adapted to the size of the project being financed and the expected levels of savings.

[83] A framework for the next generation of innovative financial instruments - the EU equity and debt platforms

[84] A framework for the next generation of innovative financial instruments - the EU equity and debt platforms

[85] IPMPV (2012) International Performance Measurement and Verification Protocol: Concepts and Options for Determining Energy and Water Savings Volume 1, Efficiency Valuation Organization (EVO), January 2012, http://www.evo-world.org.

[86] ibid

The International Performance Measurement and Verification Protocol (IPMVP)[87] is the most widely used M&V procedure for energy performance determination. It addresses concerns about applying a "one size fits all" M&V approach to all building projects by identifying four generic M&V Options – Options A, B, C and D (Box 39). Since it is important to ensure that the M&V approach does not incur more cost than is needed to adequately verify the reported savings, four M&V Options have been developed. Each option is distinguished by whether the M&V should occur at the project or site-level, and the availability, frequency and duration of the measurements.

Thus, if the project is undertaken at a residential building (e.g., blocks of flats, terraced housing), Option A should be used, where simple audits are conducted before and after installation, and similar to the Green Deal (Box 15) and KfW Programmes (Box 19), an Energy Performance Certificate or report is prepared confirming the installed technical measures and their theoretical energy savings.

For public buildings, such as schools or universities, where environmental management systems are potentially available, Option B or C may apply depending on the project-type. For example, if a simple single measure (such as a lighting retrofit) is implemented, a post-retrofit spot audit or short-term metering may be sufficient (Option B) as variations are unlikely. However, for more complex measures (such as a boiler replacement where energy consumption patterns will vary with external temperatures and occupancy), for combinations of measures, and for deep renovation projects, continuous metering of the retrofit (Option B), or a whole building approach (Option C) may be required. Similar considerations should be applied for commercial buildings; however, in some instances where tenant/landlord control issues may limit the availability of baseline energy data, simulation approaches (Option D) may be necessary.

Box 39 M&V options under IPMVP

Option A (Partially Measured Retrofit Isolation): intended for projects in which the actual savings can be determined from short-term data collection, engineering calculations, and stipulated (estimated) factors. Post-retrofit energy use can be estimated.

Option B (Retrofit Isolation): intended for projects where performance and operation can be measured at the component, subsystem or system level. Spot or short-term measurements to determine savings can be used if variations are not expected to occur. Continuous metering should be used when variations are expected.

Option C (Whole Facility (Building)): intended for projects where savings are expected to be large. Continuous monitoring data from utility meters or building sub-meters is used to determine energy savings for the total site, facility or building.

Option D (Calibrated Simulation): intended for projects where baseline data does not exist. Computer simulation software is used to predict facility energy use for the base year and/or post-retrofit period.

10.2 Develop a Measurement & Verification plan

THE M&V PLAN IS THE MOST IMPORTANT M&V ACTIVITY IN AN ENERGY SAVINGS PROJECT

An M&V plan should be prepared for every project applying for ESI funding, since it is central to assuring the transparency of the process, the quality and credibility of savings determination and is the basis of verification. The objectives and constraints of a project, as well as the nature of a facility's energy consumption patterns, have a major influence on the preparation of the M&V Plan. Thus, the plan may include a single or multiple M&V Options to address the projects implemented at a facility.

An M&V Plan should be prepared during the project feasibility stage, when the project's estimated savings are calculated, to ensure that a cost effective M&V process is established. An M&V plan should address some or all of the following: site surveys, energy metering, monitoring of independent variable(s) (such as outdoor temperature or occupancy levels), calculation and reporting.

[87] ibid

11 Step 11 - Evaluate programme performance

11.1 Refer to the EU guidance on monitoring and evaluation

The European Commission has produced a *guidance document on monitoring and evaluation for the programming period 2014-2020*[88]. This sets out a series of concepts and recommendations for programme monitoring and evaluation for activities supported by ESI Funds, some of which are described below. The guidance defines the need for an impact evaluation as well as an implementation evaluation, the specific detail of which should be set out in an evaluation plan to be developed in the early stages of the programme.

Impact evaluations aim to determine the changes that can be credibly attributed to a specific programme or intervention. An observable change in a result indicator (see Step 6) does not necessarily reflect the *impact* of the programme. While such a change can result from the programme intervention, there are also likely to be contributions from other factors.

When conducting an impact evaluation, various methods and techniques are available but there is no single approach that can be universally adopted. The selection and combination of methods should be established on a case-by-case basis and different approaches to impact evaluations should be considered. Common evaluation tools include literature reviews, administrative data analysis, case studies, interviews and surveys. These can be used in order to reconstruct and verify the intervention logic. The team conducting the evaluation is likely to need to carry out a thorough review of all the project documentation (including initial energy audit reports, project proposal and monitoring documents and annual project implementation reports) and meet with the key stakeholders such as final recipients, ESCOs, financial intermediaries, supply chain stakeholders as well as with selected representatives from government and MAs who might have been involved in the project at any stage.

Box 40 Impact evaluation – capturing effects[89]

To disentangle the effects of the intervention from the contribution of other factors and to understand the functioning of a programme is a task for impact evaluation. Two distinctive questions are to be answered:

- Did the public intervention have an effect at all and if yes, how big – positive or negative – was this effect. The question is: Does it work? Is there a causal link? This is the question counterfactual impact evaluations aim to answer.

- Why an intervention produces intended (and unintended) effects. The goal is to answer the "Why and how it works?" question. To answer this question is the aim of theory-based impact evaluations.

Source: Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014.

Implementation evaluations focus on lessons that can be learned from the way in which the programme was implemented and managed. They aim to explore issues such as the application process, targeting of programme, data management systems and programme communication.

A PROGRAMME EVALUATION FRAMEWORK NEEDS TO ADDRESS A CORE SET OF QUESTIONS

Any programme evaluation framework should address the following core themes to allow for an effective evaluation.

Relevance: To what extent are the programme's objectives relevant in relation to the evolving needs and priorities at national and EU level? To what extent was the intervention relevant to the problems and needs identified? Has there been an evolution which required a re-shaping of the intervention? Has this been done satisfactorily? Was logic of the intervention internally coherent?

Efficiency: How efficiently were the resources (inputs) turned into outputs and, in turn, results? What was the cost of the intervention? Were the objectives achieved at a reasonable cost? Were the resources used and objectives targeted proportional? Were there possible alternative methods for achieving the same objectives?

Efficiency analysis looks at the ratio between the outputs, results and impacts, and the inputs (particularly financial resources) used to achieve them.

[88] Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014.

[89] Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014.

Effectiveness: How far has the programme contributed to achieving its objectives? What are the key results and outcomes of the intervention? To what extent are the effects resulting from the intervention consistent with its objectives? If they were not consistent, which factors influenced under or over-achievement (success factors and lessons learned)? Have unanticipated effects occurred as a result of the intervention? Are other interventions more effective?

Effectiveness analysis compares what has been done with what was originally planned, i.e., it compares actual with expected or estimated outputs, results, and/or impacts; and if possible with what would otherwise have happened (the counterfactual).

Utility: Did the programme have an impact on the target groups in relation to their needs? To what extent are the effects resulting from the intervention consistent with the problems and needs identified?

Sustainability: Were the resources for implementing the intervention made available on time, in the appropriate quantity? To what extent can the changes (or benefits) be expected to last after the programme has been completed? Are the results and lessons of the intervention being disseminated and mainstreamed? What are the conditions for transferring the results of the intervention? What have been the multiplier effects? What is the level of sustainability – could (part of) the intervention be self-sustainable?

The questions developed through the evaluation need to be specific to the particular programme and its context. Investigating these themes from different perspectives and through various evaluation methods can be achieved by a process known as triangulation.

11.2 Adapt requirements to the specific programme

PLANNING EVALUATIONS REQUIRES CONSIDERATION OF FACTORS SUCH AS ADMINISTRATIVE BURDEN, TIMING, AND GRANULARITY

Key considerations when determining the scope and frequency of the evaluation include:

Frequency of reporting and timeliness. Determining an appropriate frequency of reporting between projects and the programme manager is important. Greater frequency will enable closer management but the burden of reporting and data analysis will be higher. Linked to the above, the time between the end of the period for which data is being reported and the date on which data is received should be minimised.

Scheduling the evaluation process. The timing requirements of evaluations are often set out under fund-specific requirements. For example, under the ERDF and the Cohesion Fund, current guidance is to implement a continual on-going evaluation approach, particularly for implementation evaluations, rather than waiting until part way through the programme period to start a mid-term evaluation. This provides opportunities for lessons to be learned and the programme design to be improved right from its initiation. Ex-post impact evaluation at the end of the programme, allow stakeholders to reflect on the programme after its completion and derive lessons for future activities.

Using projections versus actual data. The use of verifiable data from implemented activities is preferable to projections undertaken by project teams.

Selecting Evaluators. The Commission considers it as good practice to make sure that the evaluation is undertaken by external experts or by a different organisation from that which is responsible for implementing the programme[90]. This independence is essential to ensure objectivity, and to enable the evaluation team to constructively criticise and give expert judgements on the different elements of the programme.

[90] Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020 - Concepts and Recommendations, January 2014

APPENDICES

Appendix A. Main financing mechanisms

GRANTS

Short description	Non-reimbursable financial contributions for the implementation of specific SE measures 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 usual 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	• 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	• 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 programme 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).[91] • 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 programme in 2014.[92]

[91] Ecorys, Local investments options in Energy Efficiency in the built environment - Identifying best practices in the EU (2012), http://ec.europa.eu/energy/efficiency/buildings/doc/local_investments_energy_efficiency_built_environmentfinal_report.pdf

[92] https://www.gov.uk/renewable-heat-premium-payment

DEBT FINANCING

Preferential loans	
Short description	A basic 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.[93] 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 MSs, regions etc. Currently they range from 1% to 5%. Rates at around 3% are considered to be preferential. 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:
	  ○ Financing with recourse implies that the company stands behind the project or venture and the related debt. This means that financiers recognise the company's assets in the event of default. The debt holder then reports the loan on its balance sheet as a liability – hence the terms corporate financing or 'on balance sheet' financing. Businesses are often willing to use recourse finance only for core business activity and not for projects in auxiliary areas, such as energy efficiency.
	  ○ Limited recourse financing (or project finance) refers to transactions whereby the project is financed largely based on its own merits. Project finance is long-term financing based upon the projected cash flows of the project rather than the balance sheets of the project sponsors. The financing is typically secured by all of the project assets, including the revenue-producing contracts. Project lenders are given a lien (or call) 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.[94]

Implementation	A dedicated system of preferential loans might be implemented through: • Selected commercial banks delivering loans. • A revolving fund managed by a third party. • A fund managed by the EIB or a national energy agency.
Advantages	• Final recipients are incentivised to select the most appropriate and cost effective measures. • It is a well understood mechanism among project developers, MAs, beneficiaries and final recipients. • 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.
Disadvantages	• EE savings may not always be considered as a project cash flow by some financial intermediaries (possibly due to a lack of sector knowledge), often extending considerably the pay-back period for the measure. • Final recipients do not always see the advantage of a loan with low interest rates and are less incentivized to take part. • Not very suitable for poorer households who have no income to repay the loan.
Project types	• Measures supported may include partial refurbishment, major renovation and new construction. • Preferential loans may target only the envelope or a specific technology, most support a mixture of measures and technologies that have been previously selected following specific criteria.
Project examples	• The German public bank, 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.[95]

[93] Rezessy, S., Bertoldi, P., Financing energy efficiency: forging the link between financing and project implementation, Joint Research Centre of the European Commission (2010), http://ec.europa.eu/energy/efficiency/doc/financing_energy_efficiency.pdf

[94] ibid

[95] Bullier, A., Milin, C., Alternative financing schemes for energy efficiency in buildings

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.[96]
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. [97]
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. [98] • 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 (the Fogime guarantee scheme) in France, and the Bank for Environmental Protection in Poland.[99]

[96] MacLean J.C. and Siegel J.M. (2007) *Financing Mechanisms and Public/Private Risk Sharing Instruments for Financing Small Scale Renewable Energy Equipment and Projects,* UNDP. http://www.energyandsecurity.com/images/SSRE_UNEP_Report__20August_2007.pdf

[97] Rezessy, S., Bertoldi, P., Financing energy efficiency: forging the link between financing and project implementation, Joint Research Centre of the European Commission

[98] http://www.bgeef.com/display.aspx

[99] Rezessy, S., Bertoldi, P., Financing energy efficiency: forging the link between financing and project implementation, Joint Research Centre of the European Commission

ENERGY PERFORMANCE CONTRACTING

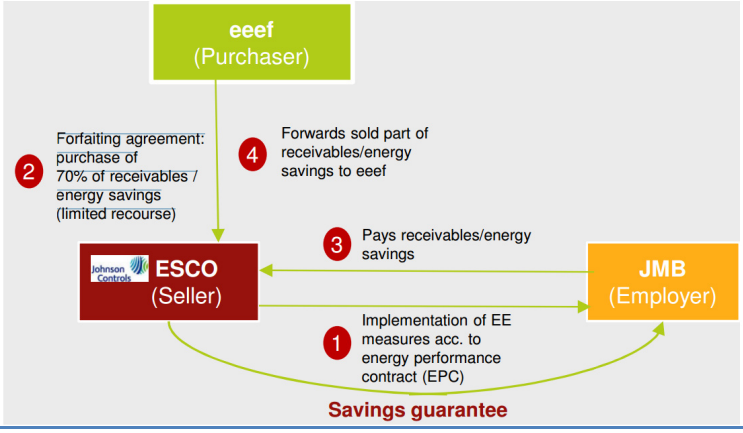
Short description	An energy performance contracting (EPC) arrangement is an integrated contract in which a contracting partner (such as an Energy Service Company – ESCO) designs and implements energy conservation measures with a guaranteed level of energy performance for the duration of the contract. The energy savings are used to repay the upfront investment costs, after which the contract usually ends.
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)[100] • 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.).[101]
Advantages	• EPC guarantees a certain level of energy savings and shields the client from any performance risk. • End-user experiences guaranteed project cost, energy and financial savings, and equipment performance. • The ESCO has knowledge of technical requirements, permit legislation and support schemes. • 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). • SE measures improve working and living conditions and increase value of the building. • Allows organisations to disconnect project debt from the building owner.[102]
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. • After contract is signed the facility owner is tied to one vendor for the term of the contract. • 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. • Measurement and Verification (M&V): while the contact is running, the results (energy saved) need to be continuously monitored. • Any failure or shortfall from the expected result requires reconciliation to recover shortfall. • EPCs only concern an agreement on savings, not on the measures to be implemented. [103]
Project types	• 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. • Most EPCs signed to date focus on the refurbishment of energy production/ distribution systems (e.g. replacement of boilers, insulation of distribution systems, efficient street lighting and energy efficient building management systems as well as biomass heating systems).
Project examples	• RE:FIT (UK): Available to public sector organisations, the RE:FIT Framework streamlines the procurement process for energy services by providing pre-negotiated, EU-regulation-compliant contracts that can be used with a group of pre-qualified ESCOs

[100] Bleyl-Androschin J.W., Schinnerl D., Grazer Energieagentur, Comprehensive Refurbishment of Buildings through Energy Performance Contracting (2008), http://www.ieadsm.org/Files/Exco%20File%20Library/Key%20Publications/IEAdsm-TaskXVI_Bleyl,%20Schinnerl_Comprehensive%20Refurbishment%20of%20Buildings%20through%20EPC_081118_vers2.pdf

[101] Milin, C., Rakhimova, L., Zugravu, N. and Bullier, A., ca. 2011. FRESH- Financing energy Refurbishment for Social Housing. Final Publishable Report. France: I.C.E. (International Consulting on Energy)

[102] Bullier, A., Milin, C., Alternative financing schemes for energy efficiency in buildings

[103] Ecorys, Local investments options in Energy Efficiency in the built environment - Identifying best practices in the EU (2012)

Forfeiting	
Short description	Forfeiting typically refers to a financial arrangement between an ESCO and a bank that can provide immediate cash flow to support project implementation. 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[104].
Main characteristics	• A forfeiting transaction involves the ESCO or equipment vendor transferring future receivables, using an Assignment Agreement, from an Energy Service Agreement to the bank along with a pledge of assets. • If an ESCO is involved, the end-user pays the bank directly and the payments are used to amortise the ESCO debt. The end-user, the ESCO and the lender also sign a "Notice and Acknowledgment of Assignment", where the end-user acknowledges the terms of the Assignment Agreement and further agrees not to set-off any future claims.
Implementation	• The ESCO or equipment vendor provides a performance guarantee, as dictated by the Energy Services Agreement, while the end-user pays fixed monthly payment to the bank. • The technology installed is owned by the ESCO and can be used as 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	• 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. • Provides the possibility of using the cash flow to serve as main collateral. • The ESCO or equipment vendor has to perform the EPC and deliver the savings guaranteed. • Risk is minimized if the end-user's creditworthiness is better than that of the ESCO.
Disadvantages	• The transaction costs of setting a forfeiting contract can be high as it is not a standard financing product. • In many cases, especially with smaller projects, the cash flow generated is not enough to serve as collateral. • Ceded receivables must be from the services rendered with a mid-term duration of 6 months to 5 years or longer.
Project types	• Due to high transaction costs, forfeiting has been used for large scale projects. • Forfeiting is also suitable in situations where the end-user has a better creditworthiness than the ESCO or equipment vendor.
Project examples	• The European Energy Efficiency Fund (EEEF), under Deutsche Bank's management on behalf of the European Commission, provided a financing volume of €1.7M with duration of 10 years for energy efficiency technology installations and heating upgrades at the Jewish Museum Berlin. The pilot project for forfeiting was conducted under a forfeiting arrangement of purchasing 70% of receivables from the ESCO (Johnson Controls).
Diagram[105]	

[104] Rezessy, S., Bertoldi, P., Financing energy efficiency: forging the link between financing and project implementation, Joint Research Centre of the European Commission (2010)

[105] http://www.sustainablegeneva2013.org/wp-content/uploads/2013/04/A3_Massud.pdf

Appendix B. Main funding programmes for SE at EU level

Grants have been at the core of most EU sustainable energy funding programmes activities with some examples of debt-based financing instruments and hybrid schemes involving loans, equity, and guarantees in attempts to leverage public funds and draw in more private finance. The main recent activities are set out in the table below.

Mandate/ Activity	Years of funding period	Purpose of the scheme	Scheme type	Financial instrument	Public, Private or PPP	Beneficiaries / recipients	Process	Total Resources	Funding bodies/countries
Grant finance									
Intelligent Energy Europe (IEE II)	2007-2013	Supports the use and dissemination of clean and sustainable energy solutions and Europe-wide exchange of related knowledge. Focuses on removal of non-technical barriers to adoption. The IEE II provided as well the PDA support under the MLEI Key Action.	Funding instrument / PDA	Grants		Min. 3 independent legal entities, each established in a different eligible country Min 1 entity for the PDA		€ 600 million	Project funding of up to 75 per cent of project costs
European Local Energy Assistance (ELENA) – IEE II	2007-2013	Funds up to 90 per cent of technical support cost to prepare, implement and finance investment programmes to implement large energy efficiency and renewable projects	PDA	Grants		Local or regional authorities, or other public bodies	Application to IFIs for TA funding	€ 132 million	Funded under the IEE II Programme. Project funding up to 90 per cent of eligible costs. Implemented by IFIs (EIB, KfW, CEB and EBRD)
7th Framework Programme (FP7)	2007-2013	FP7 provides funding for innovation up to the pre-competitive demonstration level. It supports transnational research cooperation, technological development, researcher mobility, and research activities in particular between enterprises and public research organisations.	Funding instrument	Grants		Various including SMEs and consortia of business and research institutes		€ 2.35 billion is allocated to energy	EC
Horizon 2020	2014-2020	Supports the development and deployment of innovative SE technologies and solutions. Includes the successor to the IEE II and PDA activities under its Energy Challenge – Energy Efficiency Focus Area, topic EE 20.	Funding instrument PDA	Grants	Public and private	Min 3 entities from 3 EU Member States 1 entity or consortium for the PDA	Application to INEA, EASME, RTD or DG ENER Application to EASME	According to call	
ELENA - EIB	2014-2015	Provides grant support for development of large-scale SE Investment projects	PDA	Grants	Public	1 entity or consortium	Application to EIB	€ 30 million	
Debt instruments									
Sustainable energy financing facilities (SEFF)		Combine credit lines with technical assistance to help local banks support hundreds of smaller sustainable energy projects in the region	Technical assistance and credit	Loans	Private	Commercial & household EE projects in 15 countries (through 46 banks) across EBRD countries	Local banks use the credit lines to provide commercial loans, at their own risk	€ 1.5 billion	Technical assistance is offered free, supported by grant funding from EBRD donors

Mandate/ Activity	Years of funding period	Purpose of the scheme	Scheme type	Financial instrument	Public, Private or PPP	Beneficiaries / recipients	Process	Total Resources	Funding bodies/countries
Hybrid instruments									
European Energy Efficiency Fund (EEEF) - EEPR	2011-ongoing	Uses unspent funds of the EEPR. It focuses on financing energy efficiency, small-scale renewable energy, and clean urban transport projects targeting municipal, local, regional authorities (and national authorities, if justified) as well as public and private entities acting on behalf of those authorities.	Structured finance vehicle	Loans, Equity, Guarantees	PPP	Local authorities, ESCOs	Direct investment or via financial institutions	Initial fund volume: € 265 million Target size: €500-600 million	EU Contribution: €125m – junior tranche [+ €20m in grants for TA]; EIB : €75m – mezzanine tranche Deutsche Bank: € 5m - mezzanine tranche; Cassa Depositi e Prestiti SpA (CDP, Italy): €60m – senior tranche
EU Structural and Cohesion Funds	2007-2013	European Regional Development Fund (ERDF), European Social Fund (ESF) and Cohesion Fund (CF), provided funding for investment in a wide range of areas to support economic, social and territorial cohesion, including investments in EE, RE and energy infrastructure as well as in R&D, innovation and skills related to those areas	Priorities set out in Operational Programmes at national or regional level	Grants, Loans, Equity, Guarantees		Wide range of potential beneficiaries; all direct beneficiaries of EU Cohesion Policy have to be published by the Managing Authorities, see http://ec.europa.eu/regional_policy/country/commu/beneficiaries/index.cfm?LAN=en	Specific to each MS or region, shared responsibility between EC and MS authorities	€ 347 billion	EC total budget: € 347 billion. Around € 12 billion of this allocated to energy investments, with further amounts for R&D, innovation and skills related to energy. Co-financing by MS
EU Structural and Cohesion Funds	2014-2020	European Regional Development Fund (ERDF), European Social Fund (ESF) and Cohesion Fund (CF), provide funding for investment in a wide range of areas to support economic, social and territorial cohesion, including investments in EE, RE, energy infrastructure and sustainable urban transport, as well as related research and innovation.	Priorities set out in Operational Programmes at national or regional level	Grants, Loans, Equity, Guarantees		Wide range of potential beneficiaries	Specific to each MS or region, shared responsibility between EC and MS authorities	€ 325 billion	EC total budget: € 325 billion. At least € 23 billion of this expected to be allocated to investments in EE, RE, smart distribution grids and sustainable urban transport, including research and innovation as well as potential further amounts for skills related to those areas

Mandate/ Activity	Years of funding period	Purpose of the scheme	Scheme type	Financial instrument	Public, Private or PPP	Beneficiaries / recipients	Process	Total Resources	Funding bodies/countries
									and smart energy infrastructure. Co-financing by MS
Private Financing for Energy Efficiency instruments (PF4EE)	2014-2020	Address substantial regulatory and market failure leading to current underinvestment in viable EE investment opportunities. Two core objectives are: 1. To increase debt financing to final recipients (e.g. SMEs) from private financial institutions for EE projects which contribute to meeting EU EE directives and support MS EE programmes in line with priorities set by NEEAPs. 2. To help make EE lending a more sustainable activity across the European financial sector through facilitating the development of a track record of financing that builds up information and expertise in the performance of EE projects amongst financial institutions. This in turn will help stimulate follow on lending from these financial institutions – as well as providing market signalling to other financial institutions.	Structured finance instrument	Loans, Guarantees, Technical Assistance	Private	Financial institutions, SMEs, Wide range of potential recipients	Investment via financial institutions	Not yet confirmed	MS financial institutions will make an application for funding

Appendix C. Potential output indicators to be used and adapted by programme managers

THEME	UNIT	NAME	Obligatory indicator?
General	Number of EE/RE projects	Total number of EE/RE projects financed	
	EUR	Total value of projects implemented (including private sector component)	
	EUR	Value of all loans disbursed	
	EUR	3rd party funding leveraged	
	Number of EE/RE projects defaulting	Default rate of EE/RE projects financed	
Renewables	MW	Additional capacity of renewable energy production	✓
	MWh generated / year	Annual energy generation from renewable sources	
	% of total generation	Renewable share of total energy generation	
Energy efficiency	Households	Number of households with improved energy consumption classification	✓
	Households	Number of buildings in the two lowest energy performance classes	
	KWh/year	Decrease of annual primary energy consumption of public buildings	
	Users	Number of additional energy users connected to smart grids	✓
GHG reduction	Tonnes of CO_2eq	Estimated annual decrease of GHG	✓
GHG intensity reduction	Tonnes of CO_2eq / unit	Estimated decrease of GHG intensity in CO_2 equivalents. Appropriate denominators can be defined according to the programme context (examples include € GDP, budget, Tonne output, etc.)	
Research Innovation	Full time equivalents	Number of new researchers in supported entities	✓
	EUR	Private investment matching public support in innovation or R&D projects	✓
	Enterprises	Number of enterprises supported to introduce new to the market products	✓
	Enterprises	Number of enterprises supported to introduce new to the firm products	✓
	Enterprises	Number of enterprises cooperating with research institutions	✓
	Square metres	Floor area of residential buildings with improved energy consumption classification	
	KWh/m^2	Total energy per square meter (takes into account relative shifts in energy types, e.g. ground source heat pump replacing an inefficient old oil boiler would lead to significant net savings)	
	KWh/year	Energy savings, either per building as measured via meter data, or at the utility level as measured by program savings as a percentage of total system energy sales.	
	EUR	Estimated annual value of energy cost reduction	
	kWh/Household	Total energy per Household, key end use energy per Household	
Urban Development	Persons	Population living in areas with integrated urban development strategies	✓
	Persons	Population living in areas with integrated urban development strategies encompassing sustainable energy strategies	
	Square metres	New public or commercial buildings in urban areas	
	Square metres	New low-carbon public or commercial buildings in urban areas	
	Square metres	New housing in urban areas	
	Square metres	New low-carbon housing in urban areas	
Social infrastructure - Housing	Households	Number of households benefiting from improved housing conditions	

Appendix D. Case studies

	KREDEX, Estonia[106]
Financing mechanism used and procedure to fund the projects	In KredEx, a revolving loan fund has been established by combining different funding sources: ERDF, CEB and KredEx's own funds. The financial mechanisms are a preferential loan and guarantee scheme and a grant scheme. The initial ERDF loan (€17.7 m) allowed the MA to set up the Fund. It is precisely the structural fund contribution, on which interest rates do not have to be computed, which allows KredEx to provide final recipients with preferential loans.
Investments and savings	Between 26th June 2009 and 30th June 2013, 534 loans for 515 buildings were financed by way of loans amounting to a total of €54.38mln supporting investments totalling €75.42mln. Expected energy savings for buildings in Estonia are 36.2%
Assessment and selection criteria	The renovation loan provided by Kredex targets apartment buildings constructed before 1993. The loans can be applied for by apartment associations, building associations and communities of apartment owners in buildings with at least 3 apartments. The minimum loan amount is €6,400 per apartment building. The loan maturity is up to 20 years and average interest rates in 2012 were between 3.5% and 4%. Interest rates are fixed for a period of 10 years, while with normal commercial loans they can be fixed for only 5. At least 15% of the total amount must be co-financed by the final recipients. An additional grant component can be combined with the loan. The grant rate depends on the expected energy savings: 1. a saving of 20-30% leads to a grant of 15% of the costs; 2. a saving of 40% leads to a grant of 25%; and 3. a saving 50% leads to a grant of 35%. It is compulsory to carry out an energy audit at the beginning of the application process and the loan must be used to finance the measures recommended in the audit. Energy audit must be carried out by a licensed, accredited and independent energy auditing company. The energy auditor takes measurements, collects data, provides a technical overview of the state of the building to identify the baseline energy consumption and proposes EE refurbishment measures that lead to reductions in energy consumption of at least 20%. The energy audit reports need to follow the general requirements for energy audits as specified by KredEx.
Monitoring and use of performance indicators	Monitoring and verification is part of the regular reporting of the final recipients regulated by the contract between KredEx and the recipient. The reporting requirements consist of the annual energy consumption for heat and hot water in kWh/yr. The final recipient is bound by the grant agreement signed with KredEx to accurately report the metered annual energy consumption for heat and hot water. KredEx carries out spot checks and requests supporting evidence for the annual energy consumption in the form of invoices from the heating companies for a minimum of 5% of the final recipients.
Potential for scaling up the project at national / sub-national level.	KREDEX is a national program. However, the model could be implemented in other EU countries.
Good practice features	The fund represents a successful example of financial instrument implementation for EE in buildings. There have been almost no cases of unsuccessful projects. Firstly, thanks to the system of subsidized loans, final recipients are incentivised to make careful consideration of the measures to be taken, avoiding the wasteful use of grants and subsidies. The involvement of local banks was a key success factor. The large administrative requirements that this programme demands may dissuade banks. Their motivation to participate is their desire to maintain market share. There are many different activities supporting renovation and EE issues. A key measure is awareness campaigns (e.g. why renovation is important, why loans have these requirements, how renovation can save energy costs). Information is also disseminated through seminars and training. All these activities help to ensure that the project has maximum impact.

[106] http://www.kredex.ee/en/

	KfW Programme: "Energy Efficient Construction and Refurbishment", Germany[107]
Financing mechanism used and procedure to fund the projects	The programme "Energy Efficient Construction and Refurbishment" provides financing by way of soft loans and grants for energy efficient construction and refurbishment activities for the German residential sector. The programme is available for all private investors in the residential building sector as well as housing companies at equal conditions.
Investments and savings	During the 2006-2012 period, about €48 billion were provided as loans and €108 billion were invested. During the same period, the programme led to reductions of 5.9 m t CO_2-equivalents
Assessment and selection criteria	To be eligible for the programme, it is a precondition that the efficiency standards achieved by the project are better than the requirements as set out in the German Energy Savings Ordinance. Eligibility is based on two key parameters: (1) the annual primary energy demand compared to the demand of a new building (the so-called "reference building") and (2) the structural heat insulation (specific transmission heat loss) compared to the reference building. The basis for measuring the level of energy efficiency is the so-called "KfW-Efficiency House Standard". There are three levels of promotional incentives for energy efficient construction activities expressed as Efficiency House Standards 40, 55 and 70. This means that the primary energy consumption of the housing unit in question corresponds to 40%, 55% or 70%, respectively, of what the reference building is allowed to consume according the Energy Efficiency Ordinance. For all levels, the promotional interest rate is the same. The difference pertains to the level of partial debt relief (in percent), in the form of a repayment bonus, which is granted to the borrower (in addition to the favourable interest rate) once the targeted efficiency level has been reached and verified by an energy expert. For instance, the Efficiency House 40 benefits from a 10% debt relief. The maximum loan amount is €50,000. For energy efficiency refurbishment activities, there are in total six promotional levels: starting with Efficiency House 55 as the most ambitious level, followed by Efficiency House 70, 85, 100 and 115 as well as a separate level for monument buildings. The incentive in terms of partial debt relief starts at 2.5% for the Efficiency House 115 and reaches 17.5% for the most ambitious level Efficiency House 55. Customers who do not target a deep retrofit of their building or housing unit can benefit from promotional loans for single measures such as windows, heating systems or insulation. Customers who do not want to apply for a loan also have the option to apply for a grant. The amount available is based on the same energy efficiency levels as for the loans and calculated based on the maximum loan amount applicable. It varies between 10% and 25% of the maximum loan amount of €75,000 (i.e. between €5,000 and €18,750).
Monitoring and use of performance indicators	The involvement of an energy consultant is mandatory in the application process. The consultant is responsible for checking whether the construction or refurbishment project is properly designed to achieve the targeted efficiency level. An internet-based tool has been developed to compare the technical details of the project with the targeted efficiency level.
Potential for scaling up the project at national / sub-national level.	The KfW is a national programme which is most effective on a large scale, given the fact that it is complex and has high administrative and procedural costs.
Good practice features	• Attractive promotional conditions for customers (preferential loans, partial debt relief or grants) • Larger product spectrum for commercial banks which improves their cross-selling potential, additional liquidity without refinancing cost, attractive margins • High number of housing units reached and high number of investors incentivised to invest in EE measures • Transparent and attractive scheme for customers (high and increasing level of demand) • Standard setting and wide acceptance • Systematic and comprehensive quality control • Mandatory involvement of energy experts

[107] http://www.esd-ca.eu/good-practices/good-practice-factsheets/financing/kfw-energy-efficient-construction-and-refurbishment-germany; www.kfw.de

	Pardubice Region, Czech Republic
Financing mechanism used and procedure to fund the projects	This programme which started in 2007 used an Energy Performance Contracting (EPC) approach to improve the energy performance of buildings owned by the Regional Authority of the Pardubice Region. The tendered contract, known as the Energy Service Agreement (ESA), incorporates proposing, designing, installing and guaranteeing energy savings in the Pardubice Region. Investment costs for the projects were covered by ENESA and EVC, the selected privately owned ESCOs responsible for project implementation. ENESA and EVC would install the measures and thereafter issue the invoice to the client with a payment schedule of fixed monthly payments over 12 years. The cost of investment would be repaid by the client based on guaranteed reduction of energy savings and maintenance costs. The programme used a financing structure called "forfeiting". Under such structure, the original borrower, the ESCO, sells the rights to future payments from the client to a local bank who then collects repayments for the duration of the term.
Investments and savings	The project was divided into 5 phases (lots) covering 10-20 buildings in each. The amount of investment of the largest lot was €1.5mln and energy savings were 5.1 GWh per year.
Assessment and selection criteria	The objectives of the programme were set out in the tendering documents: enhance existing energy systems, improve indoor quality and reduce energy costs. No quantitative objectives were given; therefore, tenderers had the opportunity to propose and implement the most appropriate technical measures, including: • Installation of new boiler rooms to be used instead of district heating systems; • Installation of heat pumps; • Refurbishment of distribution systems and heat exchangers; and • Installation of thermostatic valves and direct individual room control systems. The Pardubice Regional Government (the client) hired the consultancy company ENVIROS to facilitate the technical and public tendering process for the EPC type project. The consultants organized the entire tender including public tender documentation, proposals evaluation, assisted with agreement negotiation etc. They evaluated the submitted proposals and helped the Pardubice Region to select the best suitable proposal. In addition, the ESCO checked and monitored the energy usage and savings of the client on an annual basis. If the energy savings were lower than the agreed fixed repayments, the ESCO was contractually obliged to pay for the deficit. If the energy savings were higher than the agreed fixed repayments, the surplus was shared between the ESCO and the client.[108]
Monitoring and use of performance indicators	Monitoring was essential since the repayment of the investment costs was based on energy savings. After installation of the measures, the ESCO would issue the invoice to the client with a payment schedule based upon the achieved energy savings. The ESCO would guarantee for the duration of the contract that the energy costs, including the repayments for the investment, would be each year lower than the energy costs if the project had not been implemented.
Potential for scaling up the project at national / sub-national level.	There is a considerable potential for scaling up, as the Czech regional governments plan to set up similar tenders for other regions (the Pardubice Region is one of the 14 regions). This model can also be replicated in other MSs.
Good practice features	The freedom for proposing and selecting measures has been an important success factor, as it guarantees optimal use of the ESCO's knowledge. Furthermore, the ESCOs are financially responsible if the project does not achieve the intended results. The risk for the regional government is therefore minimised. The local bank bears the credit risk through the forfeiting mechanism; however, since the client is a local public authority, the credit risk is low, which is attractive for both the ESCO and the local bank.

[108] Ecorys, Local investments options in Energy Efficiency in the built environment - Identifying best practices in the EU (2012)

	Residential Energy Efficiency Credit Line (REECL), Bulgaria[109]
Financing mechanism used and procedure to fund the projects	The main financial mechanisms in the REECL programme are low interest rate loans and grants. The programme was launched in October 2005 and offers a 'one-stop shop' financing vehicle including: • Loan financing from participating commercial banks; • Incentive grant support (in conjunction with the loans), paid through participating banks upon completion and verification of individual projects; and • Technical assistance. REECL finances implementation of advanced energy efficiency techniques in the private housing sector. Eligible borrowers are: • Homeowners living in family houses and apartments; • Formally registered housing associations; and • Groups of home owners. The size of the grants is based on a financial gap analysis of the technical measures, including an inventory of the costs and savings in typical residential buildings in Bulgaria. The relative size of the grants increases with the number of measures implemented, the costs and the energy savings. The level of the grant is capped for each borrower (e.g. 20 % of the total amount disbursed by a Participating Bank for dwelling-level projects and 30% for building-level projects) and per technology type (for dwelling-level projects).
Investments and savings.	In the 2005-2010 period, approximately €46mln were signed for over 28,100 residential projects, implemented and verified. Since June 2011, another €40mln has been signed with five banks. This has resulted in 19,700 additional projects in the period 2011-2013. Therefore, the total number of projects financed is over 47,800, resulting in CO_2 reductions of 319 Kton per year.
Assessment and selection criteria	The programme has developed a list of eligibility criteria per technology type with minimum performance or design requirements (e.g. U-values for windows and insulation); and energy savings have to be beyond 20% of current national requirements. Technical eligibility requirements are periodically up-dated to reflect market progress and changes to national regulatory requirements linked to the transposition of the EU EPBD. Under the eligibility criteria set by the REECL programme, the technical measure selection (and related cost effectiveness) is dependent on the expertise of the certified experts for each technology type.
Monitoring and use of performance indicators	The application procedure for REECL projects is well monitored. Initial application forms (both financial and technical) are drawn up by loan officers from the banks in a one-stop-shop approach. These applications are all checked by the project consultant that was procured and managed by the EBRD. Once the applications are approved (i.e. the project utilises eligible equipment and the costs are within the acceptable market range) and the banks have assessed the creditworthiness of the applicant, the household (or housing association) receives the loan and can contract an installer to implement the technical measures. Installers need to draw up documents to prove that measures have been installed for the costs indicated in the application forms. Upon completion 100% of these documents are checked by the consultant, and additionally, 16-17% of projects receive a site visit by the consultant to verify that the measures have been properly installed. In case of fraud, installers receive a warning. After two warnings, installers are removed from the list of eligible (authorized and accredited) installers enlisted under the REECL programme. Installers removed can apply to get back on the list once they have addressed the issues related to the quality of installation and/or any issues related to invoices or costs. This system has proven to be very successful in ensuring quality of works and the implementation of the correct technical measures.
Potential for scaling up the project at national / sub-national level.	The REECL is a national programme which is replicable in other countries; however, it works most efficiently for large programmes as the fixed administration costs to set up the programme are high. The EBRD has set up similar residential facilities in Moldova, Kyrgyzstan, Kosovo, Russia and is preparing a larger residential financing facility in Turkey. The level of incentives and scope of technical assistance reflect conditions in local markets.

[109] http://www.reecl.org/indexen.php

Good practice features	A key success factor of the programme has been the cooperation between banks, media, manufacturers and equipment installers, led by the project consultant mandated by EBRD. The cooperation with banks reduced the barriers for households to apply for a loan, as these banks had local offices all over the country. Furthermore, the banks actively promoted the REECL programme based on their individual marketing budgets, thereby increasing the visibility of REECL. Publicity was further enhanced by organizing media events in which manufacturers could promote their technologies and the engagement of municipalities and utilities. Despite limited REECL budgets for promotion activities, the programme has become very well-known in Bulgaria. All branches of participating banks in Bulgaria have provided information about REECL. The project consultant has also developed a package of technical assistance for both residential borrowers and participating banks. Technical assistance to participating banks includes training of loan officers, advice and guidance on marketing and promotion, implementation support with technical validation of loan applications and verification of completed projects requesting incentive payments. Technical assistance to borrowers encompasses awareness raising, advice and guidance on applicable solutions and techniques, online helplines for residential stakeholders, maintenance and update of lists of eligible materials and products and lists of eligible accredited installers. Since 2011, application procedures have been largely digitalized. Although this saves time and administration costs, it also requires new expertise. Loan officers from the banks need training in how to deal with automatic application procedures with the monitoring database, etc. These training costs increase the costs of the programme. However, it is expected that administration costs will reduce as loan officers become familiar with the new system.

	Retrofit South East, UK
Financing mechanism used and procedure to fund the projects	The project was funded by the financial resources of the housing association (Radian) as well as a grant from the ERDF. The project involved deep retrofit of a small number of domestic properties to demonstrate the concept and build local supply chain awareness and capability. As part of the project a conceptual model for a Revolving Retrofit Guarantee Fund (RRGF) was developed. Under the proposed concept, borrowing for refurbishment is done against a guaranteed fund rather than against asset values therefore reducing risk for commercial loan providers[110].
Investments and savings	Total costs of the project were initially £ 843,000 for the period 2009-2011. Approximately 50% of this funding was from ERDF and 50% from the housing association Radian. A second phase started with £536,000 of funding and finished in February 2012.[111] The project achieved a 70-89% energy efficiency improvement at the refurbished homes.[112]
Assessment and selection criteria	Selection of properties was based on an asset management register of Radian. The selected properties can be classified as the bottom of the market (e.g. extremely energy inefficient). Selection criteria of the technical measures were cost effectiveness, longevity and benefits to the resident. Radian was responsible for the retrofit of the properties.
Monitoring and use of performance indicators	Lifetime CO_2 emission reductions of the project have been determined by the consultancy company Camco (commissioned by Radian).
Potential for scaling up the project at national / sub-national level.	There is large potential for scaling up the project through the proposed RRGF concept which reduces risks for commercial loan providers and provides simplified and standardized approval procedures. The concept is described in more detail in the project summary report available from http://www.radian.co.uk/flipbooks/radian_gesb_fund_mechanism_report/.
Good practice features	This programme uses an innovative mechanism which can lead to a significant leverage effect and therefore limit the need to use public funding to stimulate the market. The new knowledge generated by all elements of Retrofit South East was communicated through conferences, reports, newsletters, case studies and visits from local, national and European politicians.

[110] http://www.radian.co.uk/abouts/sustainability/retrofit

[111] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/91935/ERDF_South_East_mid_term_evaluation_February_2011.pdf

[112] http://www.aeidl.eu/images/stories/50bestpractices/uk_petersfield_analytical-fiche.pdf

Appendix E. References

The sources and studies mentioned in the guide are listed in order of appearance below.

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COM(2013) 169 final, A 2030 framework for climate and energy policies http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0169:FIN:EN:DOC
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Additional links and relevant sources of policy know-how in relation to energy efficiency investments are presented below:

National Energy Efficiency Action Plans http://ec.europa.eu/energy/efficiency/end-use_en.htm
Financing energy efficiency http://ec.europa.eu/energy/efficiency/financing/financing_en.htm
Energy Performance Contracting http://ec.europa.eu/energy/efficiency/financing/campaign_en.htm
Technology and Innovation Strategy 2020 and beyond http://ec.europa.eu/energy/technology/strategy/strategy_en.htm
The European portal for energy efficiency in buildings http://www.buildup.eu/
INTERREG IV C capitalisation report on energy efficiency http://www.interreg4c.eu/good-practices/capitalisation/energy-efficiency/
INTERREG IV C projects http://www.interreg4c.eu/approved_projects.html
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MJ-01-14-169-EN-N

DOI: 10.2833/18766 ISBN 978-92-79-35999-6