Energy Focused
Urban Development Funds

Final Report

December, 2012

DISCLAIMER:

Energy Focused Urban Development Funds

Final Report

ARUP

Contents

Appendix A
Consultation

Appendix B

Project Typologies

Appendix C

References

Glossary of Terms

BESP	Berlin Energy Savings Programme
CAP	Climate Action Plan
CEB	Council of Europe Development Bank
CF	Cohesion Fund
CHP	Combined Heat and Power
COCOF	Committee for the Coordination of the Funds
DG REGIO	European Commission's Directorate-General for Regional and Urban Policy
EAP	Energy Action Plan
EC	European Commission ("The Commission")
EE	Energy Efficiency projects/measures
EIB	European Investment Bank
ERDF	European Regional Development Fund
EPC	Energy Performance Contract(ing)
ESCO	Energy Service Company
ESF	European Social Fund
EU	European Union
FEI	Financial Engineering Instrument
FIT	Feed in Tariff
FTE	Full Time Equivalent
GHG	Greenhouse Gas
GWP	Global warming potential
HF	Holding Fund
HSSG	Horizontal Studies Steering Group
IPSUD	Integrated Plan for Sustainable Urban Development
JESSICA	Joint European Support for Sustainable Investment in City Areas
LEEF	London Energy Efficiency Fund
MA	Managing Authority
NPV	Net Present Value
OP	Operational Programme
PPP	Public Private Partnership

PV	Photo voltaic
SEAP	Sustainable Energy Action Plan
RE	Renewable Energy projects
TAF	Toronto Atmospheric Fund
TFEU	Treaty on the Functioning of the European Union
UDF	Urban Development Fund

Definitions

For the purpose of this document, the following terms and definitions apply:

- Cohesion Fund: an EU fund that contributes to interventions in the field of the environment and trans-European transport networks. It applies to Member States with a Gross National Income (GNI) of less than 90% of the EU average. As such, it covers all 12 new Member States as well as Greece and Portugal. Spain is also eligible for the Cohesion Fund, but on a transitional basis (so-called "phasing out"). The option to employ Financial Engineering Instruments does not apply to the Cohesion Fund.

- Co-investing: refers to invested funds, in addition to the mandatory National co-financing amounts, which do not have to follow the eligibility criteria of the Structural Funds.

- Combined Heat and Power (CHP): a heat engine or power station that integrates the production of usable heat and power (electricity), in one single, highly efficient process. CHP generates electricity whilst also capturing usable heat that is produced in this process.

- CO_2 equivalents (CO_{2e}): describe for a given concentration of a GHG the amount of CO_2 that would have the same global warming potential (GWP).

- *De minimis*: rule setting a threshold for State aid (currently EUR 200,000 per undertaking over a 3 year fiscal period) below which Article 87(1) of the Treaty on the Functioning of the European Union can be said not to apply, so that a given measure need no longer be notified in advance to the Commission. The rule is based on the assumption that, in the vast majority of cases, small amounts of aid do not have an effect on trade and competition between Member States.

- District heating: a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating.

- Emissions Factors: factors used to convert activity or consumption data into equivalent GHG emissions. Emissions factors are expressed in terms of emissions per energy used (e.g. tonnes of CO_2/kWh or grams of CO_2/vehicle-kilometre).

- Energy Conservation Measures (ECM): projects and measures undertaken to improve the energy efficiency ratings of buildings.

- Energy Performance Contracting (EPC): a procurement model which supports demand-side Energy Conservation Measures in buildings.

- 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, and accepts some degree of financial risk in so doing.

- EU12: EU-12 Member States are Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia.

- EU15: EU-15 Member States are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

- European Regional Development Fund (ERDF): a fund focused on reducing economic disparities within and between Member States by supporting economic regeneration and safeguarding jobs. Funding is targeted to meet three overarching objectives: Convergence, Regional Competitiveness and European Territorial Co-operation.

- Feed in Tariff (FiT): a policy mechanism designed to accelerate investment in renewable energy technologies. Under a FiT, eligible renewable electricity generators are paid a cost-based price for the renewable energy they produce.

- Final Recipients: projects, legal or natural persons receiving repayable investments from an operation implementing Financial Engineering Instruments as described in Article 44 of Council Regulation (EC) No 1083/2006 of 11 July 2006.

- Global warming potential (GWP): a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

- Holding Fund: a fund of funds normally set up to invest in more than one UDF according to Council Regulation (EC) No 1083/2006 of 11 July 2006, Article 44, amended by Council Regulation (EC) No 284/2009 of 7 April 2009 and further amended by Council Regulation (EC) No 539/2010 of 16 June 2010.

- Integrated Plan for Sustainable Urban Development (IPSUD): In general, a multidisciplinary or integrated approach comprising a system of interlinked Urban Projects which seeks to bring about a lasting improvement in the economic, physical, social and environmental conditions of a city or an area within the city, based on a coherent and unitary vision of the city.

- Internal Rate of Return (IRR): the discount rate often used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project.

- JESSICA: an initiative of the European Commission to promote the use of Financial Engineering Instruments (FEIs) for urban development and regeneration. It allows Managing Authorities to invest some of their Structural Funds allocations, usually European Regional Development Fund contributions, in revolving Urban Development Funds that in turn, invest in Urban Projects which are part of an Integrated Plan for Sustainable Urban Development.

- Managing Authority (MA): in accordance with Article 59 Regulation (EC) No. 1083/2006, a national, regional or local public authority or a public or private body designated by the Member State to manage the Operational Programme.

- (National) co-financing: the European Structural Funds meet a proportion of the contribution provided by any Operational Programme. The remainder has to be

funded from national sources, which can be either public or private sector co-financing. Investment by public or private organisations at the project level can in some cases meet National co-financing requirements.

- Measurement and verification: a process for quantifying savings delivered by an Energy Conservation Measure.

- Mezzanine finance: a hybrid of debt and equity financing that is typically used to finance the expansion of existing companies. Mezzanine financing is often debt capital that gives the lender the rights to convert to an ownership or equity interest in the company if the loan is not paid back in time and in full. It is generally subordinated to debt provided by senior lenders such as banks and venture capital companies.

- Net Present Value (NPV): the difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyse the profitability of an investment or project.

- Operational Programme (OP): Operational Programmes are documents setting out development strategies, submitted by the Member States and adopted by the European Commission, covering the use of EU Structural Funds and National co-financing contributions during the 2007-2013 programming period in the context of the National Strategic Reference Framework.

- Reference Rate: is a benchmark interest rate for each Member State set by the European Commission.

- Social Housing usually denotes housing let at sub-market rents by social landlords to lower income and vulnerable households. Social Housing can be defined in many ways and practice varies by country. In the context of this study Social Housing is used when referring to a UDF or fund investing in or through a public body (e.g. municipal housing body) targeting low-income households.

- Solar photo-voltaic (Solar PV): is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material.

- Structural Funds: the European Regional Development Fund (ERDF) and the European Social Fund (ESF), referred to under Regulations (EC) No. 1083/2006, 1080/2006 and 1081/2006.

- Third Sector: all organisations that are not-for-profit and non-government, together with the activities of volunteering and giving which sustain them.

- Urban Development Fund (UDF): a fund as defined by Article 44 of Regulation (EC) No. 1083/2006 and Article 46 of Regulation (EC) No. 1828/2006. It invests in public-private partnerships and other projects included in an Integrated Plan for Sustainable Urban Development.

- Urban Project: Investment project addressing an urban area which is included in an Integrated Plan for Sustainable Urban Development.

- Waste to energy: process of creating energy in the form of electricity or heat from the incineration of waste source. Most waste to energy processes produce electricity directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuels.

Note: Weblinks for named references are included in the footnotes of ***underlined text***.

Executive Summary

Introduction

JESSICA, Joint European Support for Sustainable Investment in City Areas, is a policy initiative of the European Commission developed jointly with the European Investment Bank (EIB) and in collaboration with the Council of Europe Development Bank (CEB). It enables Managing Authorities (MAs) to further their sustainable urban development priorities by allocating some of their Structural Funds to revolving Urban Development Funds (UDFs) which can invest in a wide range of Urban Projects. MAs can also decide to channel funds through Holding Funds (HFs) which are set up to manage one or more UDFs. By extending the range of funding possibilities from the initial grant support to revolving instruments and aiming to leverage private sector investment, JESSICA operations can make a significant impact on the sustainable development of urban areas.

As a general rule, JESSICA operations focus on projects that would not attract sufficient finance through normal market mechanisms. Therefore JESSICA has significant potential for the financing of urban Energy Efficiency (EE) and Renewable Energy (RE) projects which are typically considered medium to high risk and can have long payback periods. Arup's review of Operational Programmes (OPs) in Section 3 estimates a total ERDF allocation of €6.2 billion to EE and RE priorities in the 2007-2013 programming period.

The main objective of the study is to provide guidance to MAs, prospective UDF managers, co-investors and other stakeholders on how they can use Energy Focused UDFs to implement EE and RE projects as part of an integrated strategy to promote sustainable urban development.

To this end, Arup has performed extensive desktop and consultation-based research combined with in-house industry-based and technical knowledge, to devise three Framework Models for Energy Focused UDFs. The Models identified are intended to be practical guidelines on the governance structures, UDF investment strategies, and regulatory issues that MAs and other stakeholders can consider when structuring their UDFs, based on leading practice from both JESSICA and non-JESSICA funds investing in urban EE and RE projects.

- Framework Model 1 concentrates on Energy Housing Funds set up to invest solely in EE and RE projects in existing housing[1].
- Framework Model 2 concentrates on diversified Energy Focused UDFs that can invest in a wide range of urban energy focused projects.

[1] Regulation (EC) No 397/2009 of May 2009 amended Article 7 of Regulation (EC) No 1080/2006, making expenditure on energy efficiency improvements and on the use of renewable energy in existing housing eligible in all 27 Member States up to an amount of 4 % of the total ERDF allocation, with Member States having to define categories of eligible housing in order to support social cohesion.

For the avoidance of doubt Article 44 of Council Regulation (EC) No 1083/2006 (following the adoption of Regulation (EU) No 539/2010) is not limited to housing, and in specific Article 44 (c) allows Structural Funds to finance energy efficiency and renewable energy measures in buildings, including existing housing. The focus of Framework Model 1 is on housing as this was requested by the Horizontal Studies Steering Group (HSSG).

- Framework Model 3 investigates the potential for incorporating Energy Performance Contracting (EPC) into the public sector.

The study also includes a detailed analysis of the role that Energy Action Plans (EAPs) or Climate Action Plans (CAPs) could play in informing energy-focused strategies for both MAs and UDF managers.

Regulatory Framework and State aid

The Directives and regulations covered demonstrate some of the regulatory and policy drivers for EE and RE measures within Member States as they aim to meet their targets under the Europe 2020 Strategy, and therefore the increasing potential for Energy Focused UDFs.

The need for transparency in the selection of FEIs is paramount and the UDF and any subcontractors are always required to comply with the EU Structural Funds Regulations, EU State aid rules and all other applicable EU rules and national law, regulations and guidelines (including procurement and environmental law and other regulations where appropriate). However the Regulatory framework will always depend on the types of projects being invested in and the specific regional and national legislation.

The potential presence of State aid needs to be considered when using any Structural Funds and/or national state resources for arranging financing.

Basis of Analysis for the Framework Models

The three devised Framework Models are based on an analysis of a wide range of inputs from UDF managers, MAs, national energy focused programmes, and other urban investment funds. The focus was on funds and delivery models that have been effective at implementing energy focused projects and which have made a real impact in putting EE and RE at the heart of sustainable urban development.

Although there are Energy Focused UDFs in place, overall there is a limited number of UDFs that have already implemented projects, or are near the stage of implementing them. As a result the study scope has been widened to include non-JESSICA funds and other delivery models that have been successful in delivering urban EE and RE projects.

The consultees interviewed to develop each Framework Model are as follows, with a summary of each fund and programme consulted included in Appendix A.

Framework Model 1: Energy Housing Fund

Table 1 Consultation in Framework Model 1

Location	Type of Consultee	Consultee
Lithuania	UDF Manager	Šiaulių Bankas
	Managing Authority	Department of the Ministry of Finance
	HF	EIB
Bulgaria	Managing Authority	Regional Development Operational Programme, Programming and Evaluation Department
Estonia	UDF Manager	Swedbank AS
	HF Manager	Kredex
Germany*	Fund Manager	KfW Bank

Framework Model 2: Energy Focused UDF

Table 2 Consultation in Framework Model 2

Location	Type of Consultee	Consultee
London	Managing Authority	London Development Agency
	Fund Manager	Foresight Environmental Fund
	Fund Manager	London Energy Efficiency Fund (LEEF)
Toronto*	Fund Manager	Toronto Atmospheric Fund
UK*	Fund Manager	Partnership for Renewables
	Fund Manager	Climate Change Capital

Framework Model 3: Energy Performance Contracting in the Public Sector

Table 3 Consultation in Framework Model 3

Location	Type of Consultee	Consultee
Berlin*	City Energy Agency	Berlin Energy Saving Partnership

For clarity * denotes non JESSICA funds

The summary that follows represents some of the main components in each Framework Model. See Section 6.2- 6.4 for more details.

Framework Model 1

Introduction

Framework Model 1 represents an Energy Housing Fund that invests solely in EE and RE projects in existing housing[2] and was requested from the Horizontal Studies Steering Group (HSSG) as MAs can allocate up to 4% of their total Member State ERDF allocation to these measures. In line with the Structural Funds regulations, the housing projects have to support social cohesion, with Member States themselves having to define the categories of eligible housing (and it should be noted in this context that definitions of social[2], private and public housing will differ across the EU).

This type of fund has the potential to have a large impact on sustainable urban development through factors such as energy consumption and fuel poverty reduction.

Organisational Structure

Under the Regulatory framework UDFs can be established as separate blocks of finance within financial institutions or as independent legal entities. To date UDFs focusing on housing have been set up as separate blocks of finance within an existing retail bank or local financial institution. The HF provides finance in the form of a debt instrument or credit lines to these financial intermediaries who deal directly with homeowners and apartment/housing associations who repay the loans.

This type of organisational structure has advantages for investment in individual housing units as the financial intermediary can use an existing network of client relationships, bearing in mind that the type of housing and expenditures have to be eligible in accordance with MA definitions and Structural Funds regulations.

However, the organisational structure may be more suitable for investments in Social Housing due to the different Final Recipients, associated risks, and returns involved. In a Social Housing project, there will generally be a higher number of housing units involved together and finance will need to be secured and repaid by a municipal authority or Social

[2] Social Housing usually denotes housing let at sub-market rents by social landlords to lower income and vulnerable households. Social Housing can be defined in many ways and practice varies by country. In the context of this study Social Housing is used when referring to a UDF or fund investing in or through a public body (e.g. municipal housing body) targeting low income households

Housing organisation. In general, repayment risk tends to be lower when making investments in Social Housing since municipal authorities and Social Housing organisations tend to have good credit ratings.

Therefore for Social Housing it is recommended that the scope for an independent legal entity be considered, such as a specialist housing fund, which can make the appropriate investments, secure and coordinate financing from a wide range of sources, integrate relevant stakeholders and readily access the type of technical expertise necessary to implement large-scale projects.

Potential Final Recipients and Potential Project Typologies

Potential Final Recipients include, but are not limited to: private individuals, municipal authorities, Social Housing organisations, apartment/housing associations, and local, regional and national administrations /institutions.

Potential project typologies for EE and RE measures in existing housing include insulation of the building envelope (walls, roof, cellar floors) as well as installation of efficient boilers and RE sources e.g. solar photovoltaic on rooftops, solar thermal units, heat pumps and micro-wind.

Potential Co-Investors

Apart from the co-financing that needs to be provided by the MAs for Structural Funds, potential co-investors for a fund focusing on EE and RE in existing housing could include private sector sources such as retail banks and investment banks. However, based on specific country experiences it is clear that some private sector markets will be more open than others to financing housing measures and what is appropriate and realistic will be decided upon on an individual basis.

Financial Products

Whilst not excluding other options, based on examination of existing funds it appears that under this Framework Model debt instruments are the most appropriate financial products for housing projects. This is because they allow for relatively long payback periods and low costs of capital that suit the risks and returns of EE and RE projects in housing.

Fund managers should look at coordinating existing grant schemes that provide funding for energy audits and less profitable energy retrofit measures such as the modernisation of the building envelope. Where projects are being undertaken by private individuals, incentives offered to homeowners and apartment/housing associations can assist in increasing loan requests. This requires the coordination with MAs or other national institutions that can disburse grant and other funding at a project level.

For more information on Framework Model 1, including recommended technical assistance, project selection criteria, project management, fund monitoring and risk management processes, please refer to Section 6.2.

Framework Model 2

Introduction

The second Framework Model is for a diversified Energy Focused UDF which can invest in a range of energy focused projects such as EE and RE in housing and buildings, street lighting, decentralised energy, small-scale RE units, waste to energy projects and clean transport.

Organisational Structure

The preference of organisational structure is based on UDF manager preferences due to factors such as investment types and differing legal systems. The "London Energy Efficiency Fund" (LEEF) has been established as an independent legal entity governed by agreements between co-financing partners and shareholders. The other possibility allowed is to set up the UDF as a separate block of finance held within an existing financial institution, as is the case for the "EE/RE UDF" in Sicily, Italy. Both are equally suitable as potential options under Framework Model 2.

Potential Recipients and Potential Project Typologies

The potential Final Recipients for a diversified Energy Focused UDF include a wide range of public and private bodies that own and operate urban infrastructure e.g. local, regional and national administrations and institutions, hospitals, universities, schools, private companies and housing associations.

Existing experience from JESSICA and non-JESSICA funds demonstrates that a wide range of energy related project typologies can be funded by revolving mechanisms. This range of project typologies is included in Figure 1 with detailed analysis of the relative opportunities and barriers included in Appendix B.

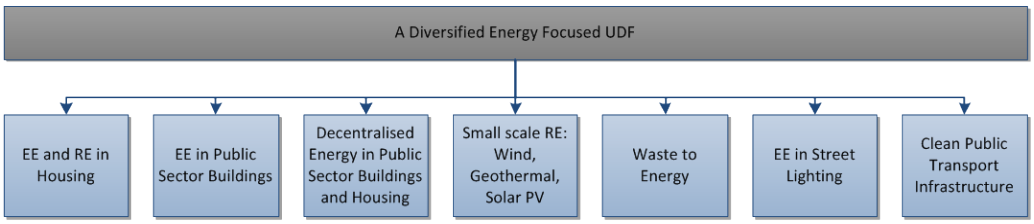


Figure 1 Project typologies for an Energy Focused UDF

Potential Co-Investors

Apart from the co-financing required for Structural Funds, based on the experience from existing UDFs and non-JESSICA funds and programmes, there is a wide range of potential co-investors for Energy Focused UDFs.

This includes:

- institutional investors;
- private equity funds;
- infrastructure funds;
- commercial banks;
- ESCOs; and
- the EIB.

Nevertheless the scale and type of co-investment for an Energy Focused UDF will be heavily reliant on factors such as the financial market in the specific Member State, project typologies, and related Final Recipients.

Financial Products

In general, projects with low risks and stable, even if relatively low, returns are more suited to debt instruments. If there is sufficient market interest it may be possible for a UDF manager to secure external co-investment from a private sector financial institution such as a commercial bank or infrastructure fund.

More risky projects that need a high level of capital investment but also have the potential for higher returns may be more suitable for equity instruments. In this case the UDF manager could investigate the possibility of securing investment from venture capital funds or other private equity sources.

In the case of high-risk projects which are unlikely to generate high returns, such as some decentralised energy projects, these may be a need for support from grant instruments of some kind, either from the ERDF or other sources.

For more information on Framework Model 2 including recommended technical assistance, project selection criteria, project management, fund monitoring and risk management processes please refer to Section 6.3.

Framework Model 3

Introduction

Framework Model 3 investigates the potential for integrating a third party into a JESSICA model in the form of an Energy Service Company (ESCO) using an Energy Performance Contract (EPC) procurement process.

This Model specifically focuses on EPC within public sector buildings, because this is where there is significant potential for JESSICA investment. The analysis draws upon expertise from the best practice model of the Berlin Energy Saving Partnership (BESP) which has been instrumental in setting up similar schemes in cities such as Vienna and Prague, as well as elsewhere in the Czech Republic, and which continues to assist developments on an international basis.

What is Energy Performance Contracting?

Energy Performance Contracting (EPC) is a procurement model which can support demand-side EE measures in buildings. The other main type of model used by ESCOs is Energy Supply Contracting which focuses on supply-side measures such as co-generation and district heating.

An EPC procurement model brings a customised and integrated approach to delivering EE projects that encompasses the planning, construction, financing, and operation and maintenance of Energy Conservation Measures (ECMs).

EPC has many benefits for property owners including:

- no upfront capital investment;
- transferring technical and performance risk to a third party (e.g. an ESCO);
- guaranteed cost savings in line with energy reduction;
- providing a means of renewing obsolete assets; and
- overcoming public procurement barriers.

The primary form of EPC used in Europe is the Guaranteed Savings model. Figure 2 demonstrates the functional activities undertaken by the different stakeholders in this type of model, in which a "building owner" (usually a municipality) has a building or a portfolio of buildings with a sub-optimal energy performance. The ESCO provides a performance guarantee for the energy savings which usually encompasses optimisation of heating, lighting and cooling controls, and the ESCO taking over some control of the building operation for a period of time.

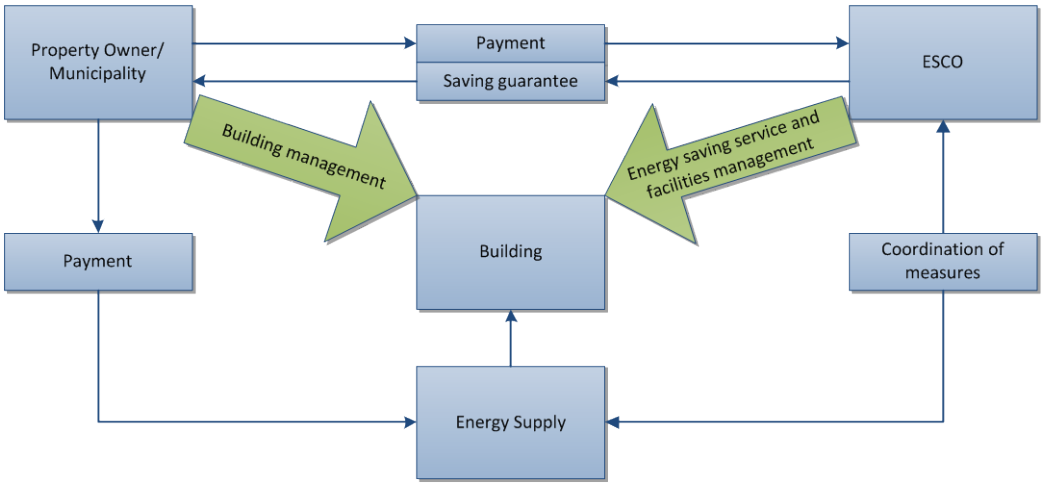


Figure 2 Functional activities in a Guaranteed Savings EPC model

The performance guarantee is usually one of three types: it either revolves around the actual energy savings from a project, stipulates that energy savings will cover periodic financing costs, or that the same level of energy service will be provided for less money. This guarantee is backed by a payment obligation in case of non-performance by the ESCO so if there is an underperformance compared to contract then the ESCO has to cover the shortfall. In this way the performance risk is transferred to the ESCO.

EPC offers significant potential for MAs to realise their EE projects in public buildings because there is a guaranteed energy saving stipulated in the contract and the ESCO is incentivised to use its expertise to implement the most suitable project measures for the building(s).

How would financing work in the context of an Energy Focused UDF?

An Energy Focused UDF can provide financing to either the public sector client or the ESCO, depending on the particular market conditions and the criteria from the relevant OP. For EE projects of this kind debt instruments are more popular to date than equity or guarantee instruments.

When the beneficiary is a municipality which has a high credit-rating and the possibility to take on more debt it may be better for them to arrange the financing since they will get

lower interest rates than a private ESCO. The demand for a UDF to provide a credit line directly to a municipality or building owner would be limited by:

- the appetite for EPC contracts in the specific country context;
- the size and experience of the ESCO market in that country;
- size of project portfolios, which can be dependent on the capacity for bundling projects together to an appropriate size for tender to an ESCO; and
- the appetite of the customer for on-balance sheet debt.

A UDF could also provide a credit line to an ESCO which would take on the debt repayment and performance risk. The term ESCO may not be mentioned specifically in the OP but this financing arrangement relies on an ESCO being an eligible beneficiary type under the relevant OP e.g. private body with a public sector service. The ESCO would receive a higher annual charge from the customer than in the previous model as the client payment also includes the financing service.

The concept of forfeiting/factoring where an ESCO can sell their receivables (i.e. the guaranteed savings) to a third party at completion so that long term debt is taken off-balance sheet is also explored under this Framework Model.

Options for the future development of this Framework Model

It is recommended that MAs implement the following measures if they wish to develop the use of EPC in a regional and/or national context under Energy Focused UDFs:

- Promote the use of EPC at a high political level including getting buy-in from all of the important agencies at a regional and national level. This will include creating a stable legal and regulatory environment for EPC;
- Investigate the potential for establishing a predetermined list of chosen ESCOs within their regional or national context to procure contractors for EE projects;
- Investigate how to pool building projects together so that attractive investment proposals can be presented to ESCOs both in terms of scale and potential returns; and
- allow ESCOs to be Final Recipients of UDF funds if so required (i.e. to allow them to enter into EPCs with public buildings /Social Housing etc…).

There is significant potential for ESCOs and EPC models to become an integral part of Energy Focused UDFs. The specific projects implemented and contracts used will depend on individual Member States' regulatory and policy frameworks, in addition to the development of the ESCO market itself. However, as a procurement model for EE projects the EPC model has been seen to have widespread support and interest from across the EU.

For more information on Framework Model 3 please refer to Section 6.4.

Table 4 summarises the recommended organisational structures, project typologies and potential beneficiaries for each of the Framework Models. This should be read in combination with Section 6 to get a detailed overview of each Model.

Table 4 Main components of Framework Models, with recommended (not exclusive) options

	Framework Model 1: Energy Housing Fund	Framework Model 2: Energy Focused UDF	Framework Model 3: EPC in Public Sector
Organisational Structure	A separate block of finance in an existing financial institution has advantages when investing in individual Final Recipients for housing **OR** An independent legal entity may have advantages if Final Recipients represent more than one individual or a group e.g. housing association	An independent legal entity to enable UDF to invest in a range of multi-sectoral urban EE and RE projects **OR** A separate block of finance in an existing financial institution is also a possibility	This model explores how to incorporate an Energy Service Company (ESCO) using EPC. This could include the ESCO being a co-investor into a UDF or being a Final Recipient of a UDF investment
Typical Project Typologies	EE and RE measures in housing	EE and RE measures in housing and public sector buildings District Heating and Co-generation Small Scale RE: e.g. wind, solar PV Energy from Waste	EE optimisation of public sector buildings. EE optimisation of street lighting
Typical Final Recipients	Homeowners and apartment/housing associations for blocks of privately owned multi-family housing Higher education institutions (student housing), municipalities/ Social Housing organisations	All public and private bodies involved in EE and/or RE projects including: public authorities, schools, universities, hospitals and private sector companies	ESCOs. Public sector building owners Municipalities

Conclusions

The conclusions of the study are positive: it is clear that there is significant potential for Energy Focused UDFs across Europe.

Based on the analysis in the study and the outputs of the consultation it is expected that EE in housing will continue to be a central focus of JESSICA operations, both because there is significant demand for EE interventions in this sector, and because JESSICA lends itself well to the types of financial products that are suitable.

There is also demand for the more diversified Energy Focused UDFs which invest in a wider range of urban EE and RE projects. By the end of the current programming period there should be a range of implementation experience for other MAs to consider.

In addition, depending on country-level legal and regulatory frameworks, innovative delivery models such as EPC, could have significant additional potential for implementation within Energy Focused UDFs.

1 Introduction to the Study

1.1 Study Objectives and Approach

JESSICA, Joint European Support for Sustainable Investment in City Areas, is a policy initiative of the European Commission developed jointly with the European Investment Bank (EIB) and in collaboration with the Council of Europe Development Bank (CEB). It enables Managing Authorities (MAs) to further their sustainable urban development priorities by allocating some of their Structural Funds to revolving Urban Development Funds (UDFs) which can invest in a wide range of Urban Projects. MAs can also decide to channel funds through Holding Funds (HFs) which are set up to manage one or more UDFs. By extending the range of funding possibilities from the initial grant support to revolving instruments and aiming to leverage private sector investment, JESSICA operations can make a significant impact on the sustainable development of urban areas.

As a general rule, JESSICA operations focus on projects that would not attract sufficient finance through normal market mechanisms. Therefore JESSICA has significant potential for the financing of urban energy efficiency (EE) and renewable energy (RE) projects which are typically considered to be medium to high risk and can have long payback periods. JESSICA operations can provide the investment and expertise for these types of projects that the market will not provide alone.

The main objective of the study is to provide guidance to MAs, prospective UDF managers, co-investors and other stakeholders on how they can use Energy Focused UDFs to implement EE and RE projects as part of an integrated strategy to promote sustainable urban development.

To this end, Arup has performed extensive desktop and consultation-based research combined with in-house industry-based and technical knowledge, to devise three Framework Models for Energy Focused UDFs. The Models identified are intended to be practical guidelines on the governance structures, UDF investment strategies and regulatory issues that MAs and other stakeholders can consider when structuring their UDFs, based on leading practice from both JESSICA and non-JESSICA funds investing in urban EE and RE projects.

The study has analysed five core components that need to be considered by MAs and other stakeholders in the establishment, implementation and operation of an Energy Focused UDF:

- the **Operational Programme(s) (OPs)** that is/are used to define the measures, potential beneficiaries and allocation to specific energy focused priorities;
- the **Regulatory Framework** both at European and national level which details the eligibility requirements for individual project types, the State aid issues, and technical directives that are involved in energy focused projects;
- an **Energy Action Plan (EAP),** considered on its own or in conjunction with a suite of plans, as an **Integrated Plan for Sustainable Urban Development (IPSUD)** which is a requirement for operations launched under Article 44 (b) of the General Regulation (EC) 1083/2006[3];

[3] See: http://ec.europa.eu/regional_policy/information/legislation/index_en.cfm

- the **Investment Strategy** of the UDF[4] which needs to comply with the MA's goals as well as regional priorities as outlined in its OP, but may also include the financial and economic metrics proposed by the UDF manager as a result of its experience in the market; and
- the **Governance Structure** of the UDF which includes the stakeholders involved in governance, project management, monitoring and risk management processes.

The conclusion of this analysis is presented as a series of three Framework Models that highlight best practice guidance which can be used by MAs and UDF managers to establish, implement and operate Energy Focused UDFs.

1.2 Framework Models

Arup has devised three Framework Models as part of this study. These Models are intended to provide the outline and components of Energy Focused UDFs with particular specificities.

The focus of each Framework Model was selected based on MA consultations, in particular with the HSSG, and are intended to provide MAs with guidance on how Energy Focused UDFs are best established, implemented and operated. The analysis throughout the report is structured around building up these Models and providing specific recommendations for MAs on the full range of issues that need to be considered when establishing an Energy Focused UDF.

Framework Model 1 is designed to advise MAs wishing to focus on EE and RE measures in existing housing and was requested from the HSSG meetings. This Model's objective is to encompass all of the lessons that can be learnt from existing operations within this sector in Lithuania and Estonia, whilst considering issues for future operations. Although this type of fund only focuses on housing[2], it has the potential to have far reaching impacts due to the potential size of ERDF resources for EE and RE in housing, particularly in EU12 countries.

The "*Housing in JESSICA Operations*" Horizontal Study will include more detail on investments in different types of housing and this Framework Model should be used in conjunction with that study.

Framework Model 2 is intended to provide guidance to MAs who wish to have a wider range of energy focused projects implemented in their region under Energy Focused UDFs. The analysis related to this Model covers an extensive range of advice from the prioritisation of projects and the types of stakeholders that could be involved, to the range of financial instruments and co-investment options.

Framework Model 3 demonstrates a specific way of structuring an Energy Focused UDF using an Energy Performance Contracting (EPC) market-based model. EPC is a procurement model and financing mechanism that enables energy savings, from the retrofitting of buildings and the upgrading of building systems, to pay for the cost of delivering and operating the infrastructure. This Model concentrates on the types of contractual arrangements that can be undertaken, the stakeholders involved, the financing

[4] The UDF Investment Strategy is a core component of the UDF Business Plan. For more details see the Horizontal Study: "*Urban Development Fund Handbook*".

structure, and how this procurement method could be used within an Energy Focused UDF.

Detailed analysis of the three Framework Models is in Section 6.

2 EU Strategic and Policy Context for Energy Focused UDFs

2.1 Introduction

The EU has made energy efficiency and renewable energy a key priority from a policy and investment perspective. The Europe 2020 Strategy (see following section) sets out the EC's ambitious objectives on climate change and energy to be reached by 2020. As part of these objectives the European Union (EU) set three targets related to energy:

- to cut greenhouse gas (GHG) emissions by 20% from 1990 levels (or even up to 30% under certain conditions);
- to deliver at least 20% of Europe's energy from renewable sources; and
- to increase energy efficiency by 20%.

Cities are very much at the forefront of delivering these targets: current estimates state that they account for 60-80% of energy consumption and 75% of GHG emissions.[5] In urban areas EE or demand-side measures, are considered to be more cost-effective than RE or supply-side measures, which are constrained by space and planning limitations. However, current estimates by the EC suggest that Europe is only on course to meet half of the 20% EE target by 2020.[6] Therefore it is only by delivering large-scale urban retrofit programmes, particularly in buildings which account for 40% of total EU energy consumption[7], that this target can be met.

The introduction of the *Leipzig Charter on Sustainable European Cities*[8] subscribed to in 2007 by EU Member States to promote sustainable urban development, and the creation of the *Covenant of Mayors*[9] in 2009 which has nearly three thousand city-level signatories voluntarily committing to reduce their carbon impacts, demonstrate that cities are keen to realise their sustainability targets.

It is clear from the vehicles addressed in this study that the public sector plays an integral role in delivery. Without public sponsors and strong political support it is difficult to implement EE projects on a large scale. The private sector still views them as low profit, complex and difficult to deliver, and it is only with public sector guidance, leadership and funding, that its confidence will increase.

There is also some scope for public sector-led RE projects in cities. Although large-scale RE generators, such as wind and solar farms, are generally not possible in urban areas due to land and grid constraints, smaller-scale projects can have sufficient returns to create investor interest and can fit well into a city-level sustainable urban development strategy

[5] See: http://www.un.org/en/sustainablefuture/cities.shtml

[6] See: Proposal for a Directive on energy efficiency (2011) p1
http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

[7] Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings, paragraph (3)

[8] See:
http://www.eukn.org/E_library/Urban_Policy/Leipzig_Charter_on_Sustainable_European_Cities

[9] See: http://www.eumayors.eu/index_en.html

e.g. waste to energy plants, district heating projects, micro to small-scale wind and solar photo-voltaic units.

Therefore there is a clear role JESSICA can play in assisting Member States to meet their sustainability targets through urban investment in viable EE and RE projects.

2.2 Policy context for JESSICA energy focused operations

The role of JESSICA instruments in the energy sector should be seen in the context of the strategies and directives which place climate change mitigation at the heart of the European political agenda, and underline the need to encourage sustainable investments in EE and RE projects. They include:

Europe 2020 Strategy

The *Europe 2020 Strategy*[10] sets the objectives for European growth strategy up until 2020 and in this way, provides much of the policy framework for the current and next programming periods. Launched in early March 2010, it outlines a 10-year strategy for smart, sustainable and inclusive growth in the EU.

Resource Efficient Europe

Resource Efficient Europe[11] sets the focus for future investment, demand management and energy efficiency policy across the EU. It is a flagship initiative of the *Europe 2020 Strategy* and includes a number of specific plans related to individual policy areas. The plans that promote the type of projects that could be realised under energy focused JESSICA operations include:

- the *Low-Carbon Economy Roadmap 2050*[12] in which the EC has set out a strategy to meet the long-term target of reducing domestic emissions by 80 to 95% across EU Member States. The roadmap demonstrates how the sectors responsible for Europe's emissions, namely, power generation, industry, transport, buildings and construction, as well as agriculture, can make the transition to a low-carbon economy;
- the *Energy Efficiency Plan 2011*[13] which proposes measures aimed at closing the gap in reaching the EU's 20% energy efficiency target, helping to realise the vision of the *Low Carbon Economy Roadmap*, as well as aiming to increase energy independence and security of supply;
- the *White Paper on the future of transport*[14] which introduces a roadmap of 40 initiatives for the next decade in order to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. At the same time, the proposals included are expected to dramatically reduce Europe's dependence on imported oil thereby leading to a 60% reduction in carbon emissions from transport by 2050; and

[10] See: http://ec.europa.eu/europe2020/index_en.htm

[11] See: http://ec.europa.eu/resource-efficient-europe/

[12] See: http://ec.europa.eu/clima/policies/roadmap/index_en.htm

[13] See: http://ec.europa.eu/energy/efficiency/action_plan/action_plan_en.htm

[14] See: http://ec.europa.eu/transport/strategies/2011_white_paper_en.htm

- a *Roadmap for a resource-efficient Europe*[15] which sets out a vision for the structural and technological change needed up to 2050, as well as the objectives to be reached by 2020 and suggestions about how they could be met.

Fifth Cohesion Report on Economic, Social and Territorial Cohesion

The *Fifth Cohesion Report on Economic, Social and Territorial Cohesion*[16] sets out the strategic direction for investing in sustainable development in the EU. One of the central challenges identified in this *Cohesion Report* is ensuring climate change resilience within Member States and in particular, how to support investment in mitigation and adaptation measures in the transition to a lower carbon economy. The public consultation on this report on the future of Cohesion Policy had 444 responses, with over half (225) from regional and local bodies[17], and highlighted that the role of Cohesion Policy in promoting the objectives of the Europe 2020 Strategy was overwhelmingly welcomed by respondents. Contributions also showed a general consensus on the need for an ambitious urban agenda, support for a bottom-up approach and the development of macro-regional strategies. These responses illustrate that, as well as promotion at the highest political levels, there is also considerable support at the local community level for a sustainable investment agenda which is crucial for the realisation of energy focused projects through mechanisms such as JESSICA.

Directive of the European Parliament and of the Council on energy efficiency

In line with the policy emphasis on energy and the environment, energy efficiency continues to be a key focus of legislative development in the EU which has adopted the *Directive 2012/27/EU on energy efficiency.*[18]

This directive establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the EU 2020's 20% energy reduction target. While the Energy Efficiency Directive does not introduce binding targets at national level, there are "binding measures" such as an obligation to renovate public buildings and other initiatives.

Key measures include:

- The public sector is required to renovate 3% of buildings "owned and occupied" by the central government in each country (Buildings need to have a useful area larger than 500 m^2 in order to be covered by this requirement which is lowered to 250 m^2 as of July 2015.
- EU countries are requested to draw up a roadmap to make the entire buildings sector more energy efficient by 2050 (commercial, public and private households included).
- Energy audits and management plans are required for large companies, with cost-benefit analyses for the deployment of combined heat and power generation (CHP) and public procurement.

[15] See: http://ec.europa.eu/environment/resource_efficiency/index_en.htm

[16] See: http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion5/index_en.cfm

[17] http://ec.europa.eu/regional_policy/archive/consultation/5cr/pdf/5cr_result_summary.pdf

[18] See: http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

- Energy companies are requested to reduce energy sales by 1.5% every year among their customers. This can be achieved via improved heating systems, fitting double-glazed windows or insulating roofs.

Each country will have to present national indicative targets by April 2013 and final plans should ensure that the EU's overall 2020 goal is met. If Europe is off track after a review planned in 2014, the Commission said it intends to come back with a proposal for further legislation. Therefore an increase in building retrofits, which include energy efficiency measures that can be financed from Structural Funds can be expected in the coming years.

2.3 Summary

The European policy and strategic environment detailed above has identified the key steps that Member States need to take to meet EU-defined sustainable energy targets and provides significant support for the types of EE and RE project investments which will be required in the current and next programming period. These types of energy investments can be realised under Energy Focused UDFs, enabling JESSICA to contribute to regional and national energy targets in the context of integrated sustainable urban agendas.

3 Review of Operational Programmes

3.1 Introduction

The energy-focused priorities within OPs are normally the first building block for establishing an Energy Focused UDF. It is in the OP where the actions that a MA can take using its ERDF allocation are agreed and therefore it is the OP that provides the parameters for energy focused projects and defines the beneficiaries that can be targeted by JESSICA operations.

Operational Programmes: a definition
OPs are prepared by each Member State, at national and/or regional level, and present the policy priorities, project types, beneficiaries, and respective funding allocations selected by the national and regional authorities for the respective programming period (currently for 2007-2013).

A review of national level OPs across Europe was undertaken to summarise the breadth of project types, beneficiaries and EE and RE funding allocations for the current 2007-2013 programming period. This may also provide guidance to MAs on the project types and beneficiaries to consider in order to further energy focused priorities in the next programming period, 2014-2020.

3.2 Operational Programme Allocations to Energy Focused Priorities

While the OPs presented in this report are still the most recent publications available for analysis and comparison, it should be noted that since they were developed and approved there was an amendment[19] made to the ERDF Regulation which states that up to 4% of national ERDF amounts can now be invested in EE and RE in existing housing throughout all 27 Member States, so as to support social cohesion,. The 4% ceiling was a theoretical maximum rather than a target. While there was no "new money", the amendment added a potential EUR 8 billion to the original allocations, to the extent that such original allocations did not already include EE and RE in housing in the EU-12 (where this was already possible).

For illustrative purposes, Table 5 provides an estimate of the total amount of ERDF funding which was allocated for energy related priority categories in the OPs[20].

As the Cohesion Fund is not eligible for Financial Engineering Instruments (FEIs) in this programming period, Arup undertook its own estimate of Cohesion Fund totals (using the original OPs for the 12 Member States acceded since May 2004, in addition to Greece

[19] Regulation (EC) No 397/2009 of May 2009 amended Article 7 of Regulation (EC) No 1080/2006 to support social cohesion by allowing up to 4% of national ERDF amounts to be invested in EE and RE in existing housing throughout all 27 Member States.

[20] See: Source DG REGIO InfoView database 2009. The InfoView database is an internal DG REGIO database which provides data on Structural Funds expenditure for the programming periods 2000-2006 and 2007-2013. It is structured around Operational Programmes.

See presentation "*Cohesion Policy support for Sustainable Energy, Public Hearing, Renewable Energy Systems and Cooperatives*", Brussels, 8 March 2012 at www.oikologoiprasinoi.eu/files/presentations/Maud%20SKARINGER.pdf

and Portugal).[21] Cohesion Fund allocations by Member State were then subtracted from the data totals in order to estimate the total potential allocations for EE and RE projects.

Please note that this was just an estimate to get the scale of the potential allocations for energy. It should be noted that these figures are not static and figures from October 2012 indicate EUR 5.1 billion for energy efficiency, up from EUR 4.2 billion in 2008. This is probably largely due to the 2009 regulation amendment referred to above allowing increased ERDF eligibility for investment in sustainable energy in housing.

Table 5 Allocations by Priority Category for 2009-2013

Category	Total Allocations to OPs (€)
Renewable Energy Sources: Wind	748,231,227
Renewable Energy Sources: Solar	1,053,891,740
Renewable Energy Sources: Biomass	1,853,140,509
Renewable Energy Sources: Hydroelectric, geothermal and other	1,133,772,731
Energy efficiency, co-generation, energy management	4,453,550,915
Total allocations (ERDF + Cohesion Fund)	**9,242,587,122**
Less Estimated Cohesion Fund allocations (see explanation in text)	*3,011,540,875*
Estimate of Total Energy Focused ERDF allocations in EU OPs	***6,231,046,247***

Source: DG REGIO database InfoView 2009

3.3 Potential Projects and Final Recipients from OPs

The types of measures that an Energy Focused UDF could finance (dependent on OP eligibility) are not limited to but include:

- EE and RE measures in buildings, including existing housing;
- EE and RE in cities e.g. small-scale RE and EE in street lighting;
- Waste to energy projects;
- Cogeneration and district energy networks; and
- Low carbon and clean transport infrastructure.

[21] The EU12 plus Greece and Portugal are eligible for the Cohesion Fund

The project typologies and potential Final Recipients that have been identified within OPs, represent those identified as being eligible for Structural Funds, and therefore JESSICA operations.

The potential Final Recipients include, but are not limited to: local, regional and national administrations and institutions, energy agencies, municipal authorities, hospitals, universities, research centres, schools, Social Housing, NGOs, landlord associations, individuals, private sector companies and SMEs.

The projects represent the full breadth of energy-focused projects being undertaken in urban areas across the EU.

The summary analysis in Figure 3 demonstrates how these are relevant for the three Framework Models.

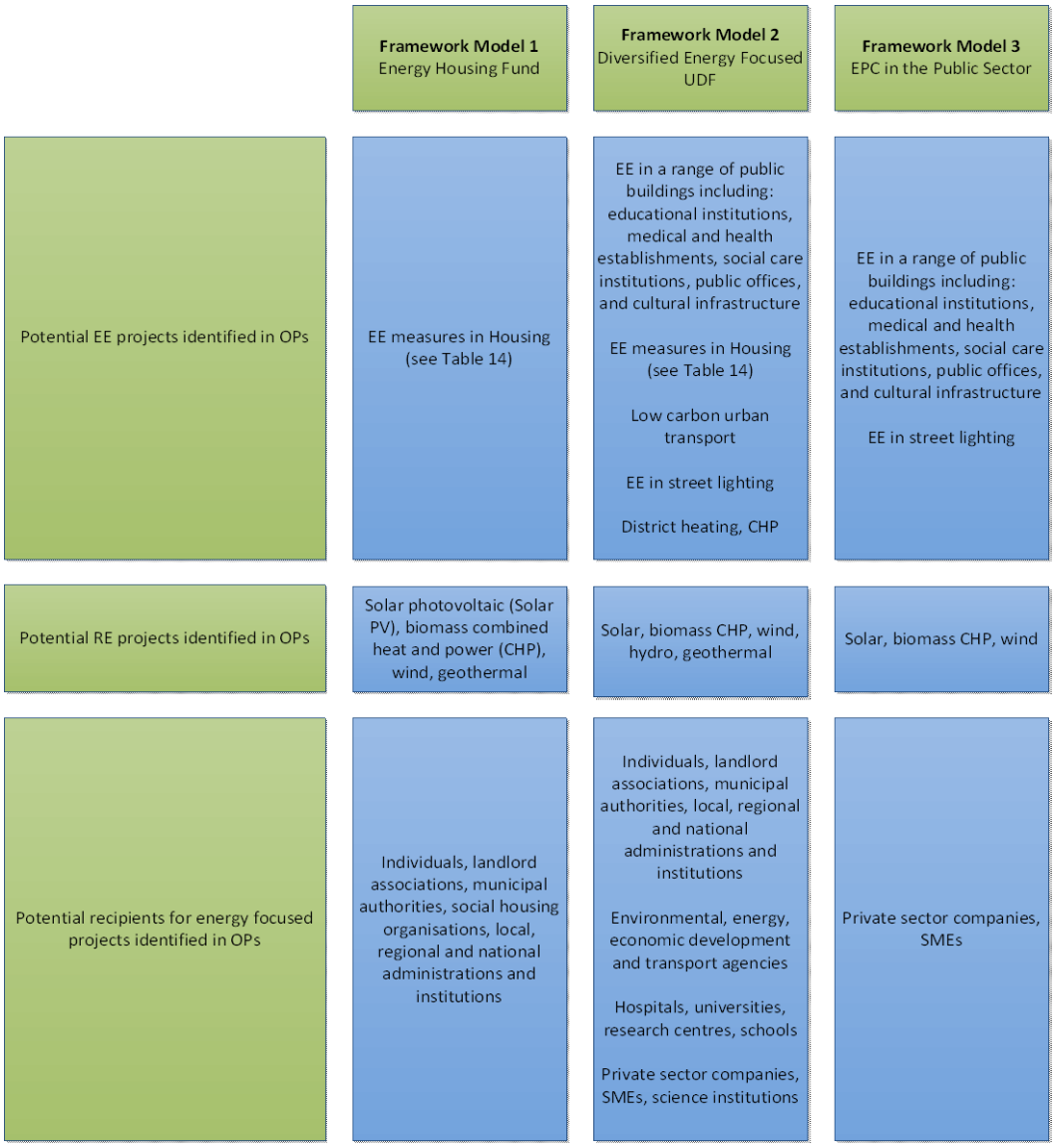


Figure 3 Potential energy focused projects and respective recipients identified in OPs in the context of Arup's Framework Models

4 Analysis of City-level Energy Action Plans

4.1 Introduction

Arup's experience of working with city authorities has enabled identification of the main components involved in developing a comprehensive Energy Action Plan (EAP), illustrated in Figure 4. There is significant overlap between the development of an EAP and establishing an Energy Focused UDF, even though not all steps will be followed in, or be applicable for, every region.

EAPs are useful because traditional urban plans are spatially focused, and most do not contain energy or carbon reduction objectives. Therefore it makes sense to look to cities to provide best practices for the types of sustainable urban development projects that Energy Focused UDFs can finance, as many of the most innovative and successful energy focused projects and programmes are being set-up, implemented and operated by cities.

City-level EAPs were chosen in particular because they tend to specify projects and methods for project prioritisation and implementation, whereas national energy plans are often developed at a more strategic, higher level.

However, while an EAP can identify projects types and targets suitable for JESSICA operations and may input into the development of an IPSUD, it should be clear that setting up an EAP is **not** a requirement for JESSICA operations. See Section 4.4 for more information on an IPSUD in relation to an EAP.

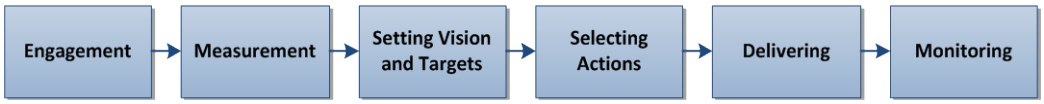


Figure 4 Components of an Energy Action Plan

The chapter is also intended to give MAs some examples of the types of projects that EU cities have implemented for sustainable urban development and give ideas for the types of projects possible under an Energy Focused UDF.

4.2 Background to City-level Energy Action Plans

Although it is national governments that are signed up to the Kyoto protocol, cities are rapidly becoming the focal points for delivery of the large-scale emissions reductions required to tackle the problems of climate change. Indeed, many have established their own (voluntary) carbon reduction targets. Current estimates suggest that cities are responsible for 75% of carbon emissions[22].

City-level EAPs are delivered through a process that has been developed and implemented across Europe, promoted in particular by the EC's *Covenant of Mayors*[23] initiative which aims to make cities themselves signatories of the European target of the 20% CO_2 reduction by 2020. In order to sign up to the Covenant of Mayors, local and

[22] See: http://www.arup.com/Homepage_Cities_Climate_Change.aspx

[23] See: http://www.eumayors.eu/about/covenant-of-mayors_en.html

regional authorities must prepare a *Baseline Emission Inventory*[24] as well as submit a *Sustainable Energy Action Plan*[25] (SEAP) within a year of their signature, which outlines their planned actions in carbon reduction. Currently covenant signatories are free to choose the format of their SEAP, although they do have to follow the general principles set out in the *Covenant of Mayors SEAP guidelines*[26].

The purpose of this section is not to preface the *Covenant of Mayors* guidelines, but to highlight best practice components of EAPs, and to provide some further analysis on these components.

4.3 Plans Reviewed

The plans were selected for review based on the following:

- the European cities that have developed SEAPs under the Covenant of Mayors initiative;
- analysing which cities have implemented large scale and successful energy focused projects from *C40 Cities,*[27]which are a group of large cities from across the world that are committed to tackling climate change, and;
- cities which have won the *European Green Capital Awards*[28] (started in 2010) which selects one European city each year with a consistent record of achieving high environmental standards (i.e. Stockholm and Hamburg).

From a long list of cities gained from this process, a short list was put together to enable the analysis to focus on cities that have made a real impact on carbon reduction and energy saving based on international research, and that have constructed multi-sector EAPs from which to plan and prioritise their energy focused actions.

A total of nine EAPs (and where relevant their equivalent Climate Action Plans (CAPs) were reviewed in detail for the purposes of identifying best practices and are detailed in Table 6.

All of the short-listed cities used a multi-sectoral approach to selecting actions for overall city-level emissions reduction. In addition, some ensured that these actions were not only focused on emissions reduction, but also at producing sustainable employment, health and wellbeing benefits and fuel poverty reduction. Therefore, as they have clearly interlinked actions supporting sustainable development, in theory they could qualify as an IPSUD and for the EAP for London this was the case.

Analysis was undertaken drawing upon both Arup's in-house experience and desk-based research, including a report by Arup for the *C40 Cities* group entitled *Climate Action in*

[24] See: http://www.eumayors.eu/+-Baseline-Emission-Inventory-+.html

[25] See: http://www.eumayors.eu/+-Sustainable-Energy-Action-Plan,32-+.html

[26] See: http://www.eumayors.eu/+-SEAP-+.htm

[27] See: http://live.c40cities.org/

[28] See: http://ec.europa.eu/environment/europeangreencapital/index_en.htm

Megacities.[29] In addition, direct consultation was undertaken with three selected cities: London, Madrid and Toronto.

Table 6 List of reviewed Energy Action Plans

City-level Energy Action Plans
Amsterdam: a different energy, 2040 Energy Strategy (2011) and *New Amsterdam Climate: A Summary of Plans and Ongoing Projects (2008)*[30]
Chicago Climate Action Plan (2008)[31]
Copenhagen Climate Action Plan (2009)[32]
Climate Action in Hamburg: update 2009/10 [33]
Delivering London's energy future: The Mayor's draft Climate Change Mitigation and Energy Strategy (2010)[34]
City of Madrid Plan for the Sustainable Use of Energy and Climate Change Prevention (2008)[35]
Rotterdam Climate City: Mitigation Action Programme (2010)[36]
Stockholm Action Plan for climate and energy (2010–2020)[37]
Toronto, Change is in the Air, Climate Change, Clean Air and Energy Action Plan: Moving from Framework to Action (June 2007)[38]

[29] See: http://www.arup.com/News/2011_06_June/01_Jun_11_C40_Climate_Action_Megacities_Sao_Paulo.aspx

[30] See: http://www.nieuwamsterdamsklimaat.nl/

[31] See: http://www.chicagoclimateaction.org/

[32] See: http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/LivingInCopenhagen/ClimateAndEnvironment.aspx

[33] See: http://www.euco2.eu/resources/Hamburg+Climate+Action+Plan.pdf

[34] See: http://www.london.gov.uk/priorities/environment/climate-change/climate-change-mitigation-strategy

[35] See: http://www.c40cities.org/docs/ccap-madrid-110909.pdf

[36] See: http://www.gcp-urcm.org/Resources/R201012010012

[37] See: http://www.c40cities.org/docs/Stockholm%20SEAP%20English.pdf

[38] See: http://www.toronto.ca/changeisintheair/change.htm

4.4 Energy Action Plans and Integrated Plans for Sustainable Urban Development

4.4.1 Regulatory requirement for an IPSUD in the 2007-2013 period

MAs who wish to pursue Urban Projects will need to ensure that they are included or referenced in their IPSUD as per Article 44(b) of *Regulation (EC) 1083/200* (following the adoption of *Regulation (EU) No 539/2010*[39]). The Regulatory framework for the period 2007-2013 does not include a detailed or binding definition of an IPSUD, which should be defined by the Member States and MAs taking account of Article 8 of *Regulation (EC) No 1080/2006* and the specific urban, administrative and legal context of each region.

Article 8 of *Regulation (EC) No 1080/2006* indicates that the ERDF may *"support the development of participative integrated and sustainable strategies to tackle the high concentration of economic, environmental and social problems affecting urban areas."* These strategies "*shall promote sustainable urban development through activities such as: strengthening economic growth, the rehabilitation of the physical environment, brownfield redevelopment, the preservation and development of natural and cultural heritage, the promotion of entrepreneurship, local employment and community development, and the provision of services to the population taking account of changing demographic structures*."

In brief, an IPSUD can be defined on a high-level basis as a series of interlinked actions which seek to bring about a lasting improvement in the economic, physical, social and environmental conditions of an urban area.

Sicily considers its existing urban integrated plans eligible as IPSUDs (i.e the "Piani Integrati di Sviluppo Territoriale" (PISU) and "Piani Integrati di Sviluppo Territoriale Urbano" (PIST)), while Sardinia uses both its PISU and the Covenant of Mayors' SEAP ("Piani d'azione per le Energie Sostenibili").

For completeness, it is noted again that a FEI that invests purely in EE and RE measures in existing buildings, including housing, is considered an Article 44(c) FEI (following the adoption of *Regulation (EU) No 539/2010*[40]) and the projects supported are not required to be part of an IPSUD.

4.5 Central components of an Energy Action Plan

Reviewing a selected number of best practice cities, combined with Arup's experience of working with city authorities, has enabled identification of the central components of an EAP with detailed analysis and their applicability to JESSICA operations illustrated in the rest of the section. There is significant overlap in the steps for developing an EAP and

[39] Regulation (EU) No 539/2010 of the European Parliament and of the Council of 16 June 2010 Amending Council Regulation (EC) No 1083/2006

[40] Regulation (EU) No 539/2010 of the European Parliament and of the Council of 16 June 2010 Amending Council Regulation (EC) No 1083/2006

establishing an Energy Focused UDF, even though not all will be followed in, or be applicable for, every region.

The main components involved in developing and maintaining a comprehensive energy strategy are illustrated in Figure 4 and discussed in more detail in the following sections.

- **Engagement:** stakeholder engagement is one of the central building blocks of both a successful EAP and a JESSICA operation. Analysis shows that the initial stage of action planning should be to engage with sector-related partners and political leaders to secure commitment to action.
- **Measurement:** there are a variety of procedures and metrics used to calculate baseline levels of GHG emissions for a city or region. The baseline measurement process can determine the starting point against which to measure progress.
- **Setting Vision and Targets:** cities and regions should set an overarching vision for their energy focused priorities, including output targets for the medium and longer term (long term implies for at least the next ten years).
- **Selecting Actions:** the prioritisation of energy-focused projects is essential in creating a significant impact on the sustainable development of cities and regions.
- **Delivering:** designing an appropriate delivery structure and investment structure for the EAP is essential in ensuring that expected outcomes are met.
- **Monitoring**: in order to analyse how effective the strategy is over time it is necessary to design project metrics to measure and monitor sustainability indicators.

4.5.1 Engagement

Due to their multi-sectoral nature, energy and climate change are issues that need multi-stakeholder support in order to achieve successful delivery. All of the EAPs researched had some level of engagement with stakeholders which ranged from stakeholder-led to stakeholder-reviewed processes.

A best practice approach to engagement for cities/regions is to:

- establish political commitment at the local and if possible at the higher regional/national level, such as in federal or national agencies; and
- identify relevant stakeholders to be involved in the process and begin to engage with them.

The textbox below demonstrates the extensive stakeholder engagement that was undertaken in Toronto in the process of designing and finalising their EAP.

Engagement in Toronto

In Toronto, prior to producing the "Climate Change, Clean Air And Sustainable Energy Action Plan", the city produced a "Framework for Public Review and Engagement", which set out the political commitment to action. This was intended for public comment, and outlined the long list of stakeholders for consultation including:

- the business community (large, medium and small enterprises and business associations);
- institutions (hospitals, universities, colleges and schools);
- the arts and design community;
- environmental organizations;
- construction companies and developers;
- trade unions;
- provincial and federal agencies;
- municipal government associations;
- professional associations;
- architects and urban design planners;
- investors, entrepreneurs and the financial community;
- manufacturers of related goods and services; and
- the scientific community and technology providers.

The plan was released as a **public consultation** and, in addition, the **City established Enviro-Action Working Groups** in a number of relevant sectors including commercial fleets, small business, trees and green space, climate change adaptation, and renewable energy in order to fully engage stakeholders.

In addition, the City of Toronto has played a part in international and national partnerships, again outlining **political commitment** and willingness to learn from others and share best practice.

A multi-stakeholder approach is vital to a successful EAP. In the case of Toronto, only 6% of the city's emissions are directly attributable to the city authority, and a similar split is found in many cities. Therefore buy-in from other important sector stakeholders is essential in realising the city's sustainable plan and targets.

Relevance for MAs interested in establishing Energy Focused UDFs

MAs interested in having an Energy Focused UDF established in their region should ensure that a comprehensive stakeholder engagement process is put in place, engaging all public and private stakeholders relevant for the particular priorities on which they wish to focus. This will ensure that priorities are aligned, support is gained, and organisations can work together to achieve the overall targets of the region, including those of the IPSUD and the UDF. The engagement process can work in line with creating a governance structure that can effectively manage and monitor outcomes, as outlined in Section 4.5.5.

4.5.2 Measurement

Energy and the environment are at the heart of the European strategic and policy agenda. *Europe 2020* is the overarching strategy and the targets it has set in GHG reduction, renewable energy creation and energy efficiency are central to Europe's energy strategy over the next 10 years. Cities are at the forefront of delivering these targets as they are responsible for between 60 to 80% of energy consumption and 75% of carbon emissions. See Section 2 for further details.

However, while it must be borne in mind that there are other social and environmental indicators that MAs will consider, this Section looks at establishing a measurement of GHG emissions as a way of monitoring progress. For other measurement indicators please see the Horizontal Study *"Methodologies for Assessing Social and Economic Performance in JESSICA"*.

The GHG measurement process has several functions:

- it enables assessment of **current levels of GHG emissions** (the baseline) at a city or regional level, thus facilitating the setting of carbon reduction targets;
- it enables the most energy and carbon intensive **sectors to be identified and prioritised** for investment;
- it develops a **structure for data collection and analysis** that can be used to monitor and track progress; and
- it enables the **quantification of GHG emission reductions** from specific projects so that, where required, MAs can track progress and see the impacts of JESSICA operations against overall carbon reduction targets.

4.5.2.1 Greenhouse Gas Measurement Protocols for Baseline Calculations

GHG measurement has been standardised for some time. The Intergovernmental Panel on Climate Change (IPCC) has published guidance on national GHG emissions inventories since 1995, while the *Greenhouse Gas Protocol*[41] (GHG Protocol) was released by the World Resources Institute in 2001 as a mechanism to quantify corporate GHG emissions.

The *GHG Protocol* defines three levels of emissions:

- Scope 1 (direct emissions) are direct releases of GHG emissions;
- Scope 2 (electricity indirect emissions) are GHG emissions from the generation and consumption of purchased electricity; and
- Scope 3 (other indirect emissions) are GHG emissions from consumption and supply chain activities.

These three Scopes are the building blocks of GHG emissions calculation tools, protocols and standards that have been developed worldwide.

City level emissions measurement protocols

There has been a proliferation of different protocols and tools that have sought to address how to measure GHG emissions of cities and regions. Many cities have developed their own approaches; as a result, there is little consistency in the way different cities account

[41] See: http://www.ghgprotocol.org/

for GHG emissions, making it difficult to compare emissions across cities. For example, while most cities report on just Scope 1 and 2 emissions, some cities (e.g Paris) have included elements of Scope 3 emissions in their calculations.

The $EUCO_2$ project, a 24 month project started in 2010 which is designed to devise strategies for achieving an 80% reduction in GHG emissions by 2050, has rolled-out *GRIP*[42] inventories *(*the Greenhouse Gas Regional Inventory Protocol*)*. About 30 cities and metropolitan regions, primarily in Europe, have adopted this methodology.

A New Global Standard

In March 2012, a draft of a new protocol was released—the *Global Protocol for Community-Scale GHG Emissions*[43] - which has been described as "*a multi-stakeholder, consensus-based protocol for completing internationally recognized and accepted community-scale Greenhouse Gas accounting and reporting standards.*"[44] The protocol builds on the principles, guidance and experience gained from other cities and regional GHG inventory protocols and tools, and was developed by the C40 Cities Climate Leadership Group and ICLEI Local Governments for Sustainability, in collaboration with the World Bank, UNEP, UN-HABITAT, and the World Resources Institute. It is intended to serve as the global protocol and international standard that communities can use to measure GHG emissions. Following a comment period, the final version of the protocol was expected to be finalised in 2012 and is to be continuously updated to enable new thinking and guidance on GHG emissions inventories to be incorporated.

The protocol includes the 2012 Accounting and Reporting Standard, as well as step-by-step guidance for data collection, quantifying emissions, and reporting emissions in a consistent and comparable way. The protocol defines what parts of Scope 1, 2 and 3 should be included in a community level emissions inventory, as shown in Table 7.

Table 7 Definitions of Scope 1,2 and 3 emissions categories

	City Level
Scope 1 (Direct)	All direct emission sources from activities taking place within the community's geopolitical boundary
Scope 2 (Indirect)	Energy-related indirect emissions that result as a consequence of consumption of grid-supplied electricity, heating and/or cooling, within the community's geopolitical boundary.
Scope 3 (Indirect)	All other indirect emissions that occur as a result of activities within the community's geopolitical boundary.

Source: *Global Protocol for Community-Scale GHG Emissions*

[42] See: http://www.getagriponemissions.com

[43] http://live.c40cities.org/community-protocol/

[44] See: http://*www.ghgprotocol.org/files/ghgp/GPC%20v9%2020120320.pdf*

The protocol provides templates to standardise reporting and guidance on avoiding double counting when figures are aggregated to facilitate preparation of national level reports. It includes guidance to address boundary issues related to inter-city emissions that transcend more than one jurisdiction as illustrated in Figure 5, and segments GHG emissions into the 4 categories shown in Figure 6:

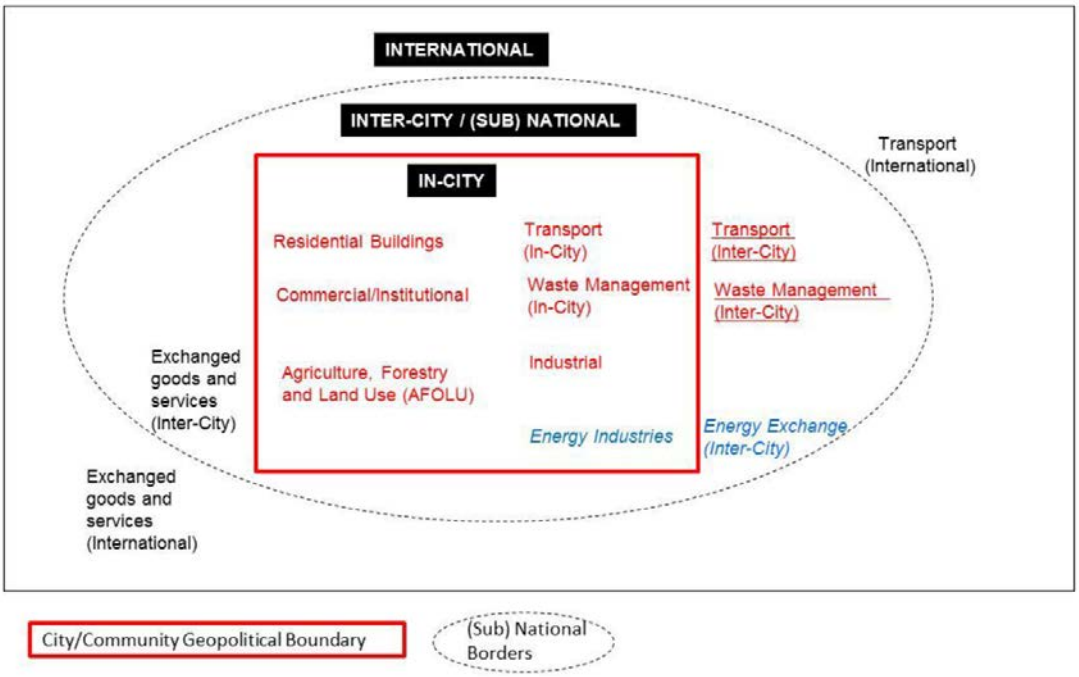


Figure 5 Sources and boundaries of community-scale GHG emissions

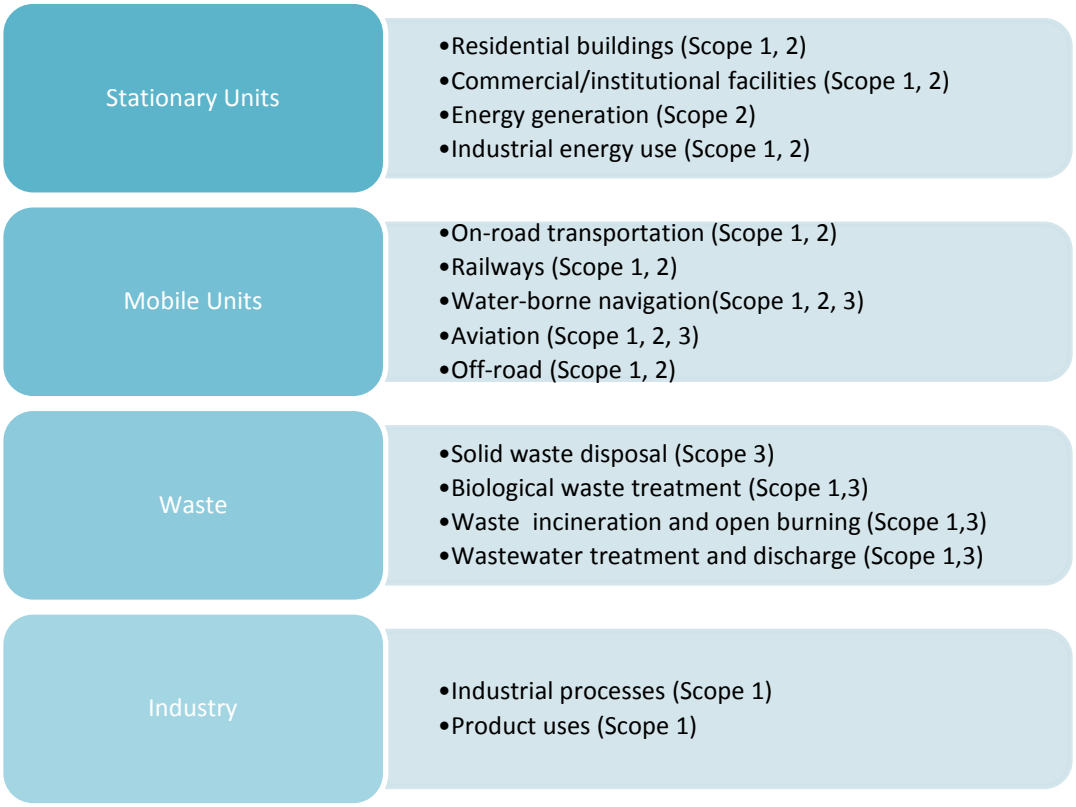


Figure 6 Categories of community-scale GHG emissions
Source: *Global Protocol for Community-Scale GHG Emissions*

Relevance for MAs interested in establishing Energy Focused UDFs

Reducing energy use and GHG emissions starts with developing a sound baseline emission inventory which can be used to set targets, track progress and quantify the GHG reductions achieved through JESSICA operations.

There is now an international standard for measuring city or regional emissions (the *Global Protocol for Community-Scale GHG Emissions*), but many cities in Europe are already using the *GRIP* tool. For MAs interested in benchmarking and comparing GHG emissions at an international level, the *Global Protocol for Community-Scale GHG Emissions* is the key new protocol to use; cities and regions already using *GRIP* can continue to use this methodology, recognising there is likely to be a shift over time to the new global community protocol.

4.5.2.2 Data analysis

The quality of any GHG emissions assessment depends on the robustness of the data input. GHG emissions are measured as a function of activity data and emissions factors:

Activity data (a) x emissions factors (f) = Greenhouse gas emissions (CO_2e)

Activity data (also known as consumption data) is the relevant measurement of energy use or any other GHG generating process. For example, this can take the form of energy use (kilowatt hours, litres of fuel), travel distances (kilometres or miles) or waste disposal (tonnes). The *Global Protocol for Community-Scale GHG Emissions* defines what activity data is needed across the key GHG inventory categories.

Emissions factors are used to convert activity or consumption data into equivalent GHG emissions. Emissions factors are expressed in terms of GHG emissions per energy used (e.g. tonnes of CO_{2e}/ kWh or grams of CO_{2e}/vehicle-kilometre). Ideally they should consider the six types of GHGs and be expressed in terms of CO_2 equivalents (CO_{2e}), which describe for a given concentration of a GHG, the equivalent amount of carbon dioxide that would have the same global warming potential.

This approach to GHG calculation can be used for developing both city/regional level inventories and for measuring emissions reductions related to specific projects. For example, if a Lithuanian city is implementing an **energy efficient retrofit programme in its municipal buildings,** the basic calculation steps would be as follows:

- "a" in this instance would represent kilowatt hours (kWh). By implementing the retrofit programme, the **energy savings are assumed to equate to 10,000 kWh/year**
- "f" would represent the **emissions factor** for the national grid mix which in this example is 0.153 kgCO_2e/kWh
- Therefore the **equivalent GHG emissions saved** would thus equal 1530kg (10000*0.153).

4.5.2.3 Data sources

There are numerous potential sources for both activity data and emissions factors, although these will vary by country. The following, making no attempt to be exclusive, lists potential sources of information for MAs:

- International agencies (e.g., IPCC, International Energy Agency (IEA), EuroStat, EU, UN);
- National GHG inventory report;
- National statistics agency;
- National environment, energy and transportation agencies;
- Regional and city government agencies;
- Utilities and transport operators;
- University and research institutes;
- Non-governmental organisation and other stakeholder groups; and
- Corporate/ industry reports.

Best practice suggests cities and regions develop on-going mechanisms to capture data and thereby enable efficient and timely updates to GHG emission inventories.

For further advice on data sources, and how and what type of data should be collected, MAs should refer to *Global Protocol for Community-Scale GHG Emissions*.

Relevance for MAs interested in establishing Energy Focused UDFs

For MAs wishing to develop an urban or regional GHG inventory, some best practice data collection guidelines to be aware of include:

- using comprehensive and robust activity data and emissions factors from a variety of local, national and EU sources;
- establishing or having access to a centralised repository for up to date information; and
- having clear responsibilities for updating and retrieving data regularly either on an annual or biannual basis depending on data availability.

Two UDFs have been established to date in London and its approach to measuring city-level carbon emissions is detailed in the text box below to give a practical example.

The London Energy and Greenhouse Inventory (LEGGI) is a "*database of geographically referenced datasets of fuel/energy consumption within the Greater London area and contains estimates of the quantity of resulting GHGs...emitted in the air*." It covers Scope 1 direct and Scope 2 indirect emissions (See Table 7).

The LEGGI is used to estimate and measure the spatial distribution of GHGs across London and is essential to formulating, monitoring and evaluating energy policies. As a result it plays a central role in the development and implementation of the Mayor's Climate Change Mitigation and Energy Strategy (CCMES).

The sources for the emissions factors, activity data, energy consumption and GHG emissions estimates are detailed below (text from LEGGI 2008 Emissions Estimate Methodology Manual). Due to delays in data publication the LEGGI is published with a two year time-lag in order to collect appropriate and robust data.

Data is collected by the Greater London Authority itself and collected in a centralised database. Activity data are from city, regional and national sources including:

- The London Atmospheric Emissions Inventory 2008 which is a database with information on emissions from all sources of air pollutants in the Greater London area;
- The UK National Department for Energy and Climate Change (DECC) electricity and gas consumption datasets for local authorities, and local and regional estimates of non-gas, non-electricity, and non-transport energy consumption;
- The UK National Department for Environment, Food and Rural Affairs (DEFRA) experimental and national statistics on CO_2 emissions at local authority and regional level datasets;
- DECC's Digest of UK's Energy Statistics 2008. This contains extensive tables, charts and commentary covering all major energy sources.

Emissions factors are from sources including:

- National Atmospheric Emissions Inventory (NAEI) and the UK Emissions Factor Database.
- European Environment Agency's Air Pollutant Emission Inventory Guidebook 2009.

4.5.3 Setting Vision and Targets

A city or region should set its targets for carbon reduction in the context of its overall strategy for sustainable development.

Setting Vision

The analysis of the EAPs showed that having an overarching vision helps to demonstrate how energy projects deliver overall sustainable development for a city. For example actions to reduce CO_2 emissions will often create additional benefits, such as improving health outcomes, encouraging community cohesion and action and creating jobs. When these additional benefits are evaluated, there is likely to be greater buy-in from a wider range of stakeholders and a greater likelihood of pooling resources for concerted action.

This process of vision-setting is therefore important within the context of Energy Focused UDFs because it will enable MAs to ensure that their vision and the UDF's business plan are aligned with the overall sustainable development strategy of the region and/or country. Such an integrated approach can amalgamate overall support and encourage buy-in for specific measures from other public or private sector investors.

Setting Targets

All the EAPs assessed have targets relating to climate change, including for instance: CO_2 and GHG reduction aims, energy conservation objectives and renewable energy penetration goals. From analysis of the best practice EAPs, good target indicators for a region should be "SMART" i.e.

Specific: (well-defined, focused, detailed and concrete)

- Quantifiable targets should be set and relate to specific strategies (e.g. a 50% reduction in CO_2 by 2025 relative to 1990).

Measurable: (kWh, time, money, %, etc.)

- Short-term (up to 3 years) and long-term targets (over 10 to 30 years) should be set as this allows regular monitoring of performance.
- Both percentage and absolute targets will mean that performance measurement is easier. It may also be useful for performance to be reviewed periodically by an external body.
- Data should be collected on a timely basis.

Achievable: (feasible, actionable)

- Ideally specific targets should be set for different sectors to take into account the varying factors.

Realistic: (in the context of the resources that can be made available)

- Resources and funding will need to be commensurate with the scale of the task.

Time-Bound: (defined deadline or schedule)

- 1990 baseline (or closest date when data is available) as is consistent with the Kyoto protocol.
- 2020 targets as is consistent with the Covenant of Mayors requirements.

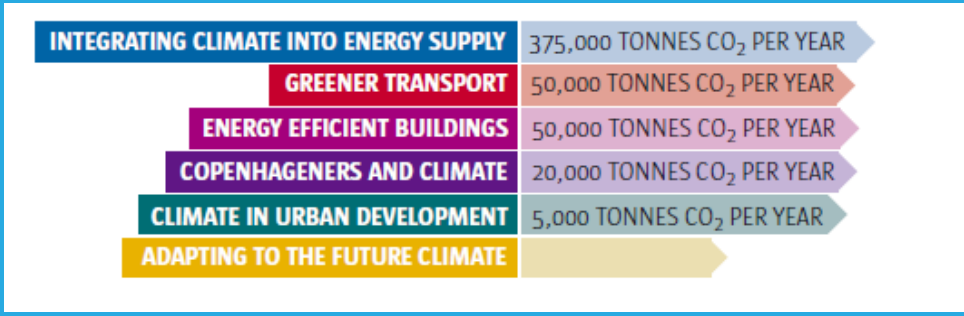
Copenhagen provides a good example of how to set far-reaching yet attainable targets. Although the ambition of being the first carbon neutral capital is extremely ambitious, the

annual breakdown of targets per sector is achievable and clearly documented in order to make it manageable. It is important that each region applies targets that are realistic and suitable for their particular context.

Setting targets in Copenhagen

Copenhagen's overarching target of being the first carbon neutral capital by 2025 is extremely ambitious. This long-term ambition is broken down to provide a shorter-term target of a 20% reduction between 2005-2015.

The breakdown set out in the diagram below makes the overarching target more achievable and realistic. How the percentage reduction breaks down in terms of tonnes of CO_2 is clearly set out in Copenhagen Climate Action Plan (2009).



Projects identified by Copenhagen to meet these targets include: biomass power stations, wind power, geothermal heating, gas condensation, electric buses, infrastructure for electric vehicles, energy efficient buildings, and a considerable amount of investment in behavioural change to support their energy efficiency goals.

Relevance for MAs interested in establishing Energy Focused UDFs

Breaking down long term regional and national sustainability targets into shorter term objectives will help make the process more achievable. Using specific, time-bound and measurable targets mean that the MA and HF manager (if relevant) can ensure the Energy Focused UDF's project portfolio is contributing towards the overall sustainability targets for the region.

4.5.4 Selecting Projects and Actions

The EAPs analysed detail how a city authority can build up a diversified portfolio of projects to work towards their sustainable development aims. In addition to providing guidance to MAs, this process can also help to provide the direction for the project pipeline of an Energy Focused UDF.

Breadth of sustainable energy projects

Each of the EAPs reviewed for this study break down policies and actions into different end-use sectors. Generally, this includes housing, public and private buildings and transport because buildings and transport are usually the largest energy consumption

sectors in a city. This breakdown of activities makes it easier to set targets, assign responsibilities and monitor progress.

The C40, in its 2011 report *Climate Action in Megacities: C40 baseline and opportunities*[45] (jointly authored by Arup) breaks down actions into these sectors:

- transport;
- existing buildings;
- waste management;
- water;
- energy supply;
- outdoor lighting;
- planning and urban land use;
- food and urban agriculture;
- information and communication technology; and
- finance and economy.

The first six categories represent the majority of city-level emissions. These categories are also representative of the sectors that MAs could focus on when developing their OP priorities for implementation through FEIs. However, the appropriate sectoral breakdown for any urban area will be based on how it is organised, how the data is broken down, and where the major opportunities and priorities are located. In addition, it is important to consider over which sectors or particular assets the MA has the power to affect change.

Table 8 is intended to give MAs some examples of the types of projects that EU cities have implemented for sustainable urban development across the most important sectors and give ideas for the types of projects possible under an Energy Focused UDF.

Project Selection Criteria

Based on the best practice analysed from the leading cities, the selection criteria for EE and RE projects include the following six dimensions:

(i) Economic viability

It will be important to consider the economic viability of projects including the project's expected net present value (NPV), internal rate of return (IRR) and payback period. These will be based on the returns from the forecast energy, either saved or generated, versus the expected investment cost over a defined period.

For example, EE retrofits do not have a standard project typology; the recommended investments vary based on the characteristics of each individual project. At a project level, a suite of recommendations for Energy Conservation Measures is tailored based on analysis of building management systems, plant and equipment, and is optimised based on costs, benefits and risks.

The general hierarchy in approaching energy and carbon reduction in existing buildings is shown in Figure 7. This hierarchy recognises there is significant potential to improve building performance by concentrating first on improving building management (e.g. metering, energy management systems, behavioural change, control systems). The first

[45] See: http://www.arup.com/Publications/Climate_Action_in_Megacities.aspx

three measures in the hierarchy can account for 20-30% of energy savings in buildings, and it is generally seen as best practice to undertake these measures before making the more expensive investments in low carbon technologies and retrofitting building envelopes.

After implementing these three types of measures, the next priorities are technological solutions (i.e. energy efficient lighting and plant) followed by improvements to the building fabric and finally, low/zero carbon technologies. The latter includes on-site renewables such as small-scale solar PV, wind, biomass, CHP and heat pumps.

This hierarchy applies across commercial and industrial buildings; however, in residential buildings some of the controls will be less relevant and building fabric improvements more important.

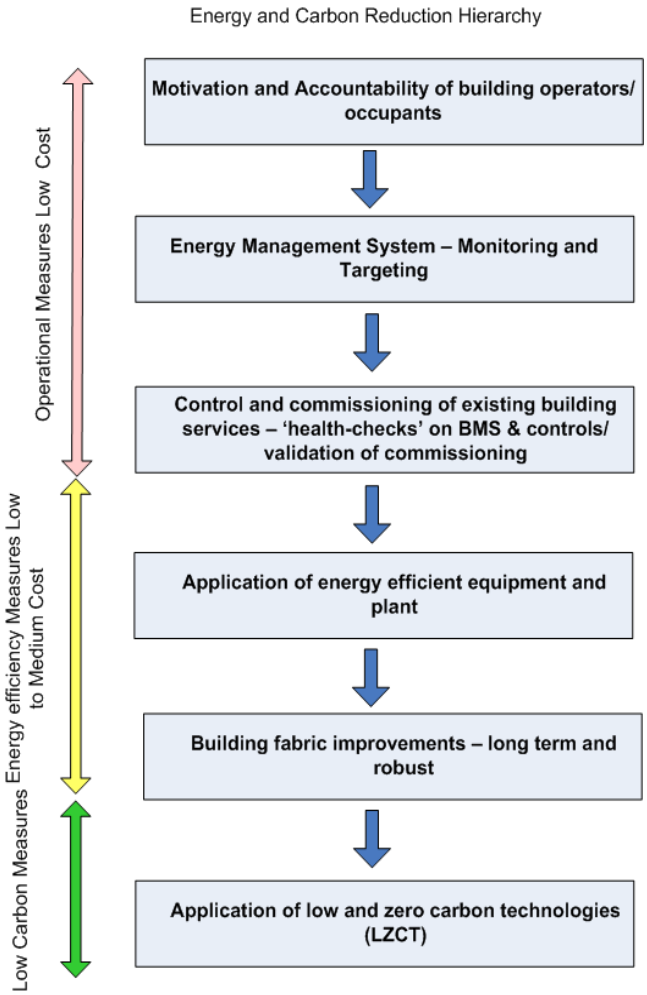


Figure 7 Energy and Carbon Reduction Hierarchy for buildings

Source: Arup

It must be noted that this type of analysis relies heavily on context, and variables such as climate, building types, age of building, building use, in addition to other location and building specific factors will be important determinants of this cost/carbon abatement profile.

(ii) GHG emission reduction

GHG reduction for EE and RE projects will vary from project to project depending on the type of sector, infrastructure involved and the specific regional or national grid mix. Within the EU, the highest energy consumption areas come from buildings, transport and energy production so it follows that MAs should focus on these sectors in their urban regions.

(iii) Economic impact

Economic impact is usually measured in terms of changes in economic growth (output or value added) and associated changes in jobs (employment) and income (wages). The economic impact of an EE and RE project could include direct and indirect number of jobs created, increase in Gross Value Added[46] and up skilling of the labour force.

(iv) Social impact

Social impact refers to how the actions can affect the surrounding community e.g. number of people no longer in fuel poverty or the number of people with improved access to services.

(v) Technical feasibility

The technical feasibility of a project relies on an analysis on the complexity of intended actions and on whether the technical solutions are reliable and readily available.

(vi) Deliverability and readiness

Delivery partners for EE and RE projects should be defined and the workforce and skill capacity required to deliver the projects should be identified.

Relevance for MAs interested in establishing Energy Focused UDFs

This section provides some guidance to MAs and UDF managers on the types of actions and energy project selection criteria that can be used to develop the sustainable development agenda of urban regions.

Bearing in mind that projects in JESSICA have to be eligible under the OP from which funding is allocated, the analysis suggests that MAs would be advised to concentrate actions in the following sectors:

- existing buildings (domestic and non-domestic);
- transport;
- energy supply;
- water;
- street lighting; and
- waste management.

The final concentration will depend on the particularities of each urban area and region.

[46] Economics measure of the value of goods and services produced in an area

Table 8 Examples of successful EU city-level energy focused projects and suitability for an Energy Focused UDF

Type	Successful Project Examples	Possible under an Energy Focused UDF?
Existing Buildings	The *Berlin Energy Saving Partnership*[47] is a partnership between the City of Berlin and the Berlin Energy Agency to deliver energy efficiency projects in municipal buildings. It uses an innovative ESCO scheme which has no upfront costs for the building owner and guarantees cost savings. To date 1,300 buildings have been upgraded through the scheme delivering CO_2 reductions of 27.3% compared to the baseline scenario. Key success factors include: strong political will, transparent procedures, financial support, enforceable standards and standardised contracts. This type of delivery model for energy efficient retrofits of public buildings is looked at in Framework Model 3 in Section 6.4.	Investment in the energy efficiency of public buildings often have difficulties in attracting sufficient finance through normal market mechanisms because of information asymmetries and the fact that public buildings are generally considered to be a public good. However, despite this, energy efficiency in public buildings can generate stable returns that are relatively risk-free and therefore could benefit greatly from investment by an Energy Focused UDF.
Waste Management	*Gothenburg Waste to Energy*[48] is a system that uses incinerated waste to generate electricity and heat. This system has led to a 25% reduction in CO_2 emissions from the city's energy consumption.	This type of project would be suitable for an Energy Focused UDF because Waste to Energy projects fit in with the sustainable agenda but can have difficulties attracting finance due to high initial investment, long planning times and contracting the sufficient demand needed. An example for an Energy Focused UDF is where the returns are linked to an equity investment in a Waste to Energy plant that supplies electricity and heat to local customers.

[47] http://www.c40cities.org/bestpractices/buildings/berlin_efficiency.jsp

[48] http://www.c40cities.org/bestpractices/waste/gothenburg_system.jsp

Street lighting	Oslo Intelligent Street Lighting[49] is a pilot project that uses 10,000 high-pressure sodium lights with an "intelligent lighting" system and has delivered a 70% reduction in energy consumption compared to the project baseline. It is a joint venture between the City of Oslo and Hafslund ASA, the largest electricity distribution company in Norway. The total investment cost for these 10,000 units was €12 million.	This type of project would be suitable for an Energy Focused UDF because street lighting is generally considered to be a public good but the public sector may lack the funding or the capacity necessary to implement an energy saving lighting project. For example an Energy Focused UDF could invest via a debt instrument taken out by the public sector with the energy savings repaying the initial investment plus financing costs.
Energy Supply	*97% of Copenhagen's city heating*[50] is supplied by waste heat. This programme was set up in 1984 and relies on capturing waste heat from waste incineration plants and combined heat and power plants (CHPs) and channelling it back into households. The project has been successful partially due to the government offering tax incentives on CHP for electricity plants which then enabled these companies to sell heat to consumers at a lower price.	Decentralised energy projects tend to have difficulties attracting finance due to the lack of information on demand profiles, which tend to make them too risky for the private sector to undertake alone. In Copenhagan's case the project was supported by tax incentives. This type of project would be suitable for an Energy Focused UDF because it will generate returns in the long term, although initially it may need some level of grant finance to support sometimes considerable set-up costs.

[49] See: http://www.c40cities.org/bestpractices/lighting/oslo_streetlight.jsp

[50] See: http://www.c40cities.org/bestpractices/energy/copenhagen_heat.jsp

4.5.5 Delivering Projects and Actions

Governance and organisational structures

It is important that the appropriate delivery structures are set up in order to enable efficient and effective delivery of a region's priorities. In some situations it may not be necessary to set up a new governance structure, especially where there is an existing structure in place such as a Local Agenda 21 plan.

Local Agenda 21 (LA 21)

Agenda 21 was the action plan developed at the United Nation's 1992 Earth Summit in Rio. One of the requirements of Agenda 21 was that each local authority should enter into a dialogue with its citizens, local organisations and private enterprises and adopt "*a local Agenda 21*". A 2003 report estimated that in Europe approximately 4,000 cities, municipalities at regional and local level, and regional authorities were engaged in a LA 21 process of some kind.

Often LA 21 groups were set up to deliver on local responsibilities. These included public, private and third sector partners. In general, the same partners will need to be involved in the delivery of a sustainable energy strategy, and there is no reason why this existing group shouldn't evolve to take on this responsibility with additional members where required.

There is no one governance structure that will suit all cities and regions, but central to the deliverability of a successful sustainability strategy is a need for political accountability as well as the ability to make decisions and deliver programmes on a day to day basis. It is essential that leadership is provided, appropriate staff resources are allocated to the delivery of projects, and that staff have appropriate skills and training.

The city of Amsterdam, which has had recognised urban planning success, can also provide some best practice guidance for MAs who want to promote EE and RE actions in their urban areas, as it established a separate office to promote such measures - the Amsterdam Climate Office. This Office can offer some practical examples pertaining to governance, organisational delivery and accountability.

Delivering an EAP in Amsterdam

The *Amsterdam Climate Office* was set up following the launch of *New Amsterdam Climate* – which is intended to be a formal framework of cooperation for climate change policy - to provide the necessary support for the initiative. *New Amsterdam Climate* brings together those needed to take action on climate change: it is made up of citizens, businesses and institutions.

The co-ordination and the delivery of day-to-day tasks are undertaken by the Amsterdam Climate Office, which is funded by the city administration.

High-level support and buy-in for the EAP is created through the *Climate Council* which is made up of a group of high-level stakeholders from across the city and is chaired by the Mayor of Amsterdam. The *Climate Council* meets annually to discuss progress and implementation.

The *Klimaattaffel* (Climate Round Table) is a more informal initiative of the Amsterdam Climate Office which directly challenges the business sector and social organisations to jointly think of new ideas and to develop and implement an approach to achieve a 40% reduction in CO_2 emissions in Amsterdam by 2025.

An example of a project proposed to the Klimaattaffel is one made by Nuon Business in collaboration with ABN AMRO, Cisco, the Amsterdam Chamber of Commerce, and Pricewaterhouse Coopers amongst others, and aims to demonstrate to the municipality that the redevelopment of an industrial park into a mixed urban district of homes and businesses can be done with considerable CO2 reductions because of the scale of the project. These will be realised through storage heating and cooling, energy sharing, green procurement, using residual heat, and innovative waste projects.

There are three main best practice guidelines for governance to highlight from Amsterdam.

Firstly, a strategy (i.e the EAP) formalises the operational boundaries for the actions that the Amsterdam Climate Office undertakes: namely, to ensure that all municipal buildings, public lighting and transport are climate neutral by 2015; that 20% of the energy requirements of Amsterdam are generated from sustainable sources by 2025; and that energy consumption in housing is reduced by approximately 40% by 2025.

Secondly, a Climate Council was set up to promote the process at the highest level with direction from the Mayor of Amsterdam. Although this body only meets annually it provides an important steering group for implementation of the EAP and buy-in at the highest levels.

Finally, the Klimaattaffel (see textbox for details) is a more informal network which enables cooperation and knowledge sharing in order to create innovative solutions for EE and RE projects across the city and it has already stimulated some interesting and groundbreaking projects.

The combination of formal and informal organisations achieves the engagement of a significant number of stakeholders in both the public and private sectors and encourages an innovative atmosphere. MAs could consider this approach to delivering their energy agendas and it provides an example of a potential delivery structure that could be an effective partner to an energy focused JESSICA operation.

Associated Funding Models and Financing Sources

It is important that national and regional energy strategies are properly funded, with financial resources identified to deliver each of the actions. There are a variety of funding mechanisms recommended by the Covenant of Mayors as being particularly relevant for EE and RE projects including:

- revolving funds, which are the model for JESSICA UDFs, enabling the returns from EE and RE projects (either from the production of energy or energy savings) to be paid back into the fund so that they can be re-used in other projects; and
- ESCOs (using Energy Performance Contracting and Energy Supply Contracting) which involve third-party guarantees to reduce risk and guarantee returns for project owners (Framework Model 3 analyses this in detail in the context of JESSICA Energy Focused UDFs).

Another option is public-private investments for RE projects such as where a local authority or city provides land assets combined with private sector investment.

The new European Energy Efficiency Fund (EEE-F) is an example of a tailor made and innovative financing option available for regions and municipalities. The initial funding volume will be €265 million which can be allocated to EE and RE projects across Europe. In addition, approximately €20 million of the EU funding will be made available as grants for project development services (technical assistance) related to the technical and financial preparation of projects

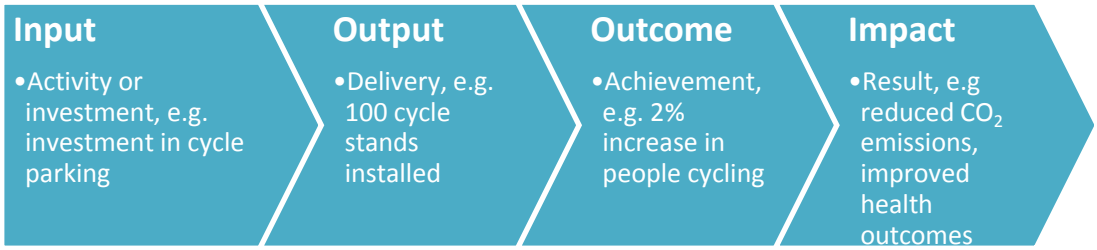
Relevance for MAs interested in establishing Energy Focused UDFs

MAs should consider existing governance structures, especially those involving the same relevant stakeholders, in order to ensure that UDFs compliment overall strategies in a city or region. Where there are needs for new or modified governance MAs may be able to take a lead role in establishing an innovative governance structure to deliver urban and energy strategies and may also facilitate coordination of regional stakeholders.

In the EU27, Energy Focused UDFs can be a central source of funding for EE and RE projects, and be used to complement existing financing opportunities. Existing plans and strategies established in the region should be looked at for suitable project pipelines and co-investment opportunities.

4.5.6 Monitoring

Notwithstanding the existing monitoring obligations under the Regulatory framework, monitoring processes can be useful for MAs to evaluate whether projects have been successful in terms of meeting targets. An ongoing monitoring strategy is important for a city or region to map progress and identify gaps and areas for improvement. A best practice approach will measure input, output, outcome and impact of initiatives, recognising the distinction between each.



Measuring outcomes and impacts is not a straightforward task however and it will be essential to use robust evaluation techniques to separate specific programmes' outcomes from other city initiatives. This can be done using surveys of stakeholders and, where data is available, suitable quantitative policy analysis tools.

Several cities have developed good reporting systems on their inputs, outputs and outcomes: Paris's annual *Bleu Climat*[51] (see textbox for details) is a good example of this. Paris combines this report with a less regular carbon footprint (approximately every 5 years) to consider the overall impacts. London monitors sustainable development through an annual *Quality of Life Report*[52] which is the analysis of the impact of a number of plans (including the *London Plan* and the *London Climate Change Mitigation and Energy Strategy*).

Paris Bleu Climat

The annual *Bleu Climat* is a report which describes energy-focused initiatives planned and undertaken, and the savings achieved as a result.

For example, renewable energy is covered by a description of the current installations and their total energy produced, studies which are underway for project evaluation, and other planned initiatives up until 2020. The report also looks at the impact of these projects by analysing the total reduction of CO_2 emissions achieved by an increase in renewable energy.

Therefore as well as the basic financial outcomes included in the central metrics for the UDF monitoring process, it is also recommended that some wider socio-economic impact-measuring variables, such as reduction in fuel poverty and job creation, be analysed by the MA over a longer time frame. This could link in with the general monitoring processes for OPs. A best practice strategy will monitor local or regional performance against a wider set of sustainability indicators, such as the *EU Sustainable Development Indicators*[53](SDIs) which, amongst others, suggest monitoring against health and well-being outcomes, employment and poverty indicators.

However there are some issues to note with a city measuring impacts in terms of the sustainable development indicators, namely:

(i) these indicators may not always be meaningful on a year-by-year basis (e.g life expectancy) and tend to change in the long, rather than short term; and

[51] See: http://www.paris.fr/pratique/energie-plan-climat/le-plan-climat-de-paris/le-plan-climat-de-paris/rub_8413_stand_69591_port_19609

[52] See: http://www.londonsdc.org/sustainable_development/monitoring.aspx

[53] See: http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators

(ii) it can be a challenge to attribute outcomes to specific actions as a range of other actions that a city or region carries out, in combination with other macro-economic factors, will impact on the results.

Therefore the impact of an Energy Focused UDF on the wider sustainable development of an urban region should be looked at in combination with other strategies and actions, and judged over a long time period e.g. at least over a 10-year duration.

See the Horizontal Study "*Methodologies for Assessing Social and Economic Performance in JESSICA*".

Relevance for MAs interested in establishing Energy Focused UDFs

Within JESSICA operations there are various monitoring, auditing and reporting obligations for UDFs, HFs and MAs linked to the requirements of OPs. Apart from these obligations, and in order to be aligned with best practice, the impacts of projects on a city or regional area should be measured against wider sustainability indicators and evaluated over a period of at least ten years. This should be done in conjunction with other strategies and actions in addition to considering overarching macro-economic conditions affecting urban regions.

4.5.7 Best practices and lessons learned

The recommendations for MAs based on the best practices and lessons learned from the analysed EAPs are summarised in Table 9. MAs can use these best practice guidelines both in the context of an IPSUD and with regard to developing their own strategies.

The EAPs outline the appropriateness of governance structures and business plans and the guidelines on measurement give ideas on how to measure a UDF's progress. The information on selecting, delivering and monitoring projects is considered to be useful and relevant to all MAs independent of their spatial level. How engagement with appropriate stakeholders is organised is especially important for regions with UDFs that span a number of municipalities since the political commitment (and potentially the financial involvement) of each may be required to determine project pipelines and implement projects.

Table 9 Summary of recommendations for MAs

EAP component	Recommendations for MAs
Engagement	It is recommended that MAs take a co-operative multi-sector approach for urban energy focused programmes in their regions. This should engage the public sector, Third Sector, business and individuals. This is especially important in the energy sector which generally requires public and private cooperation. This multi-sector approach is in line with the aims of the JESSICA initiative to promote and implement projects in an integrated way for the sustainable development of an urban area. Engagement with appropriate stakeholders will be especially important for UDFs that span a number of municipalities since the political commitment and financial involvement of all may be required to determine project pipelines and implement projects.
Measurement	For some MAs measurement of GHG emissions baselines will not be relevant since it will be outside their responsibility. However, they should still be aware of the process. Setting the baseline for an energy strategy is important and the data sources and protocols described provide some best practice guidance. Many analysed cities presented their baseline GHG emission figures broken down into sectors. This appears to be a best practice approach for use, especially for post project development monitoring processes, since it allows measurement against sectoral emissions baselines.
Setting Vision and Targets	Ensuring a region has relevant targets that the objectives of an Energy Focused UDF can be aligned with is an important part of measuring and monitoring outputs and impacts. Timely, specific and achievable targets are best practice. Most cities analysed provided breakdowns of targets by sector as well as short and long-term targets. MAs could also consider this approach where relevant: providing short term targets enables regular evaluation of progress and also allows adjustments if it is clear from the short term results that the long term targets are not on track.
Selecting Actions	There are a range of projects with the main types to focus on being: public and domestic buildings, transport, energy supply, water, streetlighting and waste. Notwithstanding that projects have to be eligible under

	the relevant OP to be eligible for JESSICA, the prioritisation of projects will depend on the effect and readiness of individual projects in addition to other positive socio-economic outcomes, and technical feasibility.
Delivering	MAs should look to establish or be part of existing governance structures that involve the public and private sector stakeholders that compliment Energy Focused UDFs. For example, by involving organisations like housing associations with a UDF that invests in housing knowledge of the benefits of EE and RE measures can be spread to encourage investment.
Monitoring	The monitoring processes used by the city-level EAPs analysed provide some best practice guidance but it is noted that this is a complicated process. In the short-term items such as energy produced from RE, energy costs savings and reductions in GHG emissions can be measured. Over a longer-term period the range of sustainable development indicators appropriate to the urban context should be used in conjunction with an assessment of other strategies and actions undertaken.

5 Consultation process for analysis of best-practice Energy Focused Funds and programmes

5.1 Introduction

The study is focused on the funds and delivery models that have been effective at implementing energy focused projects and which have made a real impact in putting energy efficiency and renewable energy at the heart of sustainable urban development.

Although there are Energy Focused UDFs in place overall there are a limited number of UDFs with implemented projects. Therefore the study scope was widened to include non-JESSICA funds and other delivery models. The results of this and previous chapters feed into the Framework Model analysis in Section 6.

At present JESSICA operations with OP contributions eligible for repayable investments in energy efficiency and renewable energy (note these are not UDFs focused exclusively on energy) are being implemented under Article 44(b) in nine Member States.

See the EIB website for the most up to date status of JESSICA Holding Funds and UDFs. http://www.eib.org/products/jessica/funds/list.htm

Table 10 JESSICA Operations, *including* energy focused measures, as of Q1 2012

Member State	HF (manager)	Allocation	UDFs
Bulgaria	Bulgaria (EIB)	€33m	Two Consortia led by: Fund for Local Authorities and Government (FLAG) Societe Generale Expressbank
Estonia	Estonia (KredEx)	€57m	Swedbank SEB
Greece	Greece (EIB)	€258m	Consortium of Pancretan Cooperative Bank and TT Hellenic Postbank National Bank of Greece S.A. Investment Bank of Greece S.A. Eurobank S.A. Piraeus Bank S.A.
Italy	Sicily (EIB)	€52m	ICCREA BancaImpresa

	Sardinia (EIB)	€70m	Equiter
Lithuania	Lithuania (EIB)	€227m	Šiaulių (2 UDFs) Swedbank SEB
Poland	Pomerania (EIB)	€57m	Bank Gospodarstwa Krajowego (BGK) Bank Ochrony Środowiska S.A. (BOŚ)
	Masovia (EIB)	€40m	Bank Gospodarstwa Krajowego (BGK)
Portugal	Portugal (EIB)	€125m	Banco BPI, S.A. (BPI) Caixa Geral de Depósitos, S.A Turismo de Portugal, I.P (TdP)
Spain	FIDAE (EIB)	€128m	*UDF under negotiation*
UK	London Green Fund (EIB)	€110m	Foresight Environmental Fund London Energy Efficiency Fund
	Scotland (EIB)	€55 million	SPRUCE (Scottish Partnership for Regeneration in Urban Centres)

5.2 Approach to the Consultation process

To gather best practice Arup has analysed and consulted with stakeholders from existing UDFs and non-JESSICA funds that have been set up to invest in EE and RE projects and having an impact on the corresponding urban area.

Structured questionnaires were developed to interview representatives from UDF managers, MAs, HFs, national programmes, other programmes such as the Berlin Energy Savings Partnership and other urban investment funds.

The questionnaires were designed to obtain answers that would inform MAs on the governance structures, delivery models and business plans adopted by successful energy-focused urban-based funds.

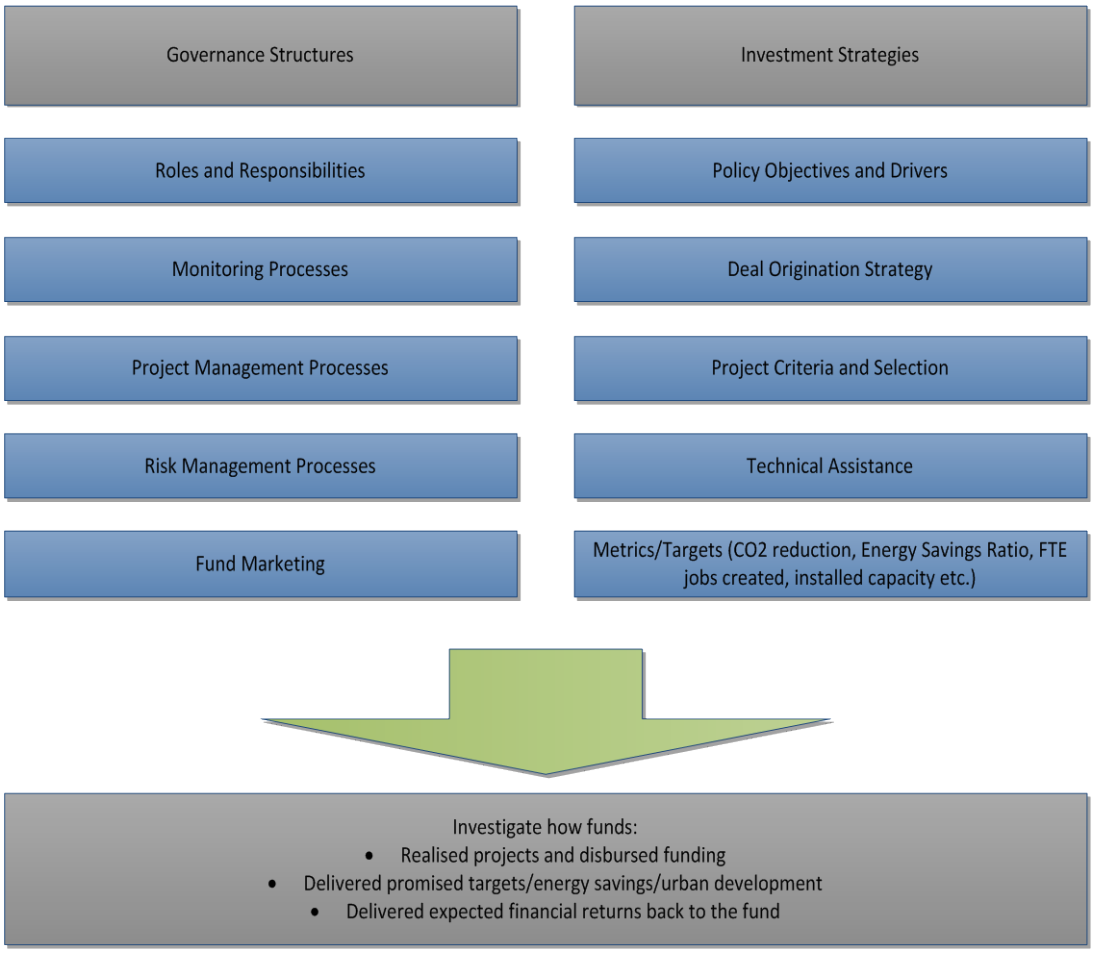


Figure 8 Approach to analysis of Governance Structures and Business Plans of energy focused funds and other models

In line with the Framework Models developed in Section 6 the consultees interviewed were as follows and the related fund and programme characteristics are included in Appendix A.

Framework Model 1: Energy Housing Fund

Location	Type of Consultee	Consultee
Lithuania	UDF Manager	Šiaulių Bankas
	Managing Authority	Department of the Ministry of Finance
	HF	EIB
Bulgaria	Managing Authority	Regional Development Operational Programme, Programming and Evaluation Department
Estonia	UDF Manager	Swedbank AS
	HF Manager	Kredex
Germany	Fund Manager	KfW Bank

Table 11 Consultation in Framework Model 1

Framework Model 2: A Multi-Sector Energy Focused UDF

Location	Type of Consultee	Consultee
London	Managing Authority	London Development Agency
	Fund Manager	Foresight Environmental Fund
	Fund Manager	London Energy Efficiency Fund
Toronto	Fund Manager	Toronto Atmospheric Fund
UK	Fund Manager	Partnership for Renewables
	Fund Manager	Climate Change Capital

Table 12 Consultation in Framework Model 2

Framework Model 3: Energy Performance Contracting in the Public Sector

Location	Type of Consultee	Consultee
Berlin	City Energy Agency	Berlin Energy Saving Partnership

Table 13 Consultation in Framework Model 3

6 Framework Models for JESSICA Energy Focused UDFs

The three Framework Models which have been formulated are to guide MAs, HF Managers, and potential UDF managers when developing governance structures and business plans for Energy Focused UDFs. The overall Regulatory framework is outlined in the following section followed by a more detailed analysis for each Model.

As outlined previously, on the request from HSSG members the first Framework Model concentrates on Energy Housing Funds that invest solely in EE and RE projects in existing housing.

The second Framework Model is for a more diversified Energy Focused UDF, which whilst still being able to invest in EE and RE in housing, also considers a range of energy focused projects in buildings, street lighting, decentralised energy, small scale RE and clean transport.

The third Framework Model investigates the potential for integrating a third party into a JESSICA model in the form of an ESCO using an EPC procurement process. This Model specifically focuses on EPC within public sector buildings because this is where EPC has a large potential for JESSICA investment.

6.1 EU Regulatory Framework for Energy Focused Funds

This section highlights selected regulatory issues to be considered under JESSICA, especially the State Aid and Technical Directives related to energy focused investments. However it is by no means exhaustive. It should be always kept in mind that any investment will have to comply with all relevant European and national legislation and that Urban Project investments must always be consistent with EU Structural Funds Regulations, relevant State aid rules, public procurement legislation and other project-specific regulatory directives. The Regulatory framework may depend on the region, project type and investment sector, and furthermore investments with Structural Funds have to be coherent with the OP under which they are carried out.

The need for transparency in the selection of FEIs is paramount and the UDF and any subcontractors are always required to comply with the EU Structural Funds Regulations, EU State aid rules and all other applicable EU rules and national law, regulations and guidelines (including procurement and environmental law and other regulations where appropriate). These EU rules include but are not limited to:

- The EU State aid rules;
- the rules applying to Major Projects under (and as defined in) *Commission Regulation (EC) No 1828/2006* (including but not limited to European Commission approval requirements and monitoring and reporting obligations);
- the rules applying to publicity measures under Article 9 of *Commission Regulation (EC) No 1828/2006*;
- the requirement to ensure there is no Irregularity (*Council Regulation (EC) No 1083/2006*) in relation to any investment or investee company.

6.1.1 State aid

According to the EC, State aid is defined as an advantage in any form whatsoever conferred on a selective basis to undertakings by national public authorities. The constituting elements of State aid are defined in *Article 107 (1) Treaty on the Functioning of the EU* (TFEU) which states that:

> *"Any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the common market."*

The potential presence of State aid needs to be considered when using any Structural Funds and/or national state resources for arranging financing. Unauthorised State aid is illegal aid and if public authorities get it wrong, the EC has the power to require repayment with interest from the aid beneficiary.

In JESSICA there are a number of levels where State aid may exist as is illustrated in Figure 9. At all stages the need for transparency is paramount.

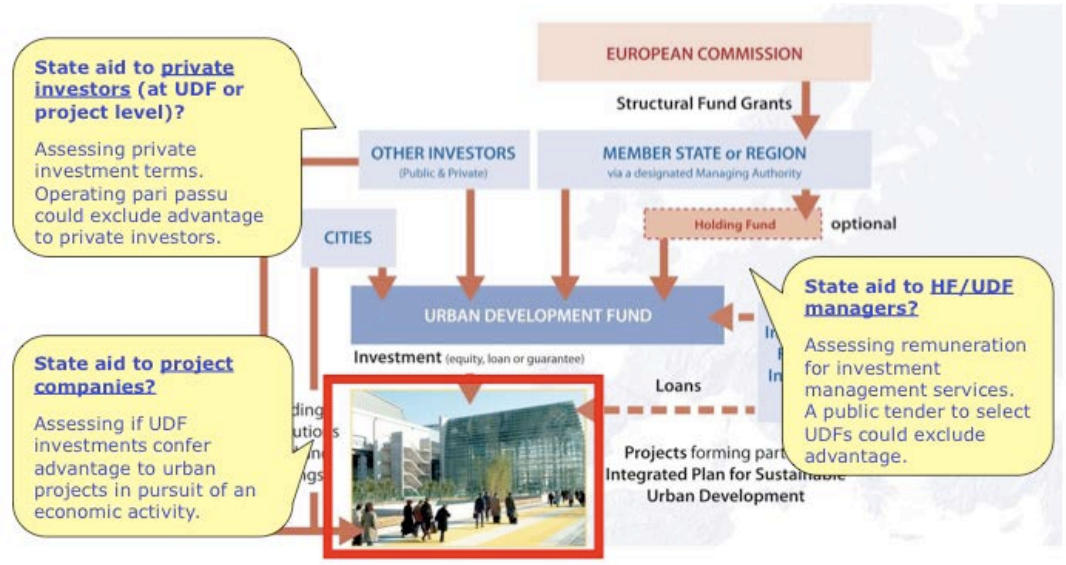


Figure 9 State aid in JESSICA operations

Source: DG Competition

For guidance on State aid in relation to JESSICA the "*Urban Development Fund Handbook*" Horizontal Study can be referenced. However, no study can provide conclusive pronouncements on State aid issues taking into account the wide variety of situations that can be observed. It is recommended that UDF managers obtain appropriate legal advice for any potential JESSICA investments in order to ensure that they are State aid compliant.

The following EU Regulations include fundamental legislative provisions concerning JESSICA:

6.1.2 EU Regulations

Council Regulation (EC) No 1083/2006, of 11 July 2006

Council Regulation (EC) No 1083/2006,[54] also known as the *General Regulation for Structural and Cohesion funds* states that:

> *"the rules on the eligibility of expenditures shall be laid down at national level subject to the exceptions provided for in the specific Regulations for each Fund. They shall cover the entirety of the expenditure declared under the operational programme."*
>
> **Article 56(4) Eligibility of Expenditure, Regulation (EC) 1083/2006**

Therefore MAs have relative flexibility in the types of projects they wish to fund using JESSICA FEIs as long as they are coherent with the relevant OPs as adopted by the Commission and are included in an IPSUD where required. See Section 4.4.1 for more details on an IPSUD.

Council Regulation (EC) No 1080/2006, of 05 July 2006

Regulation (EC) No 1080/2006[55] contains Articles referring to eligibility of expenditure (especially as regards housing), and sustainable urban development. With *Regulation (EC) No 397/2009* which amended Article 7 of *Regulation (EC) No 1080/2006*, the scope for intervention in the EU housing sector was widened allowing up to 4% of national ERDF amounts to be invested in EE and RE measures in existing housing supporting social cohesion across all EU27 Member States.

There are some categories of expenditure that *Regulation (EC) No 1080/2006* states are not eligible for a contribution from the ERDF, which also imply non-eligibility for any JESSICA UDF. These include:

[54] Council Regulation (EC) No 1083/2006 of 11 July 2006, laying down general provisions on the European Regional Development Fund, European Social Fund and the Cohesion Fund, as amended by: Council Regulation (EC) No 1989/2006 of 21 December 2006; Council Regulation (EC) No 1341/2008 of 18 December 2008; Council Regulation (EC) No 284/2009 of 7 April 2009; Regulation (EU) No 539/2010 of the European Parliament and of the Council of 16 June 2010; Regulation (EU) No 1310/2011 of the European Parliament and of the Council of 13 December 2011.

[55] Regulation (EC) No 1080/2006 of the European Parliament and of the Council of 5 July 2006 on the European Regional Development Fund and Repealing Regulation (EC) No 1783/1999, as amended by: Regulation (EC) No 397/2009 of the European Parliament and of the Council of 6 May 2009; Regulation (EU) No 437/2010 of the European Parliament and of the Council of 19 May 2010.

- interest on debt;
- the purchase of land for an amount exceeding 10% of the total eligible expenditure for the operation concerned;
- decommissioning of nuclear power stations;
- recoverable value added tax.

Therefore the capital costs of project construction are fundable by JESSICA operations, but not the VAT (if recoverable) or the interest on other debt.

Commission Regulation (EC) No 1828/2006 of 8 December 2006

Commission Regulation (EC) No 1828/2006,[56] also known as the *Implementing Regulation*, sets out rules for the implementation of *Council Regulation (EC) No 1083/2006*, in particular its Chapter II, Section 8 regarding FEIs.

This Regulation lays down the ground rules for the organisation structures of UDFs, which can be "independent legal entities' or "a separate block of finance within a financial institution".

Coordination Committee of the Funds (COCOF)

Under Article 103 of *Council Regulation (EC) No 1083/2006*, a Coordination Committee of the Funds (COCOF) was established as a management committee on the rules for implementing Structural Funds regulations.

Explanations and interpretations provided by the Commission's services and transmitted to COCOF that are most relevant to JESSICA implementation include the following Guidance Notes[57]:

- Guidance Note n°1 on Financial Engineering in the 2007-2013 programming period (COCOF 07-0018-01-EN of 16/07/2007)
- Guidance Note n°2 on Financial Engineering, including replies from the European Commission to the questions submitted by the JESSICA Expert Working Group of the Member States (COCOF 08-0002-03-EN of 22/12/2008)

[56] Commission Regulation (EC) No 1828/2006 of 8 December 2006, setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund, development funds, as amended by: Commission Regulation (EC) No 846/2009 of 1 September 2009; Commission Regulation (EU) No 832/2010 of 17 September 2010; Commission Implementing Regulation (EU) No 1236/2011 of 29 November 2011.

[57] The guidance notes can be found on the Commission website:
http://ec.europa.eu/regional_policy/thefunds/instruments/jessica_legislation_en.cfm#2

- Guidance Note n°3 on Financial Engineering (COCOF 10-0014-04-EN of 21/02/2011)
- Guidance Note on eligibility of energy efficiency and renewable energies interventions under the ERDF and the Cohesion Fund (2007-2013) in the building sector including housing (COCOF 08/0034/02/EN of 30/06/2010)
- Revised Guidance Note on Financial Engineering Instruments under Article 44 of Council Regulation (EC) No 1083/2006 (COCOF 10-0014-05-EN of 08/02/2012).

In particular, the European Commission Guidance Note in relation to EE and RE measures in existing housing outlines that FEIs open up new opportunities in the housing sector and clarifies eligible EE measures.

The COCOF Guidance note 08/0034/02/EN states that:

> *"the possibility of combining grants and repayable financing opens-up new opportunities to address a wide range of market gaps, namely through incentives to investments with long-term break even financial returns or to beneficiaries with low financing capacity."*
>
> eligible interventions are limited to "*multifamily housing"* and *"buildings owned by public authorities or non-profit operators for use as housing designated for low-income households or people with special needs"* …..For the former, Commission Regulation (EC) No 1828/2006 provides that the ERDF can support only "*the renovation of the common parts"*, which include – inter alia - *"energy-efficiency actions".*
>
> For the latter, given the need to deliver "*modern Social Housing of high quality"*, the renovation and change of use of existing buildings can encompass also energy efficiency interventions in apartments
>
> **Guidance note on eligibility of energy efficiency and renewable energies**

In addition to housing there is also considerable scope for JESSICA energy focused operations in buildings. Buildings represent 40% of total EU energy consumption and demand-side and supply-side solutions to these consumption levels are integral to the realisation of EU energy targets. The COCOF note also states that:

> *In the building sector, Cohesion Policy can support energy interventions in all types of public buildings (schools, hospitals, universities, administrative buildings etc.) and in buildings hosting activities other than housing (such as offices, factories etc.) [for example] interventions concerning the thermal characteristics of the building, heating installation and hot water supply, air-conditioning installation, ventilation, built-in lighting installation etc.*
>
> **Guidance note on eligibility of energy efficiency and renewable energies interventions under the ERDF and the Cohesion Fund (2007-2013) in the building sector including housing (COCOF Note 08/0034/02)**

6.1.3 Technical Directives relevant for energy projects

The types of measures that an Energy Focused UDF could finance, dependent on OP eligibility, are not limited to but include:

- EE and RE measures in buildings, including existing housing;
- EE and RE in cities e.g. small-scale RE and EE in street lighting;
- Waste to energy projects;
- Cogeneration and district energy networks; and
- Low carbon and clean transport infrastructure.

These broad ranges of energy-focused actions have corresponding Technical Directives that must be taken into account. In relation to Technical Directives it should be noted that the Directives themselves are not directly applicable and must be transposed into national legislation. Therefore, practitioners on the ground across the EU27 will abide by the specific national legislation relevant for them.

MAs, UDF managers and investors should always ensure that the latest Technical Directive relevant for the particular Urban Project is referenced and adhered to.

The summary below is not exhaustive but highlights some common Directives in relation to energy projects.

Energy Performance in Buildings Directive

On 19 May 2010, the EU adopted the Energy Performance in Buildings Directive, 2010/31/EU (EPBD) which is the main legislative instrument to reduce the energy consumption of buildings. (It is a recast of the original Directive 2006/32/EC on energy end-use efficiency and energy services – see below)

The EPBD includes the following:

- the application of minimum requirements on the energy performance of any large existing buildings that are subject to major renovation.
- the application of minimum energy performance requirements on technical buildings systems e.g. boilers and air-conditioning units;
- the requirement that by 31 December 2020 all new buildings are required to be nearly zero-energy buildings (see below);
- the requirement that after 31 December 2018 new buildings occupied and owned by public authorities are required to be nearly zero-energy buildings; and
- a requirement for the production of an Energy Performance Certificate whenever a building is sold, constructed or rented out.

These are to ensure that Energy Conservation Measures are included in refurbishment programmes, and go a long way toward ensuring all new building stock has a low rate of carbon emissions. Member States can determine how this directive will be enforced and each can set minimum requirements for their regions and outline exactly what “nearly zero-energy” comprises of.

The Directive details a common methodology for calculating the energy performance of buildings, minimum standards on the energy performance of new buildings as well as of

existing buildings that are subject to major renovation, and outlines the requirements for the regular inspection of heating and cooling systems.

On 16 January 2012, the EU adopted the Delegated Regulation (EU) No 244/2012, supplementing the EPBD, which establishes a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements.

Directive 2006/32/EC on energy end-use efficiency and energy services

In *Directive 2006/32/EC on energy end-use efficiency and energy services*[58] (*Appendix VI*), some common energy related terms useful for Energy Focused UDFs are referred to. For example in the Directive, an EPC is defined as follows:

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

EPC is one of the six public procurement measures identified as suitable to be used for developing a market for energy services by the EU:

> *"requirements concerning the use of financial instruments for energy savings, including energy performance contracting, that stipulate the delivery of measurable and pre-determined energy savings (including whenever public administrations have outsourced responsibilities)"*

An ESCO is defined as:

> *" a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria."*

[58] http://europa.eu/legislation_summaries/energy/energy_efficiency/l27057_en.htm

Directive of the European Parliament and of the Council on energy efficiency

In 2012 the EU has adopted the *Directive 2012/27/EU on energy efficiency.*[59] which establishes a common framework of measures for the promotion of energy efficiency within the Union.

The Directive stops short of proposing binding national energy efficiency targets but does propose "binding measures" such as an obligation to renovate public buildings and other initiatives.

The main elements of the Directive are as follows:

- The public sector is required to renovate 3% of buildings "owned and occupied" by the central government in each country (Buildings need to have a useful area larger than 500 m^2 in order to be covered by this requirement which is lowered to 250 m^2 as of July 2015)
- EU countries are requested to draw up a roadmap to make the entire buildings sector more energy efficient by 2050 (commercial, public and private households included)
- Energy audits and management plans are required for large companies, with cost-benefit analyses for the deployment of combined heat and power generation (CHP) and public procurement
- Energy companies are requested to reduce energy sales by 1.5% every year among their customers. This can be achieved via improved heating systems, fitting double-glazed windows or insulating roofs.

Each country will have to present national indicative targets by April 2013 and final plans should ensure that the EU's overall 2020 goal is met. The Directive clearly offers considerable support to sustainable energy interventions within EU Member States and if Europe is off track after a review planned in 2014, the Commission said it intends to come back with a proposal for further legislation.

Combined Heat and Power (CHP) Directive

The "*Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market"* (2004/8/EC)[60] is better known as the 'Combined Heat and Power (CHP) Directive'. It is a European Union directive for **promoting the use of cogeneration** in order to increase the energy efficiency and improve the security of supply of energy. This is intended to be achieved by creating a framework for the promotion and development of high efficiency cogeneration within the EU27.

EU Landfill Directive

The *EU Landfill Directive* (1999/31/EC) is a **driver for waste to energy projects**, such as those using anaerobic digestion, because it obliges Member States to reduce the amount of biodegradable waste that they landfill to 35% by 2016 (compared to 1995 levels).

[59] See: http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

[60] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:052:0050:0050:EN:PDF

Directive on the promotion of the use of energy from renewable sources

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009, on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, establishes a common framework for the production and promotion of **energy from renewable sources**.

Each Member State has a target calculated according to the expected share of energy from renewable sources in its gross final consumption for 2020 and this target is in line with the overall *Europe 2020 Strategy* goals. Moreover, the share of energy from renewable sources in the transport sector must amount for at least 10% of final energy consumption in the sector by 2020.

6.1.4 Summary of Regulatory Framework

The above Directives and regulations demonstrate some of the regulatory and policy drivers for EE and RE measures within Member States as they aim to meet their targets under the *Europe 2020 Strategy*, and therefore the increasing potential for Energy Focused UDFs. However the applicable elements from the Regulatory framework will always depend on the types of projects being invested in and the specific regional and national legislation.

The potential presence of State aid needs to be considered when using any Structural Funds and/or national state resources for arranging financing.

6.2 Framework Model 1: Energy Housing Fund

Framework Model 1 represents an Energy Housing Fund that invests solely in EE and RE projects in existing housing and was requested from the HSSG as MAs can allocate up to 4% of their total Member State ERDF allocation to these measures.[61] In line with the Structural Funds regulations, the housing projects have to support social cohesion, with Member States themselves having to define the categories of eligible housing.

As already outlined a FEI that invests purely in EE and RE in existing buildings, including housing, may be set up under *Council Regulation (EC) No 1083/2006* Article 44(c) (following the adoption of *Regulation (EU) No 539/2010*[62]) and the projects supported are not required to be part of an IPSUD. Therefore, to keep in line with Regulation terminology, in this Study the UDF term is reserved solely for funds established under Article 44(b). However, apart from the lack of requirement of an IPSUD, it is assumed that all other considerations remain the same (e.g. legal structure for the fund, co-financing requirements, stakeholders) and this is analysed under Framework Model 1.

All housing investments have to adhere to the Regulatory framework in relation to housing investments using Structural Fund resources. It should be noted that there are different definitions for social, private and public housing across the EU. In the context of this study Social Housing is used when referring to a UDF or fund investing through a public body (e.g municipal housing body) to groups of low-income households as opposed to a private individual.

See also the Horizontal Study "*Housing in JESSICA Operations*".

6.2.1 Organisational structures for Energy Housing Funds focusing on EE and RE in Existing Housing

Existing Experience

To date UDFs focusing on housing in Lithuania and Estonia have been set up as separate blocks of finance within an existing retail bank or local financial institution. The HF provides finance in the form of a debt instrument or credit line to these financial intermediaries who deal directly with homeowners and apartment/housing associations.

This type of organisational structure has advantages for investment in individual housing units as the financial intermediary can use an existing network of client relationships, bearing in mind that the type of housing and expenditures have to be eligible in accordance with MA definitions and Structural Funds regulations.

[61] For the avoidance of doubt Article 44 of Council Regulation (EC) No 1083/2006 (following the adoption of Regulation (EU) No 539/2010) is not limited to housing, and in specific Article 44 (c) allows Structural Funds to finance EE and RE projects in buildings, including existing housing.

[62] Regulation (EU) No 539/2010 of the European Parliament and of the Council of 16 June 2010 Amending Council Regulation (EC) No 1083/2006

An example of a housing loan repayment mechanism in Estonia

In Estonia apartment owners pay utility bills based on the proportional size of their apartment and the collection of these payments is organised by the apartment associations which pay the utility companies on a monthly basis. Legally it is the apartment association that is responsible for payments to utility providers. Therefore the loan repayments are treated as separate charges for owners.

The structure is illustrated in Figure 10 and is similar to the one used by KfW, the state owned bank in Germany, which extends low cost credit lines through local banks for retrofit projects in private housing.

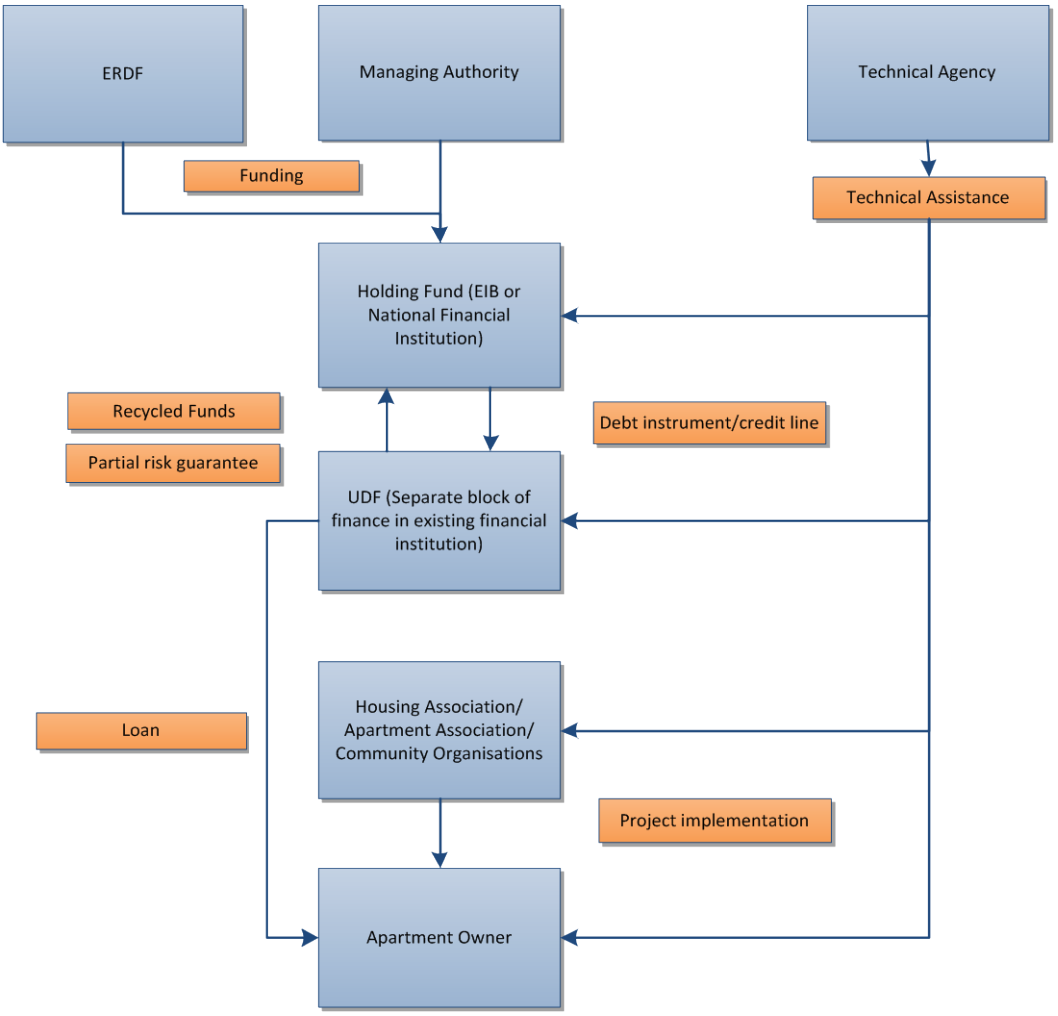


Figure 10 Organisational structure of existing UDFs concentrating on EE and RE in existing housing.

This model has worked well in EU12 countries which have a large amount of recently privatised multi-family blocks in need of renovation. The apartment owners pay a monthly service charge to the apartment management associations to cover communal fees including energy costs (based on the size of their apartment), and when a loan is given by a UDF to individual homeowners, the repayment costs can be recharged through this method.

In these cases there is not a split incentive issue (which occurs where the building owner pays for retrofits, but the tenant gets the benefit of reduced energy bills), between the loan grantee and the eventual beneficiary of the EE measures. On the other hand, in traditional Social Housing in the EU15, the split incentive problem can be a greater barrier since a public body takes out the loan for EE measures but there is no pre-existing means to recharge these costs to the Social Housing tenants who would benefit from the energy savings. However a Social Housing organisation committed to improving the socio-economic conditions of residents, as well as implementing EE measures during regular asset upgrade cycles, could make these measures more feasible.

Best Practice and Recommendations

An organisational structure where a UDF is set up as a **separate block of finance** within an existing financial institution works well where investments are being made individually.

Where Final Recipients are individual homeowners, or apartment/housing associations made up of these homeowners, repayment risks may be higher than when lending to a municipality or Social Housing organisation which tend to have higher credit ratings. As a result it makes sense for the HF to transfer repayment risk to local financial institutions that have existing credit histories with these individuals and that can better understand the risks and returns of lending to them.

Therefore for MAs whose housing interventions will primarily be made in individual housing units and multi-family housing, a structure with an HF providing finance in the form of a debt instrument or credit lines to retail banks (financial intermediaries), that deal directly with homeowners and housing associations, is recommended.

For investment on a larger scale in public and Social Housing, the above structure may be less appropriate as there will tend to be different Final Recipients, associated risks, and returns involved e.g. municipal authorities and Social Housing organisations (where existing) tend to have higher credit ratings than individuals and for this reason repayment risk can be lower in comparison to above.

Hence, there could be scope for a **separate legal entity** in the form of an independent Social Housing fund that can more easily make the appropriate investments, secure and coordinate financing from a wide range of sources, integrate relevant stakeholders and readily access the type of technical expertise necessary to implement large scale projects.

It should be noted that some UDFs can include investment in housing, whilst not being wholly concentrated in it.

It is recommended that MAs consider the types of housing that will be eligible and base the specific organisational structure around the types of stakeholders who are likely to be involved.

6.2.2 Selection criteria

Existing Experience

Existing UDFs and non-JESSICA funds have used a range of selection criteria for their loan products.

For example, Kredex's (the HF manager in Estonia) terms and conditions for the loan are that:

- the Final Recipients must be apartment associations or housing associations of apartments built before the year 1993 or communities of apartment owners;
- an energy audit needs to have been completed with priority renovation works detailed;
- the project must be expected to achieve at least a 20% energy reduction in apartment buildings of up to 2000m^2 and at least 30% in apartment buildings of over 3000m^2;
- there must be a self-financing aspect of up to 15% of the project cost (which can be covered by parallel bank loans). This includes the costs of the energy audit and building project that are not covered by the KredEx loan; and
- the minimum loan amount is €6,400 per apartment building.

In addition the Estonian UDF (operated by Swedbank) stipulates that:

- they will only finance apartment buildings with more than 5/6 apartments;
- the project must be situated in an urban area with high levels of unemployment; and
- the apartment owner will need to pass certain credit criteria, such as an investigation into how they manage their finances which includes an appraisal of the apartment association's internal debts.

They also look at "softer" issues such as if there is there internal capacity in the apartment association to manage the renovation project and the types of specialists they use.

Best Practice and Recommendations

The central recommendation is that funding decisions are based on the results of an investment grade energy audit by an accredited energy auditor which:

- establishes the baseline energy consumption of the building including analysis of the energy use that has occurred within three years (or more) prior;
- identifies and quantifies energy-saving opportunities and their potential impact;
- recommends relevant improvement measures; and
- prepares an indicative investment budget and implementation programme.

In existing UDFs this audit was arranged and paid for by housing associations or homeowners before they applied to the UDF for financing and the costs were reimbursed ex-post through grant systems. However, in a Social Housing project this audit could be undertaken by local or regional authorities or other Social Housing providers.

The energy audit will estimate the energy saving potential of the proposed measures and enable the UDF manager to assess their economic viability based on their own internal metrics i.e. the level of return they expect from investments.

Although estimating payback periods for specific measures is highly contextual, it is possible to make some high level assumptions. Insulation, in particular loft, roof and cavity wall, and replacement of old boilers with new energy efficient models tend to

make economic sense. This is supported by The Royal Institute of Chartered Surveyors in the UK who make the following recommendations:[63]

> "generally the most cost effective measures [in housing] are improving the insulation of the property starting with the hot water cylinder, the loft and then the cavity walls if applicable. Once these have been incorporated then replacing the boiler and adding thermostatic radiator valves are usually cost effective.

However, it must be stressed that payback periods and related investment costs for project typologies will depend heavily on building age, quality and size in addition to differences in energy prices (gas and electricity) between countries. The way in which an occupier uses a house is also of the utmost importance, for example operating the thermostat correctly and opening/closing windows at appropriate times. These behavioural dimensions create the risk that expected energy savings may not be fully achieved.

Therefore selection criteria of potential EE measures in housing should include reference to the geographical location and the technical feasibility of projects, while the housing itself needs to be eligible under the Regulatory framework.

In general, it should be emphasised that it is important to take an integrated approach and not carry out EE improvements in isolation, but rather consider them as part of a general housing refurbishment leading to the overall improvement of a particular area. There is thus a considerable advantage in adopting an integrated approach and developing an IPSUD, even in cases where this is not strictly required by the Regulatory framework.

6.2.3 Project typologies for Energy Housing Funds focusing on EE and RE in Existing Housing

Existing Experience

There are two main decisions that need to be made when deciding on project typologies for Energy Housing Funds:

1. Eligible housing: It is up to the MA to define the eligibility of housing for investment in EE measures and in accordance with EU regulations. For example, in many of the EU12 Member States it is the prefabricated panel buildings built in the post-WWII period that are deemed eligible and require the most energy efficient retrofit investment.
2. Eligible Measures: Energy efficient housing measures are eligible under ERDF regulations in both common and private parts of the building.[64]

[63] See: http://www.rics.org/site/scripts/documents_info.aspx?documentID=742

[64] Under Regulation (EC) No 1828/2006 renovation of the common parts of multi-family residential buildings is allowed including: roof, façade, windows and doors on the façade, staircase, inside and outside corridors, entrance and their exteriors and elevator. In addition technical installations of the building and energy-efficient actions are allowed. The renovation and change of use of existing buildings can encompass energy efficiency interventions in apartments.

To date UDFs have implemented or plan to implement the following types of measures in housing:

- energy-efficient renovation of multi-family apartment blocks;
- energy-efficient renovation of housing units; and
- RE measures in housing.

The types of project measures that have been identified by the two UDFs in Lithuania and Estonia (in multi-family apartment blocks) are included in Table 14.

Table 14 Eligible measures in existing multi family apartment blocks in Lithuania and Estonia

Funds	Eligible measures
Lithuania	• Replacement of windows • Replacement of doors • Insulation of ceilings and roofs • Insulation of walls • Installation of solar panels • Replacement of energy-related equipment • Replacement of elevators and electrical wiring in common areas
Estonia	• Full or partial insulation of frontages • Reconstruction and insulation of roofs • Replacement of windows and exterior doors • Insulation of cellar ceilings • Insulation of roof ceilings • Replacement, reconstruction or rebalancing of heating systems • Replacement of ventilation system by new heating return system • Solar PV

Although a wide range of measures are eligible under the Estonian UDFs, in reality there are difficulties in actual implementation. This is because 95% of the housing is owned by private individuals many of whom have low incomes or are pensioners who have no resources to rent another home whilst work is being undertaken in their apartment. In practice, the UDFs only implement external works, such as wall and roof insulation, and measures concerning ventilation and heating upgrades are considered to be much more difficult.

In KfW financing is available for:

- thermal insulation of walls, roof and floor space
- renewal of windows and exterior doors
- installation of a ventilation system
- replacement of the heating system

and they have structured pre-defined investment packages for their funded projects.[65] KfW has defined five levels of support for a "KfW Efficiency House" or “Effizienzhaus”. Each investment package relates to a Effizienzhaus with a specific figure indicating how much of the maximum primary energy requirement the house consumes. For example the best standard, a KfW-55 Effizienzhaus, receives the highest support and it requires a heating system with wood pellets or combined heat and power in addition to specified measures in the building envelope. This system allows KfW to have a high level of standardisation in terms of their technical and financial assessment of projects.

KfW’s standardised investment packages work extremely well in Germany and the programme has had considerable success. In 2010 alone KfW committed €8.5 billion to 100,000 loans representing 300,000 housing units. According to a presentation in 2011, KfW’s promotional programmes have contributed nearly 50% to the achievement of the German climate protection goals in the housing sector. However, although this is certainly a best practice approach in Germany where there is significant demand for the energy efficient retrofit of prefabricated panel multi-apartment buildings, a standardised approach may not be implementable across all Member States.

Best Practice and Recommendations

The types of building measures suitable for improving the energy efficiency of existing housing are in line with what is eligible under existing UDFs. More generally the hierarchy for energy and carbon reduction in existing buildings is shown in Figure 7 which recognises there is significant potential to improve building performance by concentrating first on improving building management (e.g. metering, energy management systems, behavioural change, control systems), then technological solutions (i.e. energy efficient lighting and plant), followed by improvements to the building fabric and finally, low/zero carbon technologies. The latter includes on-site renewables such as small-scale solar PV wind, biomass CHP and heat pumps.

This hierarchy applies across all buildings even though in housing some of the controls will be less relevant and building fabric improvements more important.

The lessons learned to date indicate that when considering project typologies for Energy Housing Funds a flexible approach based on the age, condition and ownership of housing is required. It is recommended that MAs consult with municipalities and national and regional housing organisations to decide on the type of housing that should be eligible for ERDF funding and by extension JESSICA operations.

[65] See: http://www.kfw.de/kfw/en/Domestic_Promotion/Our_offers/Housing.jsp#Energy-efficientRefurbishment

6.2.4 Technical Assistance

Existing Experience

Technical assistance is central to the implementation of EE and RE projects in JESSICA housing operations.

The following excerpt from a European Environmental Bureau report supports this view.

> "The concept of combining access to loans with access to impartial, professional advice via one agency helps to simplify an often complex and overwhelming process. A history of poor and unreliable services and unaccredited agencies delivering below par improvements has done little to build trust for the householder. With good promotion these loan schemes can start a 'wave' of energy saving investments that can also help businesses and create jobs. National Energy Efficiency Funds could provide an essential role in developing packages that can help leverage private capital for energy saving projects. They could act as one stop shops for service providers and customers, to identify, direct and access finance for energy saving in a transparent and quality controlled manner."
>
> **Saving Energy in Europe: 15 Good Practice Case Studies (May 2011) European Environmental Bureau**

Technical assistance for housing under current UDFs encompasses:

- an investment grade energy audit before project implementation that details the potential measures to be undertaken and their respective energy saving potential;
- an energy consumption audit after project implementation that verifies that the construction work has been undertaken properly; and
- regular monitoring work on the performance of building projects that is required by the UDF as part of their overall monitoring activity.

Under existing UDFs, technical assistance is provided by an external body because the UDFs themselves are retail banks without internal technical capacity. In Lithuania an integrated approach has been adopted in which the Housing and Urban Development Agency (HUDA) plays a central role and provides technical assistance to the HF and UDF managers and project sponsors.

KfW also exemplifies a successful integrated technical and financial approach. Due to this integration which provides homeowners with expert technical advice, they can help to overcome the traditional barriers to investment in EE measures, namely:

- a lack of knowledge and information about the costs and benefits of Energy Conservation Measures; and
- a lack of access to low-cost finance for projects that often have long payback periods.

Best Practice and Recommendations

Technical assistance is crucial to the implementation of EE and RE projects. Where possible, technical assistance programmes should be integrated with the financing process

and it is recommended that MAs work with national energy agencies, independent accredited energy auditors, local consultants and other local players to ensure the required technical support is being provided to the Final Recipients.

6.2.5 Financial products

Existing Experience

In the Lithuania and Estonia UDFs and the KfW model, debt instruments are used for investment in EE and RE measures in housing. This is because they allow for relatively low financing rates and longer payback periods than equity instruments and, as such, fit well with the nature of housing projects.

The textbox details some examples of investment levels and payback periods in the analysed funds.

Examples of investment levels and payback periods

In Lithuania **the UDFs** lend at a fixed rate of 3% for up to 20 years but with maximum limits for different clients.

In Estonia the loan interest is fixed for 10 years with an interest rate between 3.9-4.4% depending on the reference rate. The loan maturity is up to 20 years however there is no maximum level of investment.

The **KfW fund** offers a maximum of €75,000 per housing unit with payback periods of up to 30 years.

In all of the funds analysed, financial incentives were offered to the Final Recipients for the housing projects. These include incentives for achieving certain levels of energy efficiency, grace periods on repayment of financing costs, grants for project preparation and subsidies for low-income homeowners. Examples are included in the text box.

Best practice and recommendations

Based on existing funds it appears that debt instruments are the most appropriate financial instruments because they allow for relatively long payback periods and low financing costs that suit the risks and returns of such projects.

In addition, it is recommended to combine any potential incentives offered to homeowners and apartment/housing associations for energy audits and project preparation.

6.2.6 Potential investors

Existing Experience

In the Lithuania JESSICA operation there is no private co-investment but the HF requires the UDF to guarantee part of the recovery of the loan amount (between 10 to 20%) to the HF in case of default by the homeowners. This means that although the UDF does not take risk in terms of co-investment in projects, it does guarantee part of the recovery of funds.

In Estonia, Swedbank will offer the same loans to homeowners once the initial €33 million allocation from the KredEx fund has been disbursed.

Best practice and Recommendations

When Energy Housing Funds are set up as a separate block of finance within an existing financial institution it makes sense for co-investment to be provided by the UDF itself. Nevertheless Energy Housing Funds which invest in EE and RE measures in existing housing could be set up as independent legal entities with a range of stakeholders. In these structures other sources of financing at the UDF level and co-investment at the project level could come from a range of financial institutions including large retail banks and investment banks. However, it may be difficult to attract private sector co-finance or co-investment in many Member States due to the long payback periods and relatively low returns involved in EE and RE projects in housing.

6.2.7 Final Recipients

Existing Experience

Under existing UDFs concentrating on EE and RE measures in existing housing, Final Recipients have included the homeowners and apartment/housing associations for multi-family apartments blocks.

Best practice and Recommendations

There is no “best practice” approach with respect to which Final Recipients should be considered since it will depend on the eligible housing specific to the each region. However, where possible, MAs should ensure that the full range of Final Recipients required for project implementation is compatible with the types of eligible projects. In addition to above, other important Final Recipients that will be relevant for Energy Housing Funds investing in housing include municipalities, community organisations, student housing and Social Housing organisations.

See Section 3.3 for the range of Final Recipients specified in energy focused OP priorities.

6.2.8 Procurement models

Existing Experience

The procurement model used in both Estonia and Lithuania is straightforward and can be used where future energy efficiency projects are being implemented in multi-family apartment blocks.

Under existing UDFs in Lithuania and Estonia the following high-level procurement process is used:

- a proposal to undertake a modernisation project of a multi-family building or number of buildings is drawn up by an apartment/housing association (the project sponsor) and agreement is obtained from all homeowners;
- the project sponsor procures an accredited energy auditor to undertake an investment grade energy audit and a technical advisor to draw up an investment plan;
- the investment plan and energy audit are presented to the UDF manager which then makes a decision on whether or not to fund the project; and
- if funding is obtained, the project sponsor procures a contractor to undertake the construction works.

In Lithuania this procurement process is supported to a great extent by HUDA which provides the technical assistance.

EPC (discussed in more detail in Framework Model 3) has been used in some pilot projects in Social Housing, but not on a wide scale to date due to difficulties in creating the necessary scale for ESCO interest, complexities posed by national legal and regulatory frameworks, higher risk due to behavioural aspects, and lack of experience in this type of procurement model in some markets. The *FRESH programme*[66] is a good resource for information on the pilot projects that have been implemented to date.

This subject for housing is covered in more detail in the Horizontal Study "*Housing in JESSICA Operations*".

Best practice and Recommendations

The particular procurement process used will be dependent on the project sponsor and national legislation. In most cases for housing projects the energy audit and construction works will need to be procured separately. If the EPC model becomes more widely used in the next programming period then an ESCO could perform both the energy audit and the construction work and in this case only one procurement process would be needed.

[66] See: http://www.fresh-project.eu/

6.2.9 Fund marketing

Existing Experience

The campaign carried out in Estonia since 2006 by the HF manager Kredex provides a very good example of an active advertising and promotional campaign on the benefits of EE investments for all relevant market participants. This has helped to spread the benefits of EE investments amongst homeowners and increase the level of interest for UDF loans.

KfW offers some guidance on how to effectively market EE measures in housing. They have done extensive marketing and branding which includes establishing brands for levels of EE in housing.[67] These were originally created for new housing but they now also apply to renovated housing. This has created a new market demand for their brand and is used as the standard for EE in Germany.

Best practice and recommendations

Marketing and publicity will assist in the success of any UDF. However, an Energy Housing Fund that focuses solely on EE and RE in housing requires a particularly concerted marketing effort because individual housing units only require low levels of investment. Therefore, a proper marketing effort will help to secure a sufficient scale in the relevant programming period.

It is recommended that fund managers establish highly distinct brands for their financial products to build demand. This could include publicising the full benefits of EE and RE projects to homeowners e.g. improvements in the comfort levels of their housing, reduced energy bills and positive social effects such as improvements in the environment. This type of branding can contribute to ensuring a secure project pipeline.

6.2.10 Project management processes

Existing Experience

Project management processes for EE measures, used by existing UDFs and non-JESSICA funds, are relatively simple and mainly involve verification that the works have been performed in line with contractual arrangements.

In KfW's bespoke programme of "Effizienzhaus" each level has defined technical standards included in their programme of works. External measurement and verification works are completed by energy consultants to ensure that the planned measures comply with these defined standards.

Best practice and recommendations

It is recommended that fund managers implement a quality control review in line with their overall project monitoring and evaluation processes, for example by ensuring that project costs are in line with forecasts and construction is being undertaken to the required quality levels.

[67] See: http://www.kfw.de/kfw/en/Domestic_Promotion/Our_offers/Housing.jsp#Energy-efficientRefurbishment

6.2.11 Fund monitoring processes

Existing Experience

The existing UDFs give some examples of monitoring procedures. In Lithuania the HF has three main targets:

- renovation of 1,000 multi-apartment buildings by the end of 2015;
- renovation of 33 student dormitories in Higher Education Institutions (HEIs) and 2 dormitories in vocational and training colleges by the end of 2015; and
- 20% energy reduction in all these buildings by the end of 2015.

The HF takes the responsibility for aggregating the relevant data received from the monitoring reports and submitting them to the MA on a regular basis using two main sources of information:

- reports from the UDF on financial information including disbursement of funds, repayments, and general information about the project progress; and
- reports on energy reduction from HUDA.

In Estonia, KredEx targets EE improvements of at least 20% in apartment buildings of up to 2000m^2 and at least 30% in apartment buildings of over 3000m^2. KredEx gets monthly reports on the status of building projects from UDFs and plans to perform spot checks on samples of projects to ensure that construction is of an adequate standard.

KfW undertake monitoring on a sample basis by asking random selections of homeowners who took their loans to report their energy savings. From this they construct aggregate models to assess CO_2 reduction, savings in heating costs, and job creation effects. This data is clustered on building age and the different levels of EE that can be attained. KfW also monitor the retail banks to ensure that their processes are correct and that loans have been disbursed correctly.

Thus the two JESSICA funds focus mainly on energy reduction and financial information in their monitoring reports while KfW includes other variables such as reduction in heating costs and job creation effects.

Best practice and recommendations

A monitoring process which includes monitoring against agreed targets and providing assurance on financial metrics should be determined. For Energy Housing Funds that invest in EE and RE in existing housing, monitoring should include:

- a periodic assessment of the **technical progress** of projects being implemented;
- a periodic assessment of the **energy savings** in projects that have been implemented; and
- a periodic assessment of **financial metrics** such as funds disbursed, and repayments.

It is recommended that these reports are analysed and collated regularly e.g. on an annual basis.
Although energy reduction and basic financial information are the central metrics for the UDF monitoring process, it is also recommended that some wider socio-economic impact-measuring variables, such as reduction in fuel poverty and job creation, be analysed by the MA over a longer time frame. This could link in with the general

monitoring processes for OPs. See the Horizontal Study *"Methodologies for Assessing Social and Economic Performance in JESSICA"*.

6.2.12 Risk management processes

Existing Experience

In existing UDFs where local financial institutions take on the repayment risk, the risk management processes are relatively straightforward. In both Lithuania and Estonia the apartment owners and housing associations have credit histories with the institutions that manage the UDFs and therefore the risks can be managed effectively.

Best practice and recommendations

Energy Housing Funds that invest in private housing (where eligible) should use their own best practices before granting loans such as investigating credit history and the loan/value ratio on buildings. For situations where an apartment association is the loan recipient, the fund manager can look into credit histories between the individual homeowners and the apartment association.

Energy Housing Funds that invest in Social Housing[68] will tend to have lower repayment risk because municipal authorities and Social Housing organisations are likely to have very good credit ratings.

To safeguard against any risk that lies with the HF in respect to the Energy Housing Fund not performing as expected, it is recommended that there are separate safeguards in any agreements signed.

6.2.13 Specific implementation issues for consideration by MAs for Energy Housing Funds

There are a few key challenges involved in establishing Energy Housing Funds focusing on EE and RE in existing housing that need to be worked on and developed.

Split Incentive
One of the main issues come across, for traditional Social Housing in the EU 15 in particular, is overcoming the split incentive barrier. In a Social Housing model, typically a municipality or Social Housing organisation would take out financing to fund EE and RE measures in their housing stock. The tenants (whose rents are often paid for by the municipality or other government organisation) would benefit from these energy saving measures and therefore a split incentive would arise between the social landlord and the social tenant.

However, the situation is not uniform across the EU. In some Member States, such as Germany, rents can be increased in relation to certain EE measures (depending on performance levels). In other countries there is an upper limit for rents and a legal prohibition to increase them even if energy costs for the tenants will be reduced.

It is important to take account of the regional and country technical, economic, and legal differences for EE in the housing sector.

[68] Note definition of Social Housing for this study

The capacity for grant finance to be integrated into the Framework Model
It will be important for some projects that grant financing can be integrated within their JESSICA operations. One option that could be explored would be to enable a FEI to disburse grants and financial instruments and to date, this has not been a possibility.

The lack of experience with FEIs in the public sector.
JESSICA operations can open up possibilities for MAs who wish to employ FEIs to further the scope of their Structural Funds allocations. Much needed guidance can be provided by the JESSICA Evaluation Studies, working with the MA to set up a HF and providing technical assistance through a number of mechanisms.

6.3 Framework Model 2: Energy Focused UDF

The second Framework Model is for a diversified Energy Focused UDF which can invest in a range of energy focused projects from EE and RE measures in housing and buildings, to street lighting, decentralised energy, small scale RE and clean transport projects.

The fund will rely on MAs having a commitment to broad-scale urban energy interventions and including these priorities, and related Final Recipients in their OPs and IPSUDs. The EAPs, detailed in Section 4, should be referenced for the information on the sectoral data and related project actions.

6.3.1 Organisational structures for an Energy Focused UDF

Existing Experience

Existing JESSICA UDFs have been set up either as separate blocks of finance held within an existing financial institution or as independent legal entities governed by agreements between co-financing partners and shareholders.

The previous section gave an overview of structures involving existing financial institutions which is also applicable to a more diversified Energy Focused UDF.

For a UDF that is set up as an independent legal entity the London JESSICA programme offers a good example. The structure demonstrates how a wide range of public and private stakeholders from co-investors to relevant public authorities can be included.

Figure 11 details the various oversight bodies involved in the governance of the London Green Fund (LGF) which is the HF for the LEEF and the London Waste UDF (Foresight Environmental Fund). These are typical of the oversight bodies that should be involved in the governance structures of all UDFs and include:

- a JESSICA Oversight Committee (JOC) which was set up as a forum and working group for investors into the LGF and responds to any issues relating to the funding agreement between the EIB and the MA;
- the LGF Investment Board which is responsible for the LGF business plan and reviewing progress of the HF; and
- an advisory board to the London Waste UDF made up of investors into the UDF itself which will advise on its business plan and will have decision making powers in a few areas including replacement of any key staff in the UDF manager.

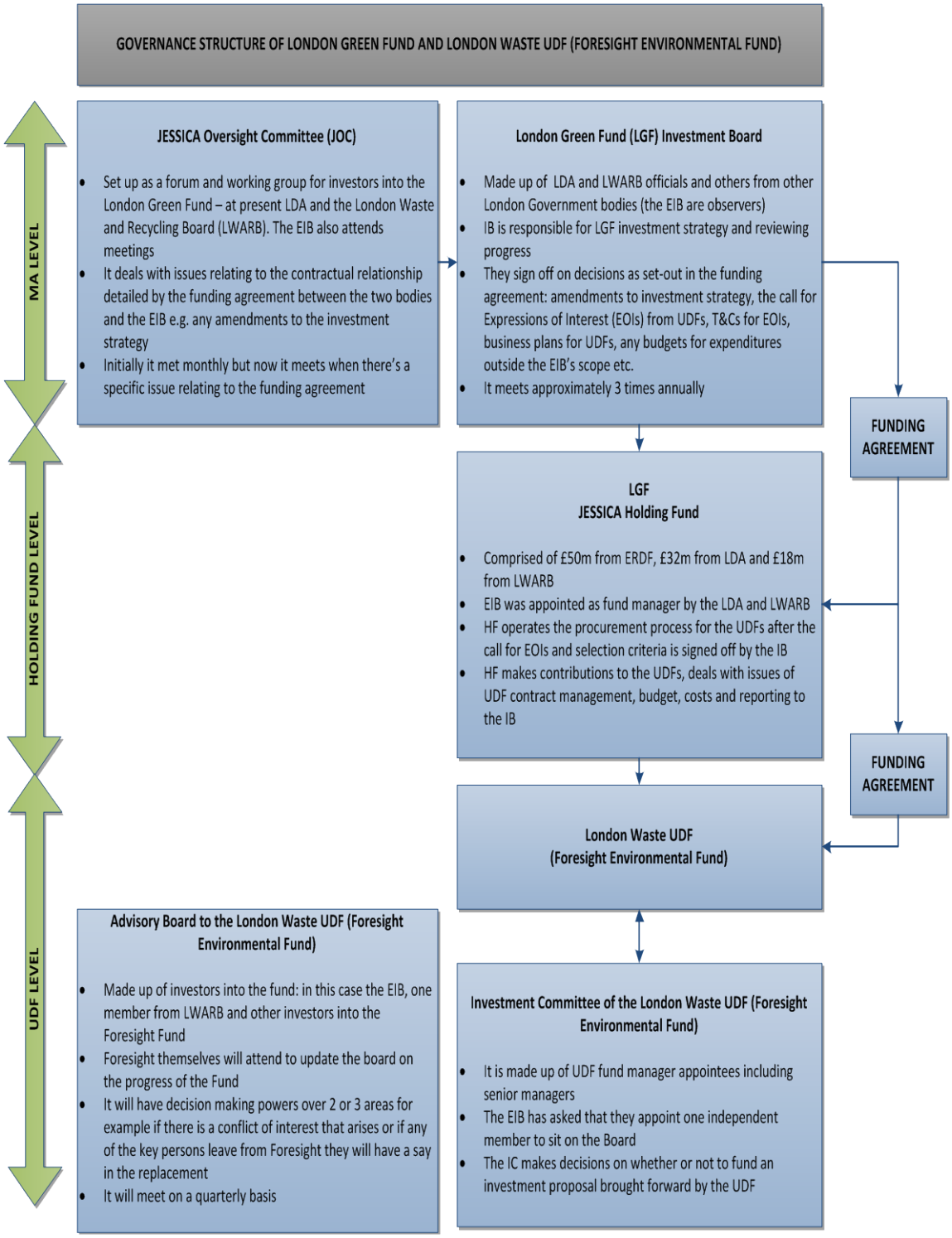


Figure 11 Governance structure of the London JESSICA Programme

Source: Prepared based on interview with MA

Best practice and Recommendations

At present Energy Focused JESSICA operations across Europe tend to have a similar operating structure, with a HF directing the UDF in line with MA objectives. It is recommended that where suitable, UDF managers use broad-based investment experience

to access co-investment for a diversified portfolio. Therefore, in the appropriate circumstances MAs can take advantage of the potential for financing in a wide range of measures by one UDF so as to increase the impact of their JESSICA operations. This concept is demonstrated by comparing the "Prevalent Model" and the "Impact Model" in Figure 12.

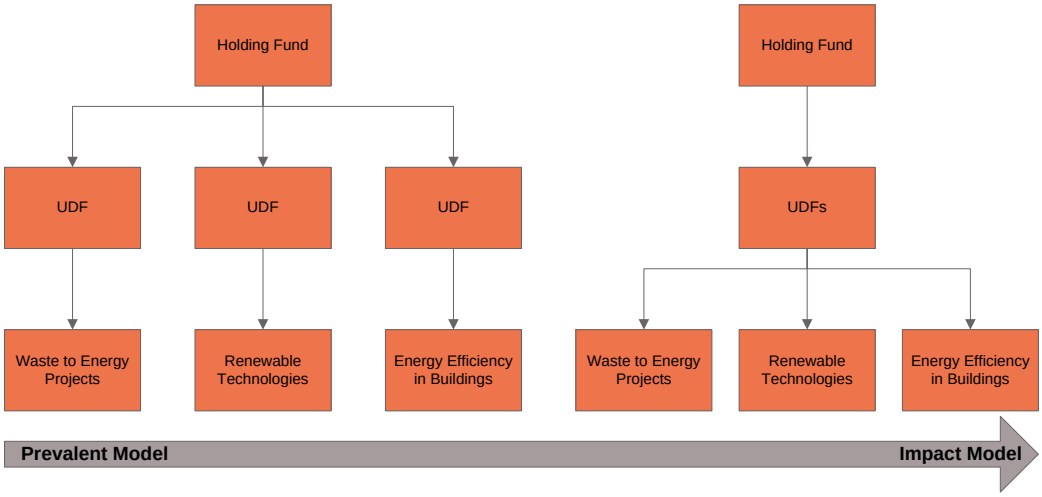


Figure 12 UDF typologies in a JESSICA Energy Focused operation

Depending on the national legislative framework, it is recommended that diversified Energy Focused UDFs are set up as independent legal entities. This will enable the organisational structure to incorporate a range of public and private sector organisations. In all cases national legislation needs to be taken into account as, for example, restrictions on financial institutions may limit the possibilities for a UDF to become an independent legal entity.

The concept of an oversight committee acting as an investor's forum and working group for the HF is recommended for all UDFs because it can help align the priorities of the different co-financing providers at the HF level.

The advisory boards at UDF level will also be important in ensuring that UDF investments are aligned with the priorities of all investors.

6.3.2 Selection criteria for project typologies

Existing Experience

Existing diversified Energy Focused UDFs, such as the EE/RE UDF in Sicily and the LEEF, do not have project implementation experience to date.

However, both the Berlin Energy Saving Partnership and the Toronto Atmospheric Fund offer some robust project selection criteria to consider. Both these funds take a quantitative and qualitative approach to project selection, and this mix of appraisal techniques is important for MAs and UDF managers to consider.

Fund/Programme	Selection criteria for projects
Berlin Energy Saving Partnership (BESP)	BESP will screen EE projects on the basis of the following: • Building should be in constant use with same occupiers for at least 10 years (including the same type of usage) • Building need to be free of construction work in order to properly measure the baseline • Consistent development in energy consumption over the last few years with a lack of Energy Conservation Measures already implemented • Feasibility of intervention in central heating system (i.e. assets need to be owned by the building owner) • Compliance with a minimum project size • If there is an energy saving potential of 20% or higher then it should be suitable to be included in the BESP programme.
Toronto Atmospheric Fund	Key criteria for projects include the project: • Having a catalytic effect i.e. it will encourage more projects in the sector • Being replicable • Having a payback period with a viable cash-flow so that benefits are commensurate with the project risks

Best Practice and Recommendations

Before a diversified Energy Focused UDF is established, it is recommended that MAs analyse the range of investment sectors and technologies that could be best supported based on the individual context of their Member State and region e.g. a focused feasibility study could be carried out.

The types of criteria that should be considered are:

- **Project readiness** – existing EE and RE projects in the pipeline should be analysed to check eligibility and the correct technical specifications.
- **Location** – the projects need to be in suitable locations i.e. urban and within administrative boundary of MA.

- **Returns** - the EE and RE projects should be revenue generating with indicative economic returns based on NPV, IRR, cost of carbon abatement etc.
- **Sustainability** – the EE and RE projects should increase the energy saving and sustainable energy generation in the region.
- **Stakeholders** – the relevant stakeholders involved in these projects need to be considered and engaged with to align interests.
- **Scale and Replicability** - to build up sufficient scale and secure co-investment there are advantages when projects are replicable and of a sufficient scale.

In general the suitability of projects should be assessed on the basis of a multi-criteria approach since several dimensions will be important for successful implementation.

An Energy Focused UDF's portfolio will depend on an economic and financial assessment based on criteria such as the above, in addition to other criteria that may be important to individual MAs, such as the potential for job creation, up-skilling of the labour force and improvements in health and wellbeing. Potential payback periods are very dependent on climate, supply chains, energy prices, planning processes, regulation and other variables and are difficult to generalise. This is why a detailed feasibility study to specify potential projects in each regional context could be very useful.

6.3.3 Project typologies for Diversified Energy Focused UDFs

Existing Experience

Existing experience from JESSICA and non-JESSICA funds demonstrates that a wide range of energy project typologies can be funded by revolving funds. This range of project typologies is included in Figure 13 and is based on the range of projects considered eligible under the analysed OPs and by existing UDFs.

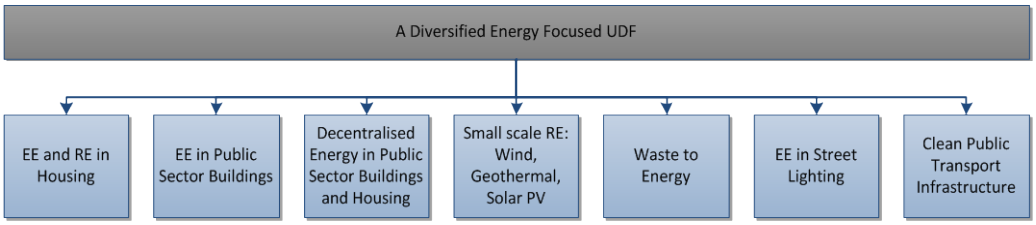


Figure 13 Project typologies for a diversified Energy Focused UDF

EE and RE in housing have been detailed in Framework Model 1 and the project typology analysis and respective selection criteria also apply to this Framework Model. Therefore this Model concentrates on the remaining project typologies.

Energy efficiency in public sector buildings

Significant investment potential is envisaged in this sector due to:

- the availability of projects;
- the ability to pool projects to create scale;
- ease of political support; and
- lack of private sector investment.

The public sector is a particularly important beneficiary due to the large number of buildings owned by individual municipalities and other public sector organisations. This can enable a sufficient scale to attract investor interest and achieve a large impact on energy reductions for a region.

Decentralised energy projects in public sector buildings and housing

There is significant investment potential for decentralised energy projects in urban areas. These projects can increase the security of supply, reduce energy costs, and also have important wider socio-economic effects such as job creation.

District heating schemes

Many urban areas have district-heating schemes that require modernisation and /or expansion. However, these are not always financially viable and there are also issues that will affect implementation in particular contexts: for example, whereas in Northern Europe many district heating schemes have been implemented successfully, the case for them in Southern Europe is less convincing based on their lower heat demand.

Small Scale Solar PV and Wind

Small scale solar PV is becoming popular in urban areas across Europe. This scale of PV tends to be on the rooftops of residential and municipal buildings.

Small-scale wind is not likely to be viable in urban areas due to the impact of surrounding buildings on the wind resource. In addition side effects such as noise pollution can also be a disincentive to implementation and the technology can be very expensive. However in any investment portfolio it will be up to individual MAs and UDF managers to consider whether urban wind generation is feasible within a region.

Solar thermal water heating systems

Another option for using solar energy efficiently is through water heating systems in urban buildings. In many Member States, this can be a cost-effective technology to provide hot water in buildings, and capital costs can be low. MAs and UDF managers should investigate the potential for this particular technology within their specific geographic context.

Biomass CHP systems

Biomass CHP is where biomass, such as woodchips, is used to create both heat and electricity for buildings and industrial facilities. There are many different types and scales of biomass CHP technologies currently available, but there have been reliability issues with some systems. The characteristics of technologies, i.e. capital cost, generating capacity and technical maturity can vary significantly. Two of the main issues that MAs and UDF managers will need to consider are the availability of feedstock (supply chain), creating economies of scale and air quality issues, particularly in inner city areas.

Energy efficiency in street lighting

Energy efficient retrofit of street lighting consists of replacing conventional luminaries with energy efficient lighting, and optimising systems controls. There can be a high potential for reduction in energy usage and maintenance requirements using relatively simple procedures, particularly in Northern Europe where average daylight hours are fewer than in Southern Europe.

Clean and energy efficient public transport infrastructure

Many urban areas are developing policies for clean and energy efficient public transport infrastructure including electric vehicles and associated infrastructure, cycle hire schemes, and electric or hybrid buses. However, the returns associated with these technologies tend to be low, with payback periods in excess of 20 years. MAs who wish to implement these types of projects within a JESSICA operation should consider a wider range of economic returns, such as reductions in air pollution, noise reduction and health benefits.

Waste to Energy Systems

Waste to energy projects have been widely used in many EU Member States such as Denmark, Belgium, the Netherlands, France, Austria and Germany. The process can reduce mass and volume of waste, and be used to generate energy in the form of electricity and heat or even biogas that can be used in vehicles. Technical characteristics and the key opportunities and barriers for the different types of systems are detailed in Appendix B.

Best practice and Recommendations

All projects to be financed with Structural Funds through Energy Focused UDFs need to have eligible Final Recipients included in the relevant OPs.

It is recommended that MAs look at the potential for investment in EE and RE in public sector buildings due to the scale and availability of projects across the EU27, but all other key sectors including waste, transport, water and lighting should also be considered. Regarding the range of project typologies that a diversified Energy Focused UDF can fund, it is difficult to provide specific best practice recommendations since project portfolios will depend heavily on the particular Member State and regional context.

6.3.4 Technical assistance

Existing Experience

Technical assistance can be needed for project preparation in order to gather together sufficient scale for investor interest and to develop a standardised approach for efficiency and consistency. Often the necessary know-how and skills are not available at a local level especially for relatively new initiatives such as JESSICA. The types of skills required include:

- assistance in the preparation of technical and financial documents for projects to be financed within Structural Funds;
- assistance in the transition from a high level strategy to actual project implementation;
- assistance in the identification of the most suitable projects requiring technical assistance; and
- preparation of the documentation necessary to submit applications for co-financing from Structural Funds.

Technical Consultants should possess technical and project management competencies such as:

- relevant and up-to-date experience in EE measures and tasks e.g. technical feasibility studies, energy auditing, project design, implementation and monitoring of EE measures;
- relevant and up-to-date experience in RE technologies, especially in relation to those described;
- a track record in assisting bodies to set targets in terms of EE (and/or potentially GHG emissions abatement) and recommending projects to achieve these targets;
- a track record in assisting bodies to prepare projects for interest to outside bodies e.g. ESCOs; and
- knowledge of the relevant European and national/regional environmental regulations and laws.

Existing experience demonstrates that technical assistance can be incorporated into the organisational structure of the UDF.

In the public sector, ELENA[69] can be an important source of funding for technical assistance for municipalities or other public authorities. It is available to help build technical and financial delivery structures for identified projects and as such can be integral in identifying and developing project pipelines for Energy Focused UDFs. For example, ELENA is used to fund the RE:FIT programme which is a London-wide energy efficient retrofit programme that can be used to source projects to be funded by LEEF.

In addition, the Covenant of Mayors and other Intelligent Energy Europe initiatives play a major role in preparing cities and regions to access innovative and complex financing, and build networking and sharing platforms designed to exchange best practices.

Best Practice and Recommendations

It is recommended that MAs work with municipalities to access or coordinate access to technical assistance. While by no means the only option, funds such as ELENA, Intelligent Energy Europe, and other programmes provide support for technical assistance programmes within the public sector and can develop project pipelines to be funded by an Energy Focused UDF within the region.

Technical assistance at the project level assists the adequate preparation required and can also be used in the monitoring, measurement and verification of projects once operational. If required it is recommended that MAs and UDF managers sub-contract reliable and accredited technical advisors to perform such work.

6.3.5 Financial products and Potential Investors

Existing Experience

Public sector Final Recipients tend to be less risky than those in the private sector and as EE projects in public sector buildings can offer relatively low but stable returns they can be suited to long term debt instruments.

The Foresight Environment Fund (London Waste UDF) is a private equity model that will source investment from pension funds and venture capital funds to make investments in waste to energy and waste recycling facilities. The higher risks and related returns

[69] See: http://www.eib.org/elena

involved in these types of projects make them more suitable for equity investment than debt.

Grant finance, for example from sources such as technical assistance ERDF programmes or ELENA funding, may also be an integral part of the UDF model to enable project preparation and development processes, both within the MA itself and also at the project level for aspects that have lower financial returns.

Based on experience from existing UDFs and non-JESSICA programmes there is a wide range of potential co-investors for diversified Energy Focused UDFs.

This is not limited to but includes:

- institutional investors
- private equity funds
- infrastructure funds
- commercial banks
- ESCOs; and
- the EIB.

Different projects tend to attract different types of investors and related financial instruments based on their individual risk profiles.

In the UK the LEEF has been able to secure debt and mezzanine finance for EE projects from commercial banks and infrastructure funds. The senior debt will be provided unsecured because the Final Recipient is a local authority which is typically considered to be low risk.

This could also be possible for similar projects in other Member States such as Germany and Austria where markets for energy efficient retrofit projects are more mature, and there is a stable public sector. However, the extent that private sector co-investment can be attracted to EE projects will depend on the relative maturity of this market, and the security of the public sector.

In addition, pension funds are beginning to be attracted to the infrastructure market to diversify their portfolios into more stable and tangible assets. Infrastructure such as municipal buildings, schools, universities and hospitals are long-term assets and investments in their improvement can fit well with the long-term liabilities of many pension plans. Investment in infrastructure is also considered to be "socially responsible investing[70]" (SRI) which fits in with the JESSICA objectives.

Best Practice and Recommendations

In general, projects with low risks and stable (even if relatively low) returns are more suited to debt instruments. If there is sufficient market interest it may be possible for a UDF manager to secure external co-investment from a private sector financial institution such as a commercial bank or infrastructure fund. Examples include the energy efficient retrofit of buildings.

More risky projects that need a higher level of capital investment but also have the potential for higher returns, may be more suitable for equity instruments. Such projects

[70] Socially responsible investment is where investment is made in line with ethical and social principles including to provide public goods which are essential to society such as schools, hospitals, universities, prisons and other social infrastructure.

have dependent factors such as relying on securing planning permission and securing off-take and output contracts (RE projects such as biomass) as well as issues such as securing sufficient feedstock (e.g. waste to energy facilities). In these cases the UDF manager could investigate the possibility of securing investment from venture capital funds or other private equity sources.

In the case of high-risk projects which are unlikely to generate high returns, such as some decentralised energy projects, there may need to be support from grant instruments of some kind, either from the Structural Funds or other sources.

All of these financial instruments will need to be provided on a pari-passu basis in order to avoid State aid implications.

The scale of co-investment for an Energy Focused UDF will be heavily reliant on project typologies and related Final Recipients. For some UDFs it may also not be possible to attract private sector co-investment at a project level due to the financial market in the specific Member State and risks and returns that do not fit with the investment priorities of financial institutions within that country.

6.3.6 Final Recipients

Existing Experience

Under existing Energy Focused UDFs, even though there is not yet any project implementation experience, potential Final Recipients include local authorities for EE projects in public buildings, mixed public–private companies (e.g private ESCOs with public sector focus) and Social Housing landlords.

Best practice and recommendations

It is important for MAs to consider the eligible Final Recipients when considering the type of projects they would like to be carried out in their region as this will have an impact on the entities that can receive Structural Funds financing from a UDF.

The potential Final Recipients include, but are not limited to: local, regional and national administrations and institutions, energy agencies, municipal authorities, hospitals, universities, research centres, schools, Social Housing, NGOs, landlord associations, individuals, private sector companies and SMEs.

See Section 3.3 for the range of Final Recipients specified in energy focused OP priorities.

6.3.7 Fund Marketing

Existing Experience

Under existing HFs managed by the EIB regular workshops take place in many regions, usually in collaboration with the MA, with the aim of explaining the JESSICA initiative and the procedures for requesting UDF financing.

One such example is in Poland where a number of workshops have taken place in all regions providing:

- Practical information on the JESSICA initiative;
- Information on the terms and conditions of JESSICA financing;
- Updates on the current state of implementation of the initiative;

- Advice on formal and legal procedures, including IPSUDs;
- Information on the rules for the preparation of Urban Project documentation.

Best practice and Recommendations

At the local level there is often not very much experience in EU regulations and Structural Funds, especially in the private sector. It is important to keep the local stakeholders up to date and aware of JESSICA developments in their area. This is particularly important for the regional and local policy makers and the potential co-investors for Urban Projects. Regular workshops and media publications can assist in this process.

6.3.8 Project Management processes

Existing Experience

In existing UDFs project management processes depend on the financial instruments used. For example, the Foresight Environmental Fund will have an equity stake in all project companies and, as a result, a representative positioned as a Director who will take part in monthly board meetings, outcomes appraisals and reporting.

In the case of LEEF, when debt instruments are used, project management will rely on periodic reviews of technical construction work. A similar process is used by the Berlin Energy Agency in the case of the Berlin Energy Saving Partnership.

Best Practice and recommendations

It is recommended that where debt instruments are used project management involves periodic reviews of technical construction works, which could be undertaken by a technical advisor sub-contracted by the UDF manager.

Where equity instruments are used, the UDF should have more control over the project management process through involvement in the board.

6.3.9 Fund monitoring processes

Existing Experience

Due to the limited implementation experience in Energy Focused UDFs, there is a limited amount of information available on the JESSICA processes for monitoring EE and RE projects.

Based on experience from Berlin Energy Saving Partnership and Toronto Atmospheric Fund, monitoring processes for EE and RE projects tend to include:

- periodic reporting on the status of the project portfolio, providing data on project progress such as costs to date, proportion of project complete, and a review of the risk register; and
- periodic reporting on the reduction in energy consumption by the technical advisor, once projects have been implemented and are operational; or if there is technical capacity, by the project sponsor themselves i.e. an internal energy manager.

Therefore these types of reporting are required in addition to the general monitoring on the financial status of the UDF, such as amounts disbursed and repayments received.

Best Practice and Recommendations

It is recommended that a monitoring process is set up to provide information on the:

- status of the project portfolio such as costs to date, proportion of project complete and a review of the risk register;
- reduction in energy consumption once projects have been implemented; and
- general financial indicators such as amounts disbursed to projects, and repayments received.

6.3.10 Risk Management processes

Existing Experience

While the specific risk management details in the operational agreements signed between the EIB and the UDF manager are confidential, there is generally some level of risk-sharing between the EU funds and the UDF's own investments. This is through minimum leverage levels, ceilings on subordination and delivering the total funds from the HF to the UDF in tranches. Overall the aim is to incentivise the UDF to make worthwhile investments in projects that will generate a return and so fulfil the revolving potential of the UDFs.

Best Practice and Recommendations

A minimum leverage of private funds should be attained, either at the UDF or individual Urban Project level. Risk sharing mechanisms can include a ceiling on subordination (first loss exposure) of JESSICA funds against other financiers and disbursing funds to the UDFs in separate tranches linked to absorption speed. This reduces the risk-exposure of the resources drawn from the OP.

6.3.11 Specific implementation issues for consideration by MAs

MAs should consider the sectors and related projects types for implementation by an Energy Focused UDF in line with the relevant OPs. Regarding the range of project typologies that an Energy Focused UDF can fund, it is difficult to provide specific best practice recommendations since project portfolios will depend heavily on the particular Member State and regional context. Considerations include the overall sustainability development aims of a region and how the projects will fit into this, as well as project readiness, energy savings, sustainable generation potential, GHG reductions, involvement from the relevant stakeholders, and the level of co-investment that could be raised from market sources.

6.4 Framework Model 3: Energy Performance Contracting in the Public Sector

The third Framework Model in this study investigates the potential for integrating a third party into a JESSICA model in the form of an Energy Service Company (ESCO) using an Energy Performance Contracting (EPC) procurement process.

As stated earlier in Chapter 2, moving towards a 20% increase in energy efficiency for the EU is one of the Europe 2020 targets. While not the only focus, energy efficiency is also a component of Cohesion Policy programmes. While Member States and regions should ensure that public funding complements private investment, leveraging it and not crowding it out, there is potential for Structural Funds to contribute to the 20% reduction in energy use.

In particular the new Energy Efficiency Directive requires Member States to develop long-term renovation strategies for their building stock, including policies to stimulate deep renovations, and public authorities are expected to take an exemplary role in this area. In the case of investments in energy efficiency in public buildings, it is important to take an integrated approach and not carry out energy efficiency improvements alone. They should rather be considered as part of a general refurbishment leading to the overall improvement of a particular building. Therefore there is a large advantage in carrying out this kind of work within a territorial approach linked to regional and local development which fits in with the JESSICA integrated approach.

This Model specifically focuses on EPC within public sector buildings because this is where EPC has a large potential for JESSICA investment and experience can be drawn from across Europe. It draws upon expertise from the best practice model of the Berlin Energy Services Partnership, which has been instrumental in setting up similar schemes in cities such as Vienna and Prague, and continues to assist developments on an international basis.

6.4.1 What is Energy Performance Contracting?

EPC is a procurement model which supports demand-side EE measures in buildings. The other main type of model used by ESCOs is Energy Supply Contracting which focuses on supply-side measures such as co-generation and district heating.

An EPC procurement model brings a customised and integrated approach to delivering EE projects that encompasses the planning, construction, financing, and operation and maintenance of Energy Conservation Measures.

EPC has many benefits for property owners including:

- no upfront capital investment;
- transferring technical and performance risk to a third party (e.g the ESCO);
- guaranteed cost savings in line with energy reduction;
- providing a means of renewing tired assets; and
- overcoming public procurement barriers.

The primary form of EPC used in Europe is the Guaranteed Savings model. Figure 14 demonstrates the functional activities undertaken by the different stakeholders in this type of model, in which a “building owner” (usually a municipality) has a building or a portfolio of buildings with a sub-optimal energy performance. The ESCO provides a

performance guarantee for the energy savings, which usually encompasses optimisation of heating, lighting and cooling controls, and the ESCO taking over some control of the building operation for a period of time.

The performance guarantee is usually one of three types: it either revolves around the actual energy savings from a project, stipulates that energy savings will cover periodic financing costs, or that the same level of energy service will be provided for less money. This guarantee is backed by a payment obligation in case of non-performance by the ESCO so if there is an underperformance compared to contract then the ESCO has to cover the shortfall. In this way the performance risk is transferred to the ESCO.

After the installation of the Energy Conservation Measures the building owner pays the ESCO based on the guaranteed energy savings and they will continue to pay the same energy costs as before the project (and sometimes less) throughout the duration of the contract. When the contract has ended (usually between 10 to 15 years but can be shorter depending on the project), the entire energy savings will be to the benefit of the building owner. ESCOs can retain an ongoing operational role in measuring and verifying savings over the financial and contractual term.

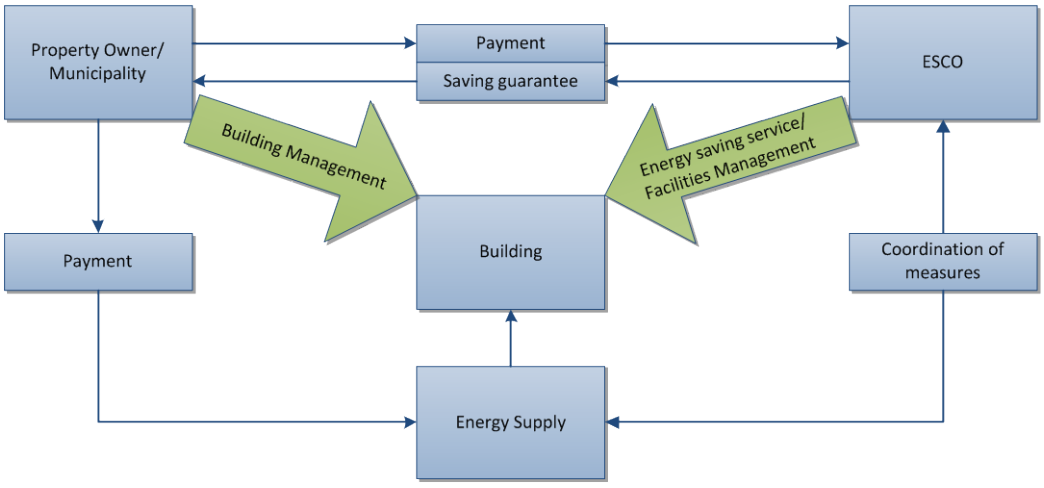


Figure 14 Functional activities in a Guaranteed Savings EPC model

Source: adapted from European Energy Service Initiative[71]

6.4.2 Project typologies

As noted in Section 6.1.2, *COCOF Guidance note 08/0034/02/EN* details that schools, hospitals, universities, administrative buildings, offices, and factories are all eligible for energy interventions. In the context of a JESSICA operation, an EPC is most likely to be used in public sector buildings or street lighting. EPC may also be used in the procurement of EE measures for housing but this study does not cover that as it is discussed in the Horizontal Study "*Housing in JESSICA Operations.*"

A standard EPC model will focus on the optimisation of building performance (such as heating, cooling and lighting) rather than wide-scale refurbishment of the building envelope. This is because the latter measures typically have longer payback periods and therefore are not as financially attractive to the ESCO.

[71] European Energy Service Initiative (April 2010) p.3

Measures included in an EPC model for building performance include:

- modernisation or new installation of building automation systems to upgrade control of energy supply;
- optimisation of lifts and escalators;
- peak load management;
- installation of CHP plants to support and optimise the heating and hot water supply;
- boiler replacement;
- modern lighting control systems;
- optimisation of ventilation systems; and
- user training and motivational/behavioural change education.

In addition to building projects there have also been EPC models which involve:

- replacement of luminaries with energy-efficiency bulbs and fittings;
- optimisation of street lighting controls; and
- management of waste.

The *European Energy Service Initiative*[72] (EESI) is trying to promote an "EPC-plus" model which, in addition to performance optimisation, also includes refurbishment measures that reduce the heat demand of buildings. This model could meet the demand of building owners who need to perform whole building EE retrofits and refurbishment. However, because of the low payback periods for many types of thermal insulation it is thought that this type of model requires public sector subsidies, grants or very low interest debt products. Building cost subsidies would allow the contract duration for EPC to be kept to a reasonable length and the investments would have a double purpose as they also result in maintaining or improving the building estate. To date this type of project has not been implemented in Europe but this could be an option for MAs and UDF managers to explore, possibly to be pursued more intensively in the next programming period. In the context of an Energy Focused UDF this could mean that a grant could be given for thermal insulation building refurbishment measures and an EPC used for the performance optimisation.

6.4.3 Main contractual terms and conditions of an EPC

The main advantage of an EPC for a building owner or a municipality that owns a large number of buildings is that they can transfer the performance risk of Energy Conservation Measures to the ESCO through the performance guarantee. As mentioned, any shortfall in energy savings must be compensated by the ESCO and the municipality is guaranteed that they will deliver their legal obligations.

The precise terms and conditions of EPCs vary depending on the type of project, national legislation and the particular requirements of the building owner. However there are some

[72] See: http://www.european-energy-service-initiative.net/eu/project.html

standard terms and conditions included in most, if not all, EPC contracts that have been identified by EESI[73]. These are detailed in the Table 13.

Table 13 Main contractual Terms and Conditions of an EPC

Headline requirements	Detailed requirements
Guarantee of savings	• Details of the guaranteed yearly savings to be achieved through the duration of the contract. This can be in MWh, cost and CO_2 reductions etc. • Details of the ESCO's obligations if yearly savings are not achieved • Details of the methodology for apportioning excess savings, if applicable
Investment size and commitment	• Details of the capital investment required to provide the guaranteed savings. The size of project that an ESCO will be prepared to undertake will depend on specific local and market conditions • Client's statement with their commitment to pay the agreed investment amount after equipment installation
Baseline definition	• Technical terms: clear technical definition of the reference scenario (baseline energy consumption and reference building use) • Financial terms: Calculated in current prices. Foreseeable cost escalation factors should be taken into consideration
Yearly savings evaluation report	• The ESCO should document the actual amount of achieved savings each year, both in physical and monetary terms, and report this to the client • The figures should go through a verification process by an independent accredited energy auditor
ESCO commitment	• The ESCO has to demonstrate its commitment to be responsible for the correct design, realisation of the energy saving interventions and adequate maintenance to ensure savings are

[73] See: http://www.european-energy-service-initiative.net/eu/toolbox/standard-documents/contract-documentation.html

	sustained over time
Client commitment	• The client has to commit to providing proper conditions for the realisation of the energy saving interventions such as staff training and awareness schemes
Planned duration of the installation of the investment	• The ESCO has to detail the duration of the implementation procedures
Transferring ownership	• The contract will detail when and how the installed energy savings technologies will be transferred into the ownership of the beneficiary • A protocol is prepared between the parties and signed, in which all possible imperfections are defined and deadlines are fixed for rectification of imperfections
Means of payment for the services and savings	• The contract will detail the payment for the ESCO's services • This tends to be a fixed monthly advanced payment with a yearly settlement based on actual performance
Contract length	• The contract period will cover the energy audit process, implementation and measurement and verification • The typical contract period tends to be 10 to 15 years in length (but may be shorter or longer depending on the particular project)
Agreed recalculation method for guaranteed savings	• The contract will detail under which conditions the baseline assumptions (reference scenario) are considered invalid • It will also detail how the baseline will be re-calculated to include updated assumptions or actual values for key parameters

6.4.4 Financing of EPCs

The financing of individual projects will rely on a number of different factors including the amount and duration of finance required, legal aspects, tax factors and any preferences for on or off balance sheet financing.

The financing of EPCs can take a multitude of forms. Finance can be built into an EPC, project owners can use government funding, or capital can be raised through commercial finance or internal budgets. In terms of JESSICA operations there is potential for debt finance to be taken out by the client or ESCO, or a mixture of debt and equity financing for the ESCO as a third party. Discussed below are two debt financing options: credit financing and forfeiting/factoring.

Credit Financing

For credit financing a financial institution extends a credit line to either the building owner or the ESCO. This credit line is backed by an energy savings guarantee.

The former set-up may be preferable if, due to their credit-rating, the building owner or municipality can obtain better borrowing terms than the ESCO. The ESCO would then receive financing for these measures from the building owner. However, this may not be appealing for the building owner because the loan will be capitalised on their balance sheet which will then reduce their ability to obtain credit for other projects.

When an ESCO takes out a credit line, the building owner pays a contracting rate which includes financing costs to the ESCO (subject to the ESCO's performance). The ESCO services the debt using the extra financing costs although in some cases the building owner will directly repay the debt to the financial institution. In this set-up the finance can remain off balance sheet for the building owner and on balance sheet for the ESCO.

Forfeiting/Factoring

Forfeiting is one of the most commonly used instruments for the re-financing of the installation costs by the ESCO. Forfeiting means the long-term sale of receivables (guaranteed savings) to a credit institution which is carried out at the completion of the project set-up i.e. when the technical installation is operational. The ESCO then makes periodic fixed payments to the bank but the long-term debt is taken off balance sheet. This can only be done once the Energy Conservation Measures have been implemented, measured and verified to assure the financial institution that the receivables are legal, rightful and undisputed.

Financing in the context of a JESSICA UDF and State aid considerations

A UDF could provide a credit line direct to a municipality or public building owner. This could be done under normal market conditions but considering factors such as:

- the appetite for EPC contracts in the specific country context;
- the ESCO market in that country;
- project portfolios that are bundled for tendering to an ESCO; and
- the appetite of the customer for on-balance sheet debt.

As mentioned, when the beneficiary is a municipality which has a good credit-rating it may be better for them to arrange financing if they can get lower interest rates than an ESCO. See Figure 15.

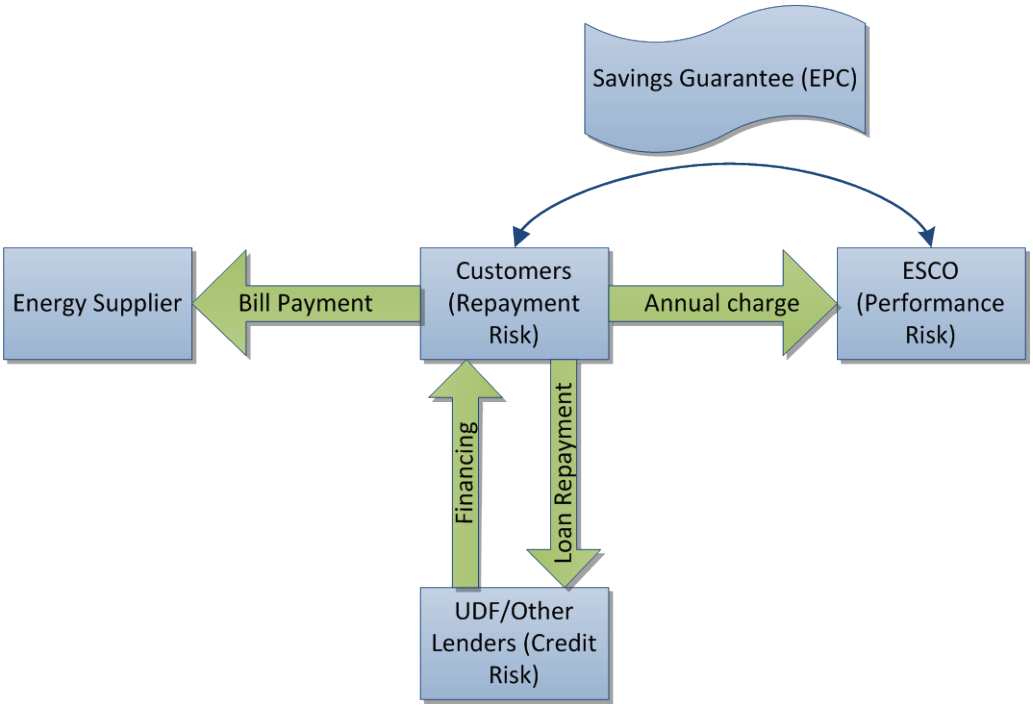


Figure 15 Customer credit financing

Where eligible under the relevant OP, a UDF could also provide a credit line to an ESCO which would take on the debt repayment and performance risk. The ESCO would receive a higher annual charge from the customer for the financing service.

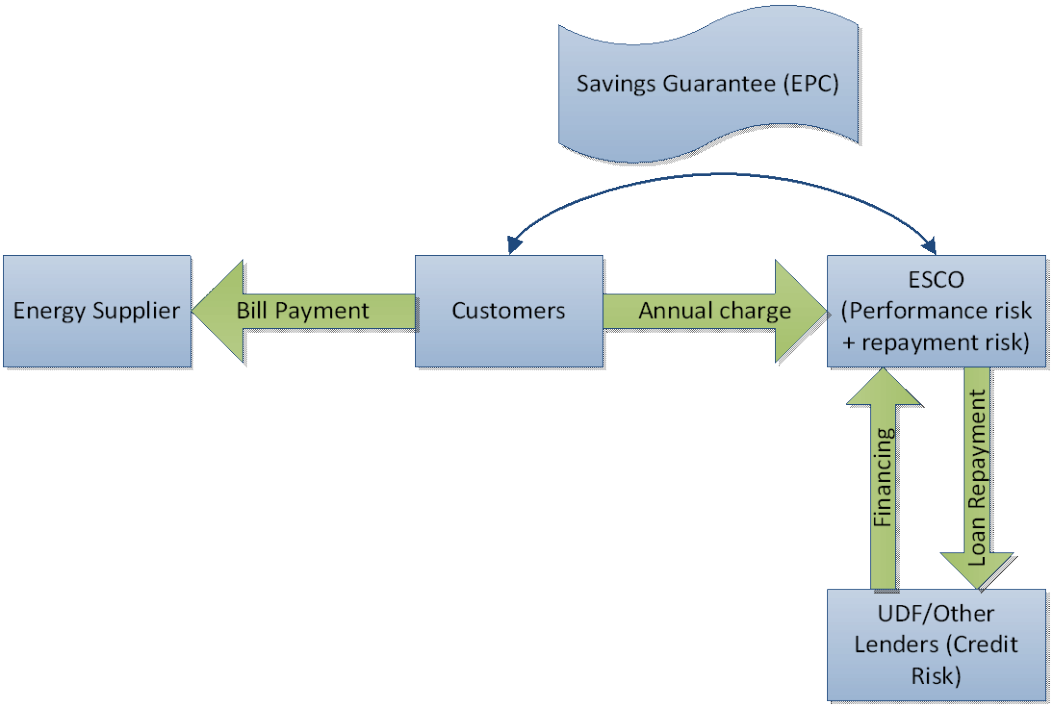


Figure 16 ESCO Credit Financing

In situations where there is some level of market failure and sub-commercial conditions are being considered, it is not yet clear how the Commission will treat these types of investments and how to ensure State aid clearance. As there is currently no precedent in JESSICA it is recommended that MAs engage relevant stakeholders, investigate both the ESCO market potential and the scale of measures to be implemented and then seek further advice from the Commission if required.

6.4.5 Successful EPC models

The public sector EPC model that has been the most successful in Europe and can provide significant best practice guidelines for JESSICA is the Berlin Energy Saving Partnership which was formed in 1996 by the Berlin Energy Agency and the Climate Protection Department of the Berliner Senate in response to rising public sector energy bills and a high energy reduction target of 40% by 2020. The lack of public finance meant that a third-party market-based model was essential to realising the target and therefore a partnership between the Berlin Energy Agency, as the technical experts, and the Senate, as the political promoters, was formed. Project development is funded by the Senate.

Thus far they have retrofitted 1300 buildings using 518 contracts and realised approximately 26% energy savings (€11.3 million/annum) in this portfolio: this represents approximately one third of the public sector building estate in Berlin. The total investment value for this portfolio is around €49 million.

The buildings retrofitted include:

- schools and kindergardens;
- vocational schools;
- city halls, finance authorities and other office/administrative public buildings;
- establishments for youth and seniors;
- libraries;
- cemeteries and forest administration buildings;
- sports facilities and swimming pools;
- technical colleges and universities;
- prisons;
- cultural institutions; and
- hospitals.

All the measures are focused on optimisation rather than renovation and average payback periods are between 8 to 12 years.

Best Practice and Recommendations

The best practice elements of the Berlin Energy Saving Partnership model are as follows:

- strong **political leadership** and promotion;
- expert **technical advice** from the Berlin Energy Agency which does all of the technical preparation of the projects;
- **standardised contracts** which shortens procurement periods and provides guidelines for ESCOs and project owners;
- reliable **legal framework** for EPC in Germany;

- creating building "pools" to **bundle projects** together into attractive financial packages for ESCOs and reduce transaction costs (this is done by the Berlin Energy Agency);
- using a predetermined **list of chosen ESCOs** to procure contractors for projects; and
- the ESCO being able to re-finance debt quickly based on guaranteed savings through the **forfeiting model** as the debt is taken off balance sheet and it can leverage more debt for other projects.

The above best practice aspects should be taken into account by MAs wishing to implement EE measures in their buildings under JESSICA.

6.4.6 Development of EPC across Europe

The European EPC market is still very much in the development phase. Out of the total ESCO market, which represents Energy Performance and Energy Supply Contracting, only 10% relates to EPC. Germany and Austria in particular have been pioneering in terms of developing standard guidelines and contracts for EPC which have led to high market standards and consistent growth. The Czech Republic and Sweden also are seen as having relatively developed markets, although they lack the standardised contracts or the market demand of Germany. France has passed an environmental law called the "Grenelle", which emphasises the importance of building refurbishment in achieving their 38% energy reduction goal by 2020, but there is still limited support for public bodies to use EPC and there are particular difficulties around public contracting regulations that impede its usage.

EPC is almost wholly limited to the public sector at present, and also in building optimisation technologies: a development of the current EPC model to include renewable energies and/or building envelope measures will be central to how effective this model can be in supporting energy reduction targets across Europe.

6.4.7 Barriers, challenges and opportunities for the EPC model

The *2007-2010 European ESCO Status Report*[74] listed 10 major barriers in Europe:

- low awareness of, and lack of information about, the ESCO concept;
- mistrust from clients;
- high perceived technical and business risks;
- public procurement and accounting rules (including off balance sheet regulations;
- lack of accepted standardised measurement and verification procedures;
- administrative hurdles and consequently high transaction costs;
- split incentives issue in the housing sector;

[74] See: http://publications.jrc.ec.europa.eu/repository/handle/111111111/15108

- aversion to outsourcing energy;
- lack of finance; and
- low priority of energy efficiency measures."

These are the issues that need to be addressed in order to increase the use of EPC as a method of implementing EE projects in buildings.

Recommendations for implementation of EPC through Energy Focused UDFs

There are important drivers for the EPC market including:

- increasing energy prices;
- demand for renovation of buildings across all Member States; and
- EU and national government policy support for EE projects including policy directives, energy performance standards, information campaigns, grant funds, energy action plans and capacity building in municipal authorities.

This last driver is central to JESSICA investment via EPC models. Member States and municipal authorities need to take the lead with measures in public buildings, including housing, in order for the EPC market to develop. For example, the Berlin Energy Saving Partnership BESP is considered to be integral to the development of the EE market in the public sector in Germany. In the case of the London *RE:FIT programme*,[75] which is attempting to kickstart the EPC market in the UK, a predetermined list of chosen ESCOs has been procured by the London Development Authority (LDA) and will be used by project owners under a Guaranteed Savings Model. In this case it is hoped that the RE:FIT programme will provide some of the project pipeline to be funded by the LEEF.

It is recommended that MAs implement the following measures if they wish to develop the use of EPC in their regional and national context and the potential for using EPC within their Energy Focused UDFs:

- Promote the use of EPC at a high political level including getting buy-in from all the important agencies at a regional and national level. This will include creating a stable legal and regulatory environment for EPC;
- Investigate the potential for establishing a framework of ESCOs within their regional or national context to procure contractors for EE projects; and
- Investigate how to pool building projects so that attractive investment proposals can be presented to ESCOs both in terms of scale and potential returns.

[75] http://www.managenergy.net/resources/1424

6.4.8 Technical assistance

Technical assistance provision will also play a role in developing the EPC market. Technical assistance providers must use their sector experience to provide a supporting role to MAs so that the most suitable projects can be financed through a UDF. This will allow the maximum economic and financial benefit to be realised as well as ensuring that the projects at the most advanced and suitable stage for investment can be included in project portfolios.

The type of technical assistance tasks that will encourage successful EPC projects include:

- assisting MAs at a local level so that they can provide clear goals for Urban Projects in line with the relevant OP (and the UDF business plan);
- involving all of the relevant stakeholders at the local and regional level;
- pooling projects together so that economies of scale can be realised to increase interest for project promoters e.g. pooling buildings together for an ESCO;
- assisting the MA with the project management on a local level e.g.
    - site visits
    - dealing with ESCOs
    - assisting with preliminary investment grade audits, and final energy audits,
    - validating energy saving measures, energy baseline calculations and forecasts,
    - assessing suitable projects for subsequent investment plans,
    - assessing EPCs offered and advising on type, suitable length etc.
    - assisting the MA with cost benefit and economic/financial analysis to advise on best projects for UDF portfolio;
- advising on national or European legislation, environmental requirements; and
- providing the MA with advice on existing energy studies for the region.

6.4.9 Summary

It is clear that there is significant potential for ESCOs and EPC models to become an integral part of energy focused JESSICA operations. The specific projects implemented and contracts used will depend on individual Member States' regulatory and policy frameworks, in addition to the development of the ESCO market itself. However the EPC model has significant support and interest across the EU and it appears that EPC has the potential to become a standardised and widely used procurement model for urban EE projects.

7 Conclusions and Recommendations

As part of an integrated development strategy for an urban area, Energy Focused UDFs can have a substantial impact on promoting socio-economic growth and sustainable development. There is significant potential to invest in EE and RE measures across all Member States to help the EU meet its sustainability targets

This study has looked at the policy drivers and funding available through OPs to support investments via Energy Focused UDFs. The three Framework Models that were developed focused on housing, cross-sector energy investments and EPCs, to be used by MAs to drive investment in projects which the market is not addressing to a satisfactory level due to perceptions about risks and paybacks.

The recommendations presented below concentrate on the actions that MAs can take to set in place the appropriate building blocks to establish an Energy Focused UDF. They highlight the areas in which MAs should focus in order to use the remaining programming period in a constructive way, as well as preparing for the next.

The recommendations relate to, and emphasise the importance of:

- identifying energy focused projects and beneficiaries in relevant OPs;
- undertaking or using existing feasibility and evaluation studies for a JESSICA operation;
- creating a vision for an Energy Focused UDF to follow;
- engaging with relevant stakeholders;
- selecting actions and a project pipeline;
- identifying co-investment options; and
- identifying or establishing an appropriate IPSUD (if required).

Energy Focused UDFs can play an important role in increasing the recycling ability of Structural Funds by financing eligible and suitable Urban Projects with an energy component. This in turn assists Member States in realising sustainable urban strategies which have a focus right across the EU. The recommendations are as follows:

MAs should identify their existing energy focused priorities and beneficiaries in their Operational Programmes

MAs should identify the potential for investing in urban EE and RE measures in their OP(s). It is important to understand the extent of the projects and programmes that are already being funded by Structural Funds, and other sources, to evaluate if there is potential for JESSICA operations, as well as to assess the appetite of the beneficiaries for FEIs.

MAs should engage in project identification to prepare a pipeline

MAs should identify sectors and project types that need to be developed in their regions to enhance the overall sustainability and well-being. Pipelines will be based on existing projects and programmes and the level of demand for EE and RE measures on a regional or national basis. MAs should identify the potential stakeholders that would need to be involved, be aware of the existing opportunities and challenges as well as identify the

potential financing needs. Where necessary a feasibility study could be carried out to identify the potential projects that could be funded by an Energy Focused UDF.

MAs should create a vision and strategy for a region that an Energy Focused JESSICA operation can compliment

An overall sustainability vision and strategy for a region will set an end goal for all and help garner support. Potential projects can be tied in with wider socioeconomic benefits including improvements in health outcomes, job creation, skills improvements, cost effective use of public resources and GHG emission reductions. When these additional benefits are evaluated, there is likely to be greater buy-in from a wider range of stakeholders and a greater likelihood of pooling resources for concerted action.

MAs should engage with all relevant stakeholders

MAs should engage with relevant stakeholders which include: the relevant municipalities, the business community, institutions (hospitals, universities, colleges and schools), environmental organisations, construction companies, ESCOs, trade unions, professional associations, investors, the financial community, utility companies and technology providers.

MAs could also begin to network with private sector financiers that invest in EE and RE projects in order to investigate the potential for private sector co-investment at a project level and also to look at their requirements for funding the types of projects on which an MA wants to focus.

MAs should be part of marketing campaigns and awareness raising

Where appropriate a public awareness campaign could also be launched: for example, if there is a plan to set up a UDF which focuses on EE and RE in existing housing, an information campaign could be launched through local retail banks or housing associations.

MAs could aim to establish a working group with representatives from a number of the above bodies focused on building up suitable project portfolios for a region, the eligible components of which could be implemented through a JESSICA operation. This would be in line with the type of best practice organisation created in Amsterdam, the “Climate Council”, which aims to get high-level support and buy-in from a group of high-level stakeholders, is chaired by the Mayor of Amsterdam and meets annually to progress Amsterdam’s climate change aims.

MAs should identify or establish an appropriate IPSUD, if it is required

In some cases an MA will already have identified an IPSUD that it wishes to use. This may be a city-level if the MA covers an urban region, or cover a wider regional or national level. As discussed in Section 5, an EAP is not a requirement for a JESSICA operation but may provide several useful elements for an IPSUD including the selection of projects and the creation of performance output targets. In any case, EAPs can be used to inform MAs on the priorities for urban areas within their jurisdictions and the baseline from which they are working.

Appendix A

Consultation

A1 Fund or Programme Characteristics

The following highlights the funds and programmes that were analysed and their main measures, fund size, and outcomes.

Fund/Programme	Year Established	Funded measures	Fund size (in October 2011)	Outcomes
Šiaulių Bankas UDF (Lithuania)	2010	Energy-efficient renovation of multi-family residential buildings, EE in student dormitories	€6 million	22 loan contracts have been signed to date. Aim is to reduce energy demand in these buildings by 20%.
Swedbank UDF (Estonia)	2009	Energy-efficiency renovation of multi-family residential buildings	€33 million	Nearly all of the €33,000,000 will be spent by the end of 2011. Aim is to reduce energy demand in buildings of up to and over 2000m^2 by 20% and 30% in buildings over 3000m^2
KfW Bank Housing Modernisation Programme (Germany)	2001	EE in residential property	Approximately €40 billion has been committed to housing projects to date	KfW's promotional programmes have contributed nearly 50% to the achievement of the German climate protection goals in the housing sector
Foresight Environmental Fund UDF (London)	2011	Waste to Energy facilities, value-added re-use, recycling.	€70,000,000	No documented outcomes to date

London Energy Efficiency Fund UDF (London)	2011	Energy efficient renovation of public sector buildings	€70,000,000	No documented outcomes to date
Toronto Atmospheric Fund (Toronto)	1992	EE and RE projects in municipal buildings, start-up companies in clean tech sector. Current focus is on energy efficient retrofit of condominium buildings and high-rises.	Initial €23 million endowment into revolving fund, directly invested more than €50 million	Saved €55 million in energy costs across the City.
Partnership for Renewables (UK)	2006	Small scale renewable projects on public sector land across the UK	£10 million grant to operate the enterprise from the Carbon Trust, with further equity investment from HSBC and the Ontario Pension Board.	No implemented projects to date: waiting for sufficient scale of projects with planning approval to secure project finance
Climate Change Capital (UK) – Green Property Fund	2003	Retrofit of Commercial Property	€1.5 billion across 4 funds	Realised 40% reduction in carbon footprint in the Green Property Fund
Berlin Energy Savings Partnership (Berlin)	1996	Energy efficient upgrade of building systems and controls, installation of CHP plants, lighting control systems, user training and	ESCOs have invested approximately €49 million to date.	1300 buildings have been retrofitted using 518 contracts and realised approximately 26% energy savings in this building portfolio. This represents approximately 1/3 of the public sector building estate

		behavioural change education		in Berlin.

Appendix B

Project Typologies

B1 Detailed opportunities and barriers for individual project typologies

This analysis is designed to provide detailed opportunities and barriers for individual project typologies that could be funded by an Energy Focused UDF

B1.1 Energy Efficiency in the Public Sector Estate

Opportunities	Barriers
Possibly the largest demand for JESSICA operations will be in this project typology due to: • availability of projects; • scale of projects; • political support; and • lack of private sector investment. The public sector is a particularly important beneficiary due to the large number of buildings owned by one municipality and therefore there is sufficient scale to be able to have a large impact on GHG emissions reduction, and also attract private sector finance (if appropriate).	If private finance is required then a barrier may be around finding private sector co-investment that is prepared to invest at the required conditions

B1.2 CHP/Decentralised Energy Projects in the Public Sector Estate

Opportunities	Barriers
There is significant potential for decentralised energy projects in urban areas to increase security of supply and reduce energy costs in public institutions	High capital cost associated with the heat network. Limited amount of experience in implementing Decentralised Energy schemes. Returns are low and tend to have long payback periods. Project preparation requires significant technical assistance and can take many years

	Potential need for public-private partnerships to undertake scheme operation and maintenance

B1.3 Small scale Solar PV

Opportunities	Barriers
Solar PV generation is becoming very popular in urban areas across Europe and can have attractive pay back periods in countries with the appropriate climate, such as Southern Spain and Greece, and often have generous policy incentives in the form of Feed in Tariffs. Costs have also been falling in recent years.	In Northern European countries it will have very long payback periods and Feed in Tariffs have started to be reduced. Like all renewable energy sources there are grid constraints across the EU which limit connections

B1.4 Biomass CHP systems

Opportunities	Barriers
Biomass CHP has some potential for JESSICA operations although supply chain risks and air quality issues particularly in inner city areas must be taken into consideration	Characteristics of the available technologies can vary significantly e.g. capital cost, generating capacity and technical maturity. Planning requirements may present a barrier due to air quality implications. Reliability, cost and sustainability of fuel supplies may present barriers.

B1.5 Energy efficiency in street lighting

Opportunities	Barriers
High potential for savings and relatively simple procedures Attractive to public bodies as can reduce energy usage, maintenance requirements and associated costs.	Coordination issues between different municipalities can be difficult Scale could be an issue (investments are likely to be small and may not interest private investors)

B1.6 Clean public transport infrastructure

Opportunities	Barriers
Many urban areas are developing policies for clean public transport infrastructure including: • electric vehicle infrastructure; • cycle hire schemes; and • electric or hybrid buses.	Unclear and risky returns as most investments in transport of this nature are done so for overall economic rates of return rather than IRR Electric vehicles are still a few years from being viable on a mass scale due to battery technology. These projects may be more commercially viable in the next programming period

B1.7 Waste to Energy Systems

- **Waste Incineration** is a waste treatment process that involves combustion of municipal solid waste. The heat generated by the process can be used directly or in some cases can be converted into electricity.
- **Anaerobic Digestion** can be used to process food waste and farm manures and then generate biogas which can currently be used in CHP plants, be sold back to the national gas grid or be used as biofuel for some types of transport vehicles such as buses and taxis.
- **Landfill gas collection** is a process to collect landfill gas, mainly methane from landfills through extraction wells, to be then be treated and used to generate energy in the form of electricity and heat.
- **Advanced Conversion Technologies** (ACT) describes the gasification and pyrolysis technologies used to reduce the mass and volume of municipal solid waste (MSW) or solid recovered fuel (SRF), and to generate energy in the form of electricity and heat.
- **Gasification** is the thermal degradation of waste in a closed system with limited air or oxygen supply (i.e. sub-stoichiometric air-fuel ratio conditions) at temperatures typically between 750°C and 1,600°C. The gasification process generates a synthetic gas (i.e. syngas) mainly comprising carbon monoxide, hydrogen and methane, which can be combusted to raise steam and drive a turbine or be converted using gas engines or gas turbines to produce electricity and heat.
- **Pyrolysis** is the thermal degradation of waste in a closed system in the absence of air, at temperatures typically between 400°C and 800°C. The pyrolysis process generates a hydrogen rich syngas which can be used to produce heat and electricity in the same way as described for gasification.

Some of the opportunities and barriers surrounding these technologies are described in the table below.

Opportunities	Barriers
Waste to Energy projects have been widely used in many EU member states such as Denmark, Belgium, the Netherlands, France, Austria and Germany. The process can reduce mass and volume of waste and generate energy in the form electricity and heat.	Waste to Energy relies on consistent supplies of waste material and suitable land banks for facilities. For waste incineration, the long lead times for projects and the risk of planning permission delays and refusal for plants are main barriers.
They can contribute towards meeting EU Landfill Directive targets.	Securing a long-term feedstock contract is currently difficult for small to mid scale anaerobic digestion plants.
Incineration can significantly reduce disposal volume of municipal solid waste.	The medium to long-term assessment indicates a reduction in landfill generation capacity by at least half over the next 10 to 15 years in the UK and these will be similar for other EU member states. This is supported by the effect of the EU Landfill Directive and associated increases in treatment technologies (e.g. anaerobic digestion) being used to divert, for example, biodegradable municipal waste from landfill, thus removing the feedstock which produces landfill gas.
The digestion of food waste from Anaerobic digestion provides the benefit of a sustainable waste treatment process for the diversion of biodegradable material away from landfill. The digestion of farmyard manures improves the fertilising properties and reduces the environmental effects of spreading undigested manure and slurry.	
Landfill gas collection will continue to contribute significant quantities of renewable power in the short term. It collects and uses methane gas, which has twenty times the global warming potential of carbon dioxide, to generate electricity.	There are limited landfill sites for development opportunities and the market has consolidated in recent years. Advanced Conversion Technologies are still considered to be emerging and unproven technologies, with very few commercial scale plants operating in Europe and world-wide.

Appendix C

References

C1 Energy focused strategies at EU level

- Europe 2020 Strategy: http://ec.europa.eu/europe2020/index_en.htm
- Cities: investing in energy and resource efficiency, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication (February 2011) *United Nations Environment Programme.*
- The Leipzig Charter on Sustainable European Cities (2007): http://www.eukn.org/E_library/Urban_Policy/Leipzig_Charter_on_Sustainable_European_Cities
- Covenant of Mayors: http://www.eumayors.eu/index_en.html

C2 Operational Programmes

- Data on individual Operational Programmes sourced from: http://ec.europa.eu/regional_policy/country/prordn/index_en.cfm
- Cohesion Policy: Strategic Report 2010 on the implementation of the programmes 2007-2013 (March 2010) *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Commission*
- Financing sustainable energy projects through the Structural Funds and the Cohesion Fund in 2007-2013 (October 2007) *Redirecting urban areas development towards Sustainable Energy, INTERREG IIIC, European Union*
- Renewable energy and energy efficiency of housing synthesis report (2011) *Expert Evaluation Network delivering policy analysis on the performance of Cohesion Policy 2007-2013, Applica SPRL*
- Technical Meeting on Sustainable Energy: Implementation Overview and Questions for Discussion (23 March 2011) *European Commission Directorate-General Regional Policy*
- JESSICA Preliminary Study for Bulgaria (2009) *Joint European Support for Sustainable Investment in City Areas Deloitte, European Investment Bank*
- JESSICA Evaluation Study for Cyprus Final Report (2009) *Joint European Support for Sustainable Investment in City Areas Deloitte, A.L.A Planning Partnership, European Investment Bank*
- JESSICA Instruments for Energy Efficiency in Lithuania Supplementary study Final Report (February 2010) *Joint European Support for Sustainable Investment in City Areas, EStep, Sutkiene Pilkauskas & Partners*
- Implementation of JESSICA in Andalucía (February 2010) *Evaluation study: Outlook and Opportunities, Consultores de las Adminstraciones Publicas*

- Hamburg Evaluation Study Final Report (December 2009) *Joint European Support For Sustainable Investment in City Areas, ARU*
- JESSICA Instruments for Energy Efficiency in Greece Evaluation Study Final Report (March 2010) *Joint European Support for Sustainable Investment in City Areas, REMACO SA*
- Scoping the use of JESSICA in London – Final Report (September 2008) *Deloitte*

C3 Regulatory Framework

- *Council Regulation (EC) No 1083/2006* of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999 (2006); *Official Journal of the European Union.*
- *Commission Regulation (EC) No 1828/2006* of 8 December 2006 setting out rules for the implementation of *Council Regulation (EC) No 1083/2006*, laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of *Regulation (EC) No 1080/2006* of the European Parliament and of the Council on the European Regional Development Fund; *Official Journal of the European Union.*
- *Regulation (EC) No 1080/2006* of the European Parliament and of the Council of 5 July 2006 on the European Regional Development Fund and repealing *Regulation (EC) No 1783/1999 (2006); Official Journal of the European Union.*
- Regulation (EC) No 397/2009 of the European Parliament and of the Council of 6 May 2009 amending Regulation (EC) No 1080/2006 on the European Regional Development Fund as regards the eligibility of energy efficiency and renewable energy investments in housing (2009); *Official Journal of the European Union.*
- Commission Regulation (EC) No 846/2009 of 1 September 2009 amending Regulation (EC) No 1828/2006 setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development fund, the European Social Fund and the Cohesion Fund and of the Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund (2009); *Official Journal of the European Union.*
- *Regulation (EU) No 437/2010* of the European Parliament and of the Council of 19 May 2010 amending Regulation (EC) No 1080/2006 on the European Regional Development Fund as regards the eligibility of housing interventions in favour of marginalised communities (2010); *Official Journal of the European Union.*
- Guidance note on eligibility of energy efficiency and renewable energies interventions under the ERDF and the Cohesion Fund (2007-2013) in the building sector including housing (2008), *COCOF 08/0034/02/EN, European Commission Directorate General Regional Policy*
- *Commission Regulation (EC) No 800/2008* of 6 August 2009 declaring certain categories of aid compatible with the common market in application of Articles

87 and 88 of the Treaty (General Block Exemption Regulation) (2009); *Official Journal of the European Union.*

- Community Guidelines on State aid for Environmental Protection (2008/C82/01); *Official Journal of the European Union.*
- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the Energy Performance of Buildings (recast) (2010); *Official Journal of the European Union.*
- *Regulation (EU) 539/2010* of the European Parliament and of the Council of 16 June 2010 amending Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund as regards simplification of certain requirements and as regards certain provisions relating to financial management (2010); *Official Journal of the European Union.*
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (27 April 2006); *Official Journal of the European Union.*
- Proposal for a Directive of the European Parliament and of the Council on energy efficiency and repealing Directives 2004/8/EC and 2006/32/EC (June 2011); *European Commission.*
- Proposal for a Regulation of the European Parliament and of the Council amending Council Regulation (EC) No 1083/2006 as regards repayable assistance and financial engineering (August 2011); *European Commission.*
- Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (1999), Official Journal of the European Communities
- Treaty on the Functioning of the European Union, Article 107 – Notion of State aid and derogations (2009); *Official Journal of the European Union.*
- Housing and the EU Structural Funds in Action (May 2009); *CECODHAS.*
- The EU policy framework for energy efficiency and RE in buildings (March 2011); *Michaela Holl.*
- Common Principles for an Economic Assessment of the Compatibility of State Aid Under Article 87.3
- JESSICA: State Aid Principles (November 2010); *JEREMIE and JESSICA Conference, Egle Striungyte.*
- Ideas for implementing the JESSICA Initiative - BBSR-Online Publikation, Nr. 03/2009 (February 2009); *Urban Development Funds in Europe, Federal Ministry of Transport, Building and Urban Affairs.*

C4 Energy Action Plans

- How to Develop a Sustainable Energy Action Plan – Guidebook (2010) *Covenant of Mayors Committed to local sustainable energy, European Commission*
- Cities: investing in energy and resource efficiency, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication (February 2011) *United Nations Environment Programme.*
- Integrated plans for sustainable urban development in the context of JESSICA (March 2010) *Joint European Support for Sustainable Investment in City Areas, European Investment Bank*
- Summary of plans and ongoing projects (2007) *New Amsterdam Climate, the Amsterdam Climate Office*
- Progress Report: First Two Years (2009) *Chicago Climate Action Plan, City of Chicago*
- An Assessment Prepared for the City of Chicago (2008) *Chicago Greenhouse Gas Emissions: An Inventory, Forecast and Mitigation Analysis for Chicago and the Metropolitan Region, Center for Neighbourhood Technology*
- Copenhagen Climate Plan (2009) *Copenhagen Carbon Neutral by 2025, City of Copenhagen*
- Copenhagen's Green Accounts (2007) *Copenhagen as the World's Eco-Metropolis, City of Copenhagen*
- Copenhagen's Green Accounts (2009) *Copenhagen as the World's Eco-Metropolis, City of Copenhagen*
- EUSEW 2010 Brussels (March 2010) *Climate Action in Hamburg, Dr. Benno Hain – Coordination Centre for Climate Issues*
- The Mayor's draft Climate Change Mitigation and Energy Strategy for public consultation (October 2010) *Delivering London's energy future, Greater London Authority*
- Spatial Development Strategy for Greater London (October 2009) *The London Plan, Greater London Authority*
- City of Madrid Plan for the Sustainable Use of Energy and Climate Change Prevention (2008) *City of Madrid*
- Plan to combat global warming (2007) *Paris Climate Protection Plan, Mairie De Paris*
- Implantation of local energy strategy a Priority for Paris (2010) *C40 Workshop 'Strategies for Highly Efficient Cities', Mairie De Paris*
- The Rotterdam Challenge on Water and Climate Adaptation (2010) *Rotterdam Climate Proof, Rotterdam Climate Initiative*
- Mitigation Action Programme 2010 (2010) *Rotterdam Climate City, Rotterdam Climate Initiative*

- Stockholm action plan for climate and energy 2010 – 2020 (2010) *City of Stockholm*
- Greenhouse Gas Emissions (2003) *Stockholm's Action Programme, City of Stockholm*
- The City of Stockholm's Climate Initiatives (2010) *City of Stockholm*
- Toward a Harmonized Strategy for Reducing Emissions (June 2007) *Greenhouse Gases and Air Pollutants in the City of Toronto, ICF International*
- Toronto's Sustainable Energy Strategy (October 2009) *The Power to Live Green, City of Toronto*
- Assessing the environmental impact of Europe's major cities (2009) *European Green City Index, Economist Intelligence Unit*
- Hallmarks of a sustainable city (2009) *Commission for Architecture and the Build Environment*
- A handbook for cities and towns in developing countries (2009) *Sustainable Urban Energy Planning, ICLEI*
- Cities and greenhouse gas emissions: moving forward (2011) *Daniel Hoornweg, Lorraine Sugar and Claudia Lorena Trejos Gomez*
- Workshop 4 Getting things done! The challenges of cooperation (November 2009) *URBACT Annual Conference, Ivan Tosics*

C5 Framework Model Analysis

- Inderst, G. (2009), "Pension Fund Investment in Infrastructure", *OECD Working Papers on Insurance and Private Pensions*, No. 32, OECD publishing
- An Innovative Energy Efficiency Program that Costs Building Owners Zero, Drives Down CO2, and Generates Immediate Savings (2007) *Case Study: Energy Savings Partnerships, Berlin Energy Agency International Know-How Transfer*
- Workshop eco buildings (2009) *Berlin's Energy Service Partnership, Berlin Energy Agency*
- Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to Action (June 2007) *Richard Butts, Joseph P. Pennachetti*
- Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to action – Phase 1 Highlights (June 2007) *Change is in the Air, Toronto Environment Office, Toronto Energy Efficiency Office*
- Leveraging Toronto's leadership 2009-2010 (2010) *Toronto Atmospheric Fund*
- TAF Strategic Plan 2011-2014 (Dec 2010) *Unleashing the Power of Efficiency, Toronto Atmospheric Fund*
- EU financial instruments: Jeremie, Jessica, Jasmine (2009) URBAMECO
- German framework and incentives for owners and landlords (Session 3) (December 2008) *Energy Efficiency for residential buildings, Markus Schonborn*

- 2nd Assignment Terms of Reference Handbook for Urban Development Funds (2010) *Joint European Support for Sustainable Investment in City Areas, European Investment Bank*
- JESSICA – Holding Fund Handbook (2010) *Joint European Support for Sustainable Investment in City Areas, European Union Regional Policy, European Investment Bank*
- JESSICA – UDF Typologies and Governance Structures in the context of JESSICA implementation (2010) *Joint European Support for Sustainable Investment in City Areas, European Union Regional Policy, European Investment Bank*
- Modernizaiton of Multifamily Buildings in Lituania by Using JESSICA Financial Instruments (April 2011) *Vilma Vaiciuniene*
- Investment funds as UDF manager: The business plan and investment strategy for Wales – Part 1 The Managing Authority's Role, *Ken Cook*
- Energy Service Companies Market in Europe: Status Report 2010 (2010) *JRC Scientific and Technical Reports, Angelica Marino, Paolo Bertoldi, Silvia Rezessy*
- Achieving its potential (2003) *Third Party Financing, Energy Charter Secretariat*
- A feedback from the FRESH project: France, Italy, United Kingdom and Bulgaria (January 2011) *Energy Retrofitting of Social Housing Through Energy Performance Contracts, Christophe Milin, Adrien Bullier*
- Integrated Energy Contracting – A new ESCo Model to Combine Energy Efficiency and Renewable Supply in large Buildings and Industry (October 2009) *IEA DSM TASK XVI "Competitive Energy Services (Energy Contracting, ESCo Services)", Jan W. Bleyl-Androschin*
- Latest Development of Energy Service Companies across Europe (2007) *JRC Scientific and Technical Reports, Paolo Bertoldi, Benigna Boza-Kiss, Silvia Rezessy*
- ESCOs and Utilities: Shaping the Future of the Energy Efficiency Business (April 2008) *GreenBiz, Andy Frank*
- Energy Performance Contracting in the European Union (2011) *Energy Solutions, eu.bac*
- Paying for it (May 2009) *ExHA Finance working group, The Existing Homes Alliance*
- Successful financing schemes of biomass project development () *Regional Bioenergy Initiatives Increasing the Market for Biomass Heating in Europe, Intelligent Energy Europe, O.O EnergieSparVerband*
- Energy Performance Contracting in the European Union: Creating Common "Model" Definitions, Processes and Contracts (September 2010) *Institute for building efficiency, Johnson Controls*

- Challenges and Chances for Energy Performance Contracting in Europe (April 2010) *European Energy Service Initiative, Berliner energie Agentu*
- Utilities as a Barrier to Regeneration (January 2010) *Moving Forward: The Northern Way, Arup, Royal Institution of Chartered Surveyors*