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Energy Efficiency Subscription

General Structure

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Authors	Stefano Dotta
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Contents

1. FOREWORD

The Energy Efficiency Subscription (EES) has been prepared by Europa Partners. Europa is a project funded by Horizon 2020 Programme of the European Union and aim to promote and boost the implementation of deep energy renovation in the residential building sector by building trust on the market, triggering new investment and setting up standards and specifications to guarantee their performance

2. INTRODUCTION

Energy Efficiency Subscription (EES) sets standards and requirements for the deep energy renovation of residential buildings in order to build trust and transparency in the energy efficiency market of the five regions involved.
The EES fixs standards on different topics along the whole investment value chain:

- products standards
- level of expertise of craftsmen and professionals
- technical standard investment package for deep renovations
- contractual specifications
- measurement and verification of the performance.

All the above aspects starting from a common scheme and approach will be tailored on the basis of the regional context, which offer potential different standardized solutions given local legal, financial, climatic and construction peculiarities. Solutions will come after a consultation process with key stakeholders with the aim of getting endorsement from market operators and institutional government bodies.

The purpose of this EES is to enable residential owners, social house managers, condominium managers, market operators (ESCo, utilities, construction companies) professional organizations (Engineers, Architects), and financial institution establish common standards and requirements for the deep energy renovation of residential buildings guaranteeing accuracy, transparency, and high quality of the process.

3. SCOPE

This EES specifies requirements and standards for deep renovations of residential buildings, defining technical, financial and contractual requirements and details that need to be considered and implemented throughout the whole process. The high standards of the actors involved in the deep energy renovation process are defined by the EES and required from the signatories. Professionals and workers involved in energy efficiency works will have to demonstrate their expertise and experience to provide the final users with the quality of the execution of the works. Market operators will also have to demonstrate adequate experience, skills and financial soundness.

4. EES REQUIREMENTS AND STANDARDS

EES requirements and standards will be met by market operators to guarantee building owners and end-users results throughout the whole value chain of the deep energy renovation of residential buildings.

The EES includes the verification of requirements related to the activities to be carried out, the procedures to be adopted, and the necessary contracts to be concluded for the implementation of deep renovation of residential buildings. Some of these requirements are mandatory while others are optional. Each optional requirement is associated with a score. The EES is triggered if all mandatory requirements are fulfilled and a score of at least 10 points is obtained by fulfilling some of the optional requirements.

		EES requirement and standards		score
OPERATORS	Professional	**Architects or Engineers** expert on energy efficiency design, energy saving calculation, baseline definition, development plans for construction verification, and measurment and verification **certified according to international or national standard**	must to have	0
	Craftmen	**Craftmen involved in deep renovation intervention certified according to national standard or qualification system regulation**	must to have	0
	Market operator	**ESCo** certified according to national standard or qualification system regulation or **other market operator (e.g. Construction Companies, Utilities, etc)** that can demonstrate the following requirements: • at least 5 years of experience in deep renovation intervention • provide and manage an energy service with contractual guaranteed saving • provide expert on contract guarantee energy savings • provide expert on energy audit and M V P • provide expert in project managment • able to manage an E P C • provide financing for deep renovation intervention	must to have	0
SUSTAINABILITY	Materials & products	**Use of materials and products with environmental certification complied with ISO 14025** (EPD), **ISO 14021, ISO 14024** (e.g. Ecolabel, Ble Angel, etc.) and PEFC/FSC	must to have	0
		Use of **materials complied with specific EES requirement** • % of recycled materials • % of renewable materials • % of local materials	optional	2
	Indoor Air Quality	**Absence of interstitial condensation** between layers of the building enevelope, natural air exchange systems (window openings)	must to have	0
		Mechanical ventilation systems equipped with heat recovery units complied with EN 15251	optional	2
	Other environmental criteria	Use of a **Green Building Rating Tool** (e.g. LEED, BREAM, HQE, ITACA etc.)	optional	6
STANDARD PACKAGES FOR DEEP RENOVATION	Procedure to select a package of energy efficiency measures	• Carry out **energy audit complied with EN 16247** to identify the energy efficency measures • Energy audit result based on dynamic energy model calibrate	must to have	0
	Reducing risk on delay and work execution error on construction site	• Develop an **Operational Performance Verification Plan** (pre- works) • **Perform OPV** activities at the end of the works	must to have	0
		Use of technologies and solution for **industrial construction and standardization** (prefabs techonologies)	optional	2
	Reduction of risk on environmental impacts	Adopt an **environmental management system for construction site**	optional	3
	Improve the process to guarantee quality	**BIM** to optimize the deep renovation process, from design to O&M	optional	3
	Energy efficiency standard	Minimum **energy efficiency standard** complied with national or regional incentives mechanism required (KfW 55 or 40 in Germany, 2 energy classes reduction in Italy etc.)	must to have	0
		NZEB standard	optional	2
		Positive energy buildings	optional	3

CONTRACTUAL SPECIFICATION	General specification included in the contract	A minimum list of specificiation to be included in the contract • Start and end dates of the works • Technical responsability for the work and energy saving lies with the market operator • Energy efficiency standard after works (KfW 55 or 40 in Germany, 2 energy classes reduction in Italy etc.) • Penalties for market operator in case of failure to achive the improvement of energy efficiency certification	must to have	0
		EPC specificiation • Energy savings guarantee (measured and verified during the O&M phase) • Baseline which will form the basis for savings calculations • Penalties for market operator in case of underperformance • Bonus for market operator in case of overperformance • Operations Maintanance & Monitoring Plan • Measurement and Verification Plan • Insurance related to garantee saving	optional	2
	Specific requirements - EES Option A & C	• The responsibility for obtaining the incentives lies with the building's owners	must to have	0
		EPC specification • O&M service is provided by the market operator for the entire of the contract (few years) with the aim to verify the achievement of the energy savings	optional	2
	Specific requirements - EES Option B	• The responsibility for obtaining the incentives lies with the market operator	optional	1
		EPC specification • O&M service is provided by the market operator for the entire of the contract (long period 8-15 years) with the aim to verify the achievement of the energy savings • The owner pay to the market operator an annual fee for works and O&M • The annual fee value depending by the energy performance obtained	optional	2
MEASUREMENT AND VERIFICATION	MVP specification	In case of EPC • Baseline referring to the buildings, systems, time period, energy use or condition defined according to ICP protocoll or EVO standard • MVP complied with IPMVP - EVO standard - Option C • MVP carried out by expert certified on IPMVP (CMVP) • Routine and non routine adjiustment must to be consider in the verification phase accordint to IPMVP EVO standard • Measure and Verification activities carried put by third party (CMVP) during the O&M phase	optional	4

Table 1 EES requirement and standard matrix

4.1. OPERATORS

In order to ensure quality and confidence in the energy refurbishment of residential buildings, EES requires that all operators involved are properly trained and experienced. The main operators are professionals, craftsmen and construction companies and for each of them a number of mandatory requirements must be met.

4.1.1. Professional

The professionals involved in the design phase must be engineers or architects with at least 5 years of experience in energy audit of buildings and deep renovation projects. Certifications related to the experience, knowledge and skills of the professionals and experts involved in the audit and design phase are desirable to ensure the quality of the process and strengthen final users' trust. The certification must have been issued only and exclusively by a body or organization operating in accordance with ISO /IEC 17024.

Certification in ITALY

- Energy manager expert – Certification complied with UNI 11339:2009
- Green building expert - Certification complied with CAM 2.6.1 - DM 11 Ottobre 2017

Certification in FRANCE

Audit for building energy performance:

- Certification OPQIBI 1905 - Audit énergétique des bâtiments (tertiaires et/ou habitations collectives)
- Qualification Audit Énergétique par AFNOR Certification

Energy efficiency engineering in building systems (heating, ventilation, hat water,) design

- Certification OPQIBI 1327 - Ingénierie de la performance énergétique dans le traitement climatique du bâtiment

Energy efficiency engineering in building envelope design

- Certification OPQIBI 1224: Ingénierie de la performance énergétique de l'enveloppe du bâtiment

Measure and Verification of building energy performance

- Référent en mesure et vérification de la performance énergétique par AFNOR Certification

Certification in GERMANY

- Be part of the energy efficiency expert list (Energieeffizienz-Expertenliste) for federal funding programmes (KfW) created by the Federal Ministry of Economic Affairs (BAFA), German Energy Agency (DENA) and the KfW bankegruppe

- Expert on energy efficiency with nationally recognized qualification (College degree, "Techniker" oder "Meister" in Area of § 88 GEG + further education "Energieberater" or similar)

Certification in PORTUGAL

- Specialist in Energy Management and Control – according to Ordinance N. 782/2009, Regulates the National Qualifications Framework and defines the descriptors for the characterization of national qualification levels and by Order N. 978/2011, of 12th of January.

- Green Building Expert - Technician/Certified Construction Specialist – training is certified by accredited entities and in accordance with Ordinance N. 782/2009, Regulates the National Qualifications Framework and defines the descriptors for the characterization of national qualification levels and by Order N. 978/2011, of 12th of January.

- Energy efficiency and air quality certification - Energy certification is the result of the transposition of Directive No. 2002/91/EC in 2006 into the national legal order. It had several changes, the most recent of which was made on December 7th, 2020 (Decree-Law N. 101 D/2020).

    - The Qualified Expert is the technician responsible for the energy assessment of the buildings and the respective issuance of the Energy Certificate. These professionals are trained in architecture or engineering, with specific qualifications and minimum experience of 5 years, working within the scope of the Energy Certification System for Buildings (SCE). The recognition of professional qualifications follows the provisions of Law N. 9/2009, of March 4th, as amended by Laws N. 41/2012, of August 28th, 25/2014, of May 2nd and 26/2017, of May 30th, which transposed Directive 2005/36/EC of the European Parliament and of the Council, of September 7th, 2005, on the recognition of professional qualifications, as amended by Directive 2013/55/EU of the European Parliament European Parliament and of the Council of 20th November 2013.

- Portuguese relevant Orders:

    - Order of Engineers

    - Order of Technical Engineers

    - Order of Architects

Certification in LATVIA

- Certified energy auditor (according to MK nr. 382) and in compliance with LVS EN 12599 standard

4.1.2. Craftsmen

The craftsmen involved in deep renovation intervention must be specialized in the works they are responsible for. They must have at least 5 years' experience in similar activities and possibly have the appropriate certificates for their knowledge, skills and abilities. The certification must have been issued only and exclusively by a body or organization operating in accordance with ISO /IEC 17024.

Certification in ITALY

- Window and door frame installer - Certification complied with UNI 11673-2:2019
- External thermal insulation composite system (ETICS) installer - Certification complied with UNI 11716:2018
- Photovoltaic system installer - Certification complied with UNI CEI TS 11696:2017
- Biomass heating systems installer – Certification complied with UNI 11657: 2016
- Building Automation Control System (BACS) installer- Certification complied with UNI CEI TS 11672:2017
- Low temperature radiant systems installer - Certification complied with UNI 11741:2019

Certification in FRANCE

- General quality certification for craftsmen: QUALIBAT certification
- Certifications for craftsmen involved in building global energy performance and efficiency:
    - RGE certification
    - ECO-ARTISAN certification
- Photovoltaic system installer: QUALIPV certification
- Wood heating systems installer: QUALIBOIS certification
- Digging for geothermal systems: QUALIFORAGE certification
- Electrical equipments: QUALIFELEC certification
- Plumbing and water heating systems: QUALIFEAU certification

Certification in GERMANY

- Be part of the energy efficiency expert list (Energieeffizienz-Expertenliste) for federal funding programmes (KfW) created by the Federal Ministry of Economic Affairs (BAFA), German Energy Agency (DENA) and the KfW bankegruppe

- Expert on energy efficiency with nationally recognized qualification (College degree, "Techniker" oder "Meister")

Certification in PORTUGAL

- Window and door frame installer – Efficient window installers must be duly accredited for CLASSE+ certification by participating in the CLASSE+ Efficient Window Installer course. CLASSE+ energy labeling is an initiative of ADENE – Portuguese Energy Agency and constitutes an instrument available to citizens to support their choice of more efficient windows, using the suitable companies and the best professional/installers. The trained technicians will contribute to the quality of the window installation works, ensuring that the installed solutions provide consumers with the expected benefits in terms of reducing energy costs and improving thermal and acoustic comfort conditions.
- External thermal insulation composite system (ETICS) installer - the design and execution of the ETICS must comply with the regulatory requirements in force, namely the Regulation of Energy Performance of Residential Buildings, Regulation of Energy Performance of Commercial Buildings and Services and Technical Safety Regulation Against Fire in Buildings, and in compliance with hygiene and safety conditions at work in the application procedures.
- Photovoltaic system installer - 522238 - Electrical Installations Technician, 522 - Electricity and Energy.
- Solar thermal systems (DWH) installer - 522348 - Installer / Technician of Thermal Systems for Renewable Energies, 522 - Electricity and Energy.

- Biomass heating systems installer – 522348 Installer/Technician of Thermal Systems for Renewable Energies, 522 - Electricity and Energy.

- Building Automation Control System (BACS) installer - 523268 - Electronics, Automation and Command Technician, 523 - Electronics and Automation.

- Low temperature radiant systems installer – In Portugal there is no certification for this type of installer, however, there are several training courses, mainly provided by the main product brands.

4.1.3. Market operator (Esco, Utilities, Construction companies)

The company guaranteeing the delivery of the service to building owners will ensure that the deep renovation works achieve the contractually defined results. They must have adequate experience, expertise and organizational skills:Specifically, they need:

- A minimum of 5 years of experience in energy efficiency projects of similar size and complexity should be demonstrated or some reference as proof of experience and know-how;
- To perform an energy performance service with contractual guaranteed saving;
- To involve experts in the administrative, financial, legal and contractual fields related to contracts to guarantee energy savings;
- To involve professional experts in energy audit, verification and measurement of energy performance;
- To deliver deep energy renovation project;
- To propose and manage an Energy Performance Contract with guaranteed energy savings;
- To have a financial capacity, both on their own and through financial institutions, to provide financing for the interventions, also through third parties (FTT) when provided in the contract;
- To involve expert and specialized craftsmen during the work phases.

Certifications related to these capacities are desirable to ensure the quality of the process and strengthen final users' trust. The certification must have been issued only and exclusively by a body or organization operating in accordance with ISO/IEC 17024.

Certification in ITALY

- Energy Service Company certificated according to UNI/CEI 11352

Certification in PORTUGAL

- Decree-Law N. 319/2009 of 3rd November:
  - Transposes Directive N. 2006/32/EC into the internal legal order.
  - Indicative objectives, mechanisms, incentives and institutional, financial and legal frameworks necessary to eliminate the current market deficiencies and obstacles that hinder an efficient end use of energy are established;
  - Conditions are created for the development and promotion of a market for energy services and for the development of other energy efficiency improvement measures for end end-users.

- Decree-Law N. 29/2011 of 28th February:
    - Establishes the legal framework applicable to the formation and execution of energy performance contracts that have the nature of energy efficiency management contracts, to be signed between the services and bodies of the direct, indirect and autonomous Public Administration and the energy service companies, with a view to the implementation of measures to improve energy efficiency in public buildings and equipment for the provision of public services.
    - "Energy services company" means a natural or legal person who provides energy services and/or other measures to improve energy efficiency at a user's premises and who, in doing so, accepts a certain degree of financial risk, and must pay the services provided are based, either totally or partially, on the degree of achievement of the improvement in energy efficiency and on the satisfaction of the other agreed performance criteria.
- Resolution of the Council of Ministers n. 2/2011:
    - Launches the Energy Efficiency Program in Public Administration - ECO.AP.
- Normative Order N. 15/2012 - ESCO Qualification System Regulation
- Ordinance N. 60/2013:
    - Standard specifications of procedures for the formation of energy efficiency management contracts.

4.2. Sustainability in deep renovation

The construction sector faces the challenge of the transition to a sustainable, low carbon, and resilient economy. Beside the reduction of energy consumption, deep renovation needs to adopt a life-cycle perspective rather than a linear value chain that focuses on the construction works phase only.

A building is considered a green building when it meets specific characteristics.
In the context of deep renovation, some of these are intrinsic to the intervention, such as Efficient energy consumption or the consumption of renewable energy like solar energy. Others can be considered when carrying out a green deep renovation process. Examples are:

- Pollution and waste reduction measures, and the enabling of re-use and recycling;
- Good indoor environmental air quality;
- Use of materials that are non-toxic, ethical, and sustainable;
- Consideration of the environment in design, construction and operation phases of the deep renovation process;
- Consideration of the quality of life of occupants in design, construction and operation phases of the deep renovation process;
- A design that enables adaptation to a changing environment.

For EES members, the achievement of minimum energy efficiency standards is mandatory while higher levels of environmental sustainability are optional.

A first voluntary level of environmental sustainability could guarantee some minimum requirements related to the use of sustainable building materials and indoor air quality, further levels of sustainability could be achieved through the application of specific criteria and requirements or even by respecting entire sets of criteria proposed by some Green Building Rating Tools (e.g. LEED, HQE, ITACA etc.).

4.2.1. Environmental criteria - Materials

Adeep renovation realized under EES aims to reduce the environmental impact of the service maximizing the use of recycled, renewable, and local material. A list of environmental criteria is given below:

Recycled material

In order to reduce both the use of non-renewable resources and the production of waste and disposal in landfills,the content of recovered or recycled material in the construction products used for deep renovation projects must be at least 15% by weight assessed on the total of all the materials used.
For the insulation material, specific minimum requirements on recycled material content should be defined.

Material	panel	bulk
Cellulose		80%
Glass wool	60%	60%
Rock wool	15%	15%
Expanded Polystyrene (EPS)	60%	60%
Extruded Polystyrene (XPS)	45%	
Polyurethane foam	10%	10%

Renewable Material

A minimum use of renewable material for deep renovation projects could be required and should be at least 20% by weight assessed on the total of all the materials used.
For materials and products made of wood or material based on wood, or containing elements of woody origin, the material must come from sustainably managed forests/woods or be made from recycled wood. Labels like Forest Stewardship Council® (FSC®) and

Programmme for Endorsement of Forest Certification schemes™ (PEFC™) could be useful to verify this requirement.

Local Material

A minimum use of local materials for deep renovation projects could be required and should be at least 20% by weight assessed on the total of all the materials used. Local materials are defined as the materials extracted, collected or recovered and processed (manufacturing process) at a maximum distance of 150 km from the construction site.

Certification and label

The construction materials that will be used to improve the energy efficiency of buildings and to demonstrate the environmental requirements listed above must have an environmental certification issued by a certification body based on one of the following standards: ISO 14024, ISO 14021, ISO 14025.
ISO 14024: Type 1 label is issued on the basis of compliance with specific criteria developed by third parties (public or private), which require the achievement of threshold values and environmental performance limits defined throughout the product life-cycle. The label is awarded by a public or private competent body, following certification verification by a third party. Some examples of Type 1 labels are: European Ecolabel (Europe), Blue angel (Germany), French ecolabel (France).
ISO 14021 Type 2 label is based on self-declarations of the producer, who is solely responsible for it, usually referring to one stage of the life-cycle or a particular aspect of a product ("biodegradable", "recyclable", etc.). They do not require verification by third parties, but the relevant ISO standard regulates the way they are disseminated and the requirements on the content of the information. Some examples of Type 2 labels are: Remade Italy (Italy), PSV.
ISO 14025 Type 3 label is an Environmental Product Declaration (EPD) independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products. Some examples of Type 3 labels are: International EPD System (Sweden) EPDITALY (Italy), IBU (Germany), FDES INIES (France).

4.2.2. Environmental criteria – Air quality

Deep renovation interventions obtained through envelope insulation or windows replacement increase the building's airtightness reducing the energy consumption due to air leakage but could worsen indoor air quality due to a reduction in air exchange.
The Operator involved in deep renovation intervention under EES must guarantee a high level of indoor air quality through:

- Verification during the design phase of the absence of interstitial moisture between layers of the building renovated envelope;
- Determining how much mechanical ventilation might be needed to provide acceptable indoor air quality;

- Providing a mechanical ventilation system equipped with heat recovery units capable of guaranteeing an air exchange according to the categories set out in standard EN 15251.

4.2.3. Environmental criteria – Green Building Rating Tool

A large number of environmental criteria (reduction in water consumption, indoor environment quality, etc.). could be addressed during a deep renovation. The adoption of a rating system to assess the sustainability of buildings could support the design and implementation process of a deep renovation with the aim of achieving a very high level of sustainability.

Rating system in ITALY

- Rating system as indicated in the ministerial decree - DM 11 Ottobre 2017, CAM 1.2. (Breeam Casaclima, Itaca, Leed, Well)

4.3. Standard packages for deep renovations

Deep energy renovation intervention in residential buildings is carried out through energy efficiency measures identified by an energy audit compiled with EN 16247 and based on dynamic modelling on whole building retrofit calibrated on real energy consumption.
The energy efficiency measures should not only be selected on the basis of the results of the energy audit, but also ensure compliance with the "energy first" principles. It is necessary to intervene first on the thermal envelope, then on the energy efficiency of the installations, and then on the production of energy from renewable sources.

A set of risk during the construction phase will be reduced through:

- Use of technologies and solution for industrial construction and standardization (prefabs and off-site manufacturing), reducing risk of delays and work execution errors on site;
- Use of strategies to reduce environmental impacts (waste, energy, noise, dust, pollution, etc) through the application of an environmental management system for the construction site;
- Use of Building Information Model to optimize the deep renovation process, from design to O&M.

4.3.1. Energy efficiency standards

A deep renovation intervention must guarantee the achievement of significant energy savings through the efficiency of the whole building system to improve the indoor climate

environment; therefore, the project should allow to achieve a minimum energy efficiency standard, which could be different in each country in relation with national or regional incentives (KfW 55 or 40 in Germany, 2 energy classes reduction in Italy etc.). The advanced EES level provides for the achievement of higher levels of energy efficiency as NZEB or positive energy building.

4.4. Contractual and financial specifications

EES requires the adoption of a set of specifications in the contractual documents, which are of general application or could depend on the financial mechanism used to regulate the relationship between building owners and market operators.

4.4.1. Contractual and financial specification – general applications

- Timing of the work phase for deep renovation must be included in the contract;
- The technical responsibility for the work and the achievement of energy saving performance lies with the market operator;
- Guaranteed Energy efficiency standard after renovation works (KfW 55 or 40 in Germany, 2 energy classes reduction in Italy etc.);
- The energy saving expected by the deep renovation intervention should be guaranteed in the contract;
- Penalties for market operator in case of failure to achieve the improvement of energy efficiency certification;
- The overall budget and scope of the renovation work must be stated in the contract and accepted by the market operator, who must confirm that all costs for carrying out the construction works and the purchase of materials and equipment are included;
- Detailed project design for the planned measures as applicable in compliance with relevant regional and national norms and regulations;
- High standard of skills and attention to details, quality of materials and equipment, safety and health protection of workers, craftments, client and occupant, protection of the buildings from damages related to the implementation of the measures or weather during the works must be guaranteed by the market operator and foreseen in the contract;
- Civil and professional liability insurance policy for the works phase;
- Right, obligations and liabilities of the market operator must be included in the contract;

- Right, obligations and liabilities of the client must be included in the contract;
- In the settlement procedure, the period for the mutual settlement of accounts between the parties must be defined (e.g. monthly, annual) and for the payment of the fee based on the results of the Measurement and Verification of the Energy Savings Guarantee;
- Duration of the contract with indication of start and end date;
- The contract must include dispute resolution procedures;

In case of EPC, other specification have to be included in the contract:

- Minimum comfort standards guarantee by the market operator (minimum indoor temperature, domestic hot water supply);
- Energy savings guarantee (measured and verified during the O&M phase);
- Baseline which will form the basis for savings calculations;
- Penalties for market operator in case of underperformance;
- Bonus for market operator in case of overperformance;
- Operations Maintenance & Monitoring Plan;
- Measurement and Verification Plan;
- Insurance related to guarantee saving;
- Title to the measures installed in the buildings as part of the renovation works;
- Contract adjustment in case of changes in use of the building and modification of the building;

In case of EPC, some documents should be annexed to the contract:

- Energy Audit delivered according to the nation regulation;
- Financial plan for the renovation works.

4.4.2. Contractual and financial specification – specific applications

Option A: the end users are paying directly the works to the market operators, as they are benefitting directly from the incentives.

4.4.3. Contractual and financial specification

- The responsibility for obtaining the incentives lies with the building's owners.

In case of EPC:

- In addition to the deep renovation works, O&M service should be provided by the market operator for few years with the aim to verify the achievement of the energy savings;
- The Market Operator shall guarantee during the O&M Period, at its own expenses, the Proper Functioning of the Measures installed, and the Proper Functioning at the end of the service period.

Option B: the market operators have the possibility to directly access the incentives on behalf of the end users. The end users provide an annual fee following the EPC concept.

- The responsibility for obtaining the incentives lies with the market operator;
- The owner pays the market operator an annual fee for the entire duration of the contract for the deep renovation service (works + O&M);
- The annual fee is paid in full or in a reduced amount in case of underperformance;
- The market operator arranges engineering, supply, installation, start-up, commissioning and financing, referred to the Renovation Work, for the implementation of the Measures in the Building;
- In addition to the deep renovation works, O&M service should be provided by the market operator for a long service period with the aim of spreading the cost of interventions over several years without increasing the cost baseline for the building owners.

Option C: the market operators have the possibility to directly access the incentives on behalf of the end users. The end users provide a discounted payment to them, which is equal to the difference between the work and the incentives (plus financial overheads, if it is the case).

- The responsibility for obtaining the incentives lies with the market operator;
- In addition to the deep renovation works, O&M service should be provided by the market operator for a few years with the aim to verify the achievement of the energy savings.

4.5. Financial sustainability

EES provides transparency and sustainability throughout the process. EES must be profitable for both parties (end users and market operators). Economic indicators representing the profitability of the whole operation should be verified and declared. In order to ensure that the operation is financially sustainable and can be carried out without risk, the sources of funding of the market operator should also be declared to the end user.

4.5.1. Economic indicators

A set of economic indicators useful to assess the EES profitability should be verified by the market operator and declared to the end user:

- Internal Rate of Return (IRR) above 6%;
- Net Present Value (NPV) positive;
- Debt Service Coverage Ratio (DSCR) > 1,15.

4.5.2. Financing

The capital structure used by the market operator to finance an EES should be sustainable and transparent. The market operator could use different financial sources as bank loan, subsidy, forfaiting, assignment credit claim, equity, etc.

A business and financial plan showing in a transparent manner all sources of financing should be provided by the market operator to the end user.

4.6. Measurement and verification of the performance

The energy saving foreseen by the deep renovation intervention must be guaranteed by the market operator to the residential building owner for a few years after the end of the works.
The savings guaranteed will relate to a minimum reduction in volume of energy consumption (energy consumption savings). According to the *EUROSTAT guide to the statistical treatment of Energy Performance Contract,* energy savings can be expressed in energy units (e.g. kWh) or in monetary terms, and could relate to a particular energy carrier (e.g. electricity, gas) or energy service (e.g. lighting, heating).
The measurement and verification of performance will be foreseen in the contractual specification. The Scope, frequency and standard of measurement and verification activities have to be defined in a specific technical plan that will be realized according to the International Performance Measurement and Verification Protocol (IPMVP). The MVP must be accurate, complete, conservative, consistent, relevant and transparent. The operational verification activities should be provided by the market operator involving experts on IPMVP and, in case of objections of energy savings measures and verification, an independent third-party to resolve the dispute.
The measure and verification report will be delivered annually at the end of the reporting period.
In order to verify the guaranteed energy saving a baseline referring to the buildings, systems, time period, energy use or condition must be carried out before implementing the energy efficiency measures. The Baseline provides a reference to which later performance of deep renovation intervention can be compared. During the operational verification, the reduction of energy consumption that occurred in the Reporting Period could be adjusted to a common set of conditions using routine adjustment and non- routine adjustments.
According to the IPMVP standards, different methods of calculation saving are available. For deep renovation interventions in residential buildings, Option C must be considered. The

savings will be determined by measuring energy consumption and demand at the whole facility utility meter level.

Annex

- Requirements and specifications grid
- Requirement and specification checklist
- EPC_ General Terms and Conditions
- EPC_ Specification Conditions