Interreg - IPA CBC

Greece - Republic of North Macedonia

BENEFIT

D6.3

Identification of new Business Model

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Project Title	**Building ENergy EFficiency ImprovemenT: Demonstration for public buildings**
Project Acronym	BENEFIT
Project Call	CE-FNR-17-2020
Work Package	6
Lead Partner	PB3 CluBE
Author(s)	Theodoros Gkiourkas, Ioannis Fallas, Katerina Tsepoura, Nikolaos Ntavos

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Table of Contents

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

1. INTRODUCTION

1.1. Purpose of this document

The European energy efficiency and the EPBD directives em- phasize the position of buildings within the climate and energy plan. Assumed the high energy consumption of the building sector the European approach provides a mix of mandatory targets, minimum requirements, labeling, and supporting tools to help member states in delivering the requested energy ef- ficiency improvements. A strong action on the building stock represents also a unique opportunity in terms of market devel- opment, employment, and contrast of fuel poverty, with many related benefits.

Despite the commitment from the European Commission and the available benefits, the renovation of the public real es- tate clashes with the financial condition of many public bodies, the lack of economic and human resources, and the inadequate development of the energy efficiency market.

BENEFIT aims to address all above challenges by undertaking activities along three key axes:

(1) developing and testing an integrated decision-support platform for public authorities to facilitate them in planning, financing, implementing and monitoring public Buildings' Energy-Efficiency (BEE) plans and projects; outputs will provide packaged retrofit solutions of cost-prioritised interventions per building typology, accompanied by energy & cost indicators and suitable financial mechanisms;
(2) pilot implementation of one demonstration public building energy retrofit project (and study of four bankable projects) per territory, providing a leading example for increasing energy-awareness of the wider society.
(3) policy uptake and community engagement. The direct involvement of partners in the project who have a multiplier role will ensure wide dissemination-awareness raising of the relevant target groups.

The European Commission known from the beginning the significance of buildings within the energy efficiency action plan ("COM/2011/0109"). Buildings account for more than 40 % of the total final energy consumption and succeeding in improving their energy efficiency would have a important

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

influence on environmental emissions, energy security, economy, and living quality. Both the EPBD directives (2002/91/EC and 2010/31/EU), the energy services directive (2006/32/EC), and the energy efficiency directive (EED – 2012/27/EU) create a consistent legislative framework that aims at promoting a critical improvement in the building stock energy and environmental performance.

Although important outcomes have been achieved over the years, the route to the achievement of the objectives of the EU action is still a hard one. Many years of communication and dissemination initiatives has improved the awareness of the stakeholder, but economic and financial barriers, an inadequate availability of skilled and capable businesses and specialists, and undesirable attitudes (such as litigiousness in condominiums) has hampered till now the desired development.

Both the EPBD directive recast and the EED directive pay lot of attention to organizing, communication and dissemination, qualification and certification, energy audits and measurement, ESCOs and energy performance contracts (EPC). These are all tools that are required or can be very useful to implement energy efficiency activities.

Among the measures that are aimed at promoting energy efficiency in buildings it is worth mentioning:

- Minimum needs for building operation (new constructions and deep renovations) and technologies used in buildings facilities
- Energy Performance Certification of buildings
- Required nearly zero energy buildings from 2021 on (2019 for public buildings)
- Examination schemes for heating and air conditioning systems
- Required energy efficient renovations of at least 3 % of buildings owned and occupied by central public administrations
- Implementation of a public building and of long-term public building renovation strategy.

These actions must extremely influence the worldwide performance of the building sector in the next years, and some effects are now visible by checking the national NEEAPs (national energy efficiency action plans, written under 2006/32/EC directive and 2012/27/EU directive).

However, the long crisis that is indicating this time underlines the value of achieving new business models able of overcoming the present obstacles, by giving access to third party financing.

This document aims to examine innovative tasks, business models, and public support to promote energy efficiency in the public building sector, linking up with the development of an industrial policy in line with the Green Deal, also through the development of the ESCO model.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

2. OBJECTIVES

This document wants to identify the potential of new business models and in more detail:

General:

To identify the degree of combination of existing technologies, the required skills and the skills needed to manage this integration, and the collaboration between the different stakeholders and the (public and private) parties involved.

To identify the financial, managerial, and legal barriers that are obstacles to the massive dissemination of effective construction-industry technologies on a bigger scale, and that delay a cohesive and completed approach – as a replacement for the actual fragmented method from catching on.

To indicate the actual performance of innovative and effective business models to advance energy efficiency in the public building sector (ESCO, utilities, "green banks", etc.).

Based on knowledges and lessons learned from the above actions, this document will propose several recommendations for political decision makers and certain businesses, also propose feasible solutions to speed up and make easier the existing ways of action.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

3. The multiple benefits of energy efficiency

As energy efficiency continues to gain interest as a key source for economic and social progress through all the economies, realizing its real benefit is significantly important. The numerous benefits methods to energy efficiency policy tries to increase the viewpoint of energy efficiency outside the traditional procedures of reduced energy demand and lower greenhouse gas (GHG) emissions by recognizing and measuring its impacts across many different scopes.

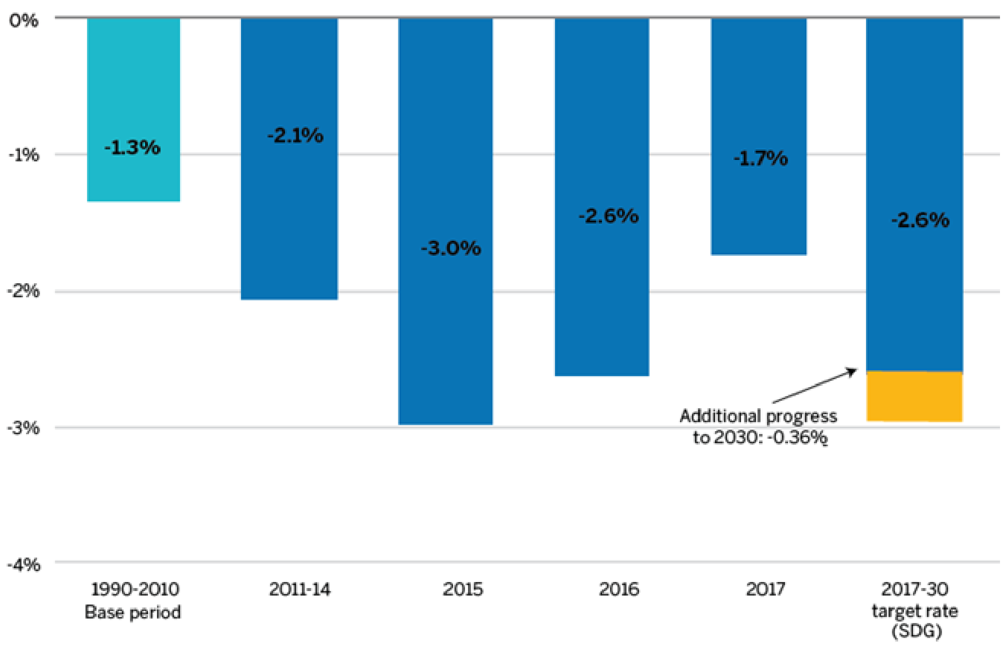
The phrase multiple benefits seek to gain a reality that is often observed: financing in energy efficiency can support many different benefits to many different stakeholders.

- Energy efficiency means using less energy to implement the same task – that is, minimizing energy waste.
- Energy efficiency leads to a selection of benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and lowering our costs on a building and economy wide level.
- Improving energy efficiency is often inexpensive – and often the most urgent – way to reduce the use of fossil fuels.
- There are many opportunities for efficiency improvements in every sector of the economy using existing technologies.
- The SDG 7 - Ensure access to cheap, reliable, sustainable and modern energy for all sets the objective of doubling the total yearly rate of energy efficiency improvement by 2030, i.e. from 1.3% to 2.6% per year.

Materialize the EE opportunities requires huge investment, especially from the private sector. The average yearly rate of improvement in global primary energy intensity during 2010 - 2017 was 2.2%, more than the 1.3% during 1990 - 2010. To reach the SDG 7.3 target, the annual improvement to 2030 would need to average 3% between 2017 and 2030.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Changes in global primary energy intensity



Source: Tracking SDG 7 - the Energy Progress Report 2020

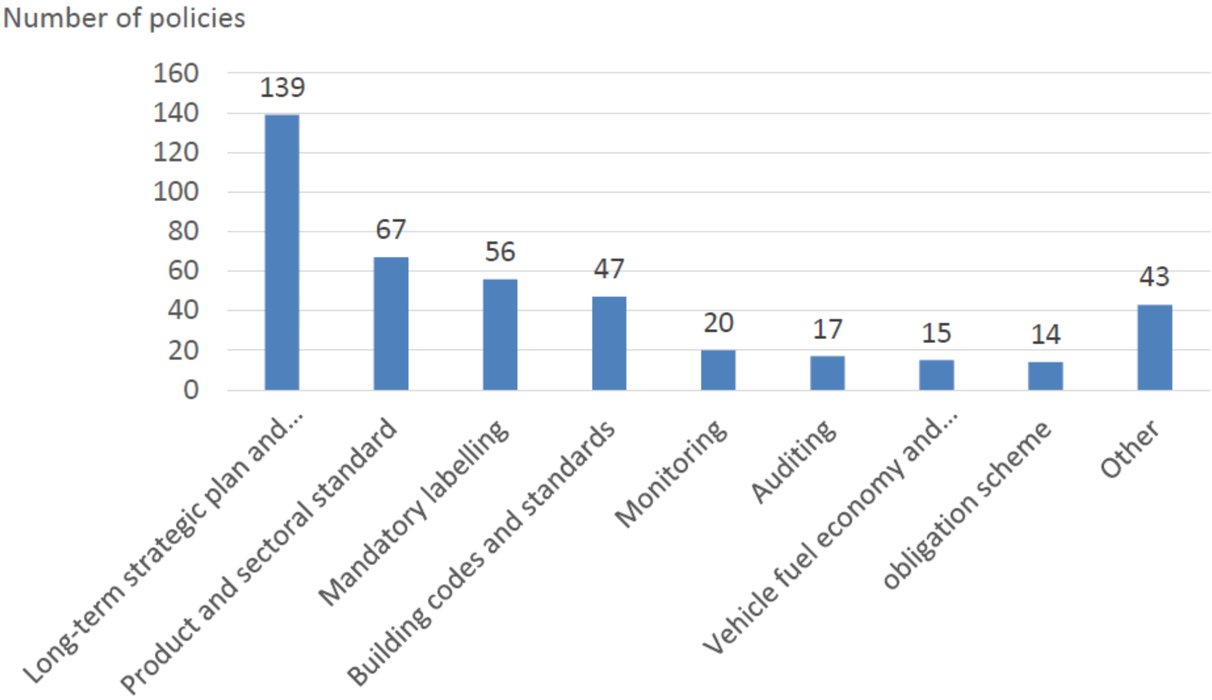
Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

4. The Key driving factors for Energy efficiency improvements

The Key driving factors for Energy efficiency improvements are:

- Technologies
- Policies
- Investment
- Consumer behaviors, lifestyle

The Types of energy efficiency policies found in 106 developing countries (as of end 2015)



5. Energy efficiency improvement

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

solutions for buildings: implications for energy services

The energy efficiency improvement solutions for buildings reply to mutual requests regarding climate control and lighting, while they differentiate in electrical uses associated with the services sector and the residential sector, remaining homogeneous though in the sectors themselves.

The repeatability of any functions is then a key elementary point of energy efficiency in buildings. It can be positively exploited both in terms of minimum compulsory constraints and voluntary contracts, and in terms of widely used retrofit actions.

This is offset by a big variety of solutions offered to handle the same necessity (for example fossil-fuels boilers, biomass boilers, heat pumps, cogeneration for heating) and a limited plant utilization factor.

Types of energy consumption:

- heating
- cooling
- lighting
- electrical consumption for offices
- electrical consumption for households
- stand-by and other energy losses
- stand-by and waste

Business models:

- large-scale retailers
- installers and distributed businesses
- engineering firms
- construction and building renovation companies
- ESCOs
- electricity and gas suppliers

Main families of technological solutions:

- heating – condensing boilers
- heating – biomass boilers
- building envelope – advanced solutions for new buildings
- building envelope – retrofit
- heating and cooling – cogeneration
- heating and cooling - renewable heat sources
- heating and cooling – district heating
- domestic hot water – heat pumps
- domestic hot water – thermal solar energy
- lighting – led
- lighting – fluorescent lamps
- home automation and building automation systems (accounting, control, monitoring, optimization)
- low-consumption office equipment
- electrical power generation from renewable sources
- energy efficient devices
- anti stand-by devices

These factors translate into a design and decisional complexity and payback phases often between five and ten years.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Energy efficiency solutions may be divided based on the technological viewpoint, the complexity of the operation, and the capital cost. The relation between these three aspects has repercussions on any business models that can be used.

For solutions proposed from a perspective of service, evaluating whether a certain solution is feasible is accomplished with two main selection criteria:

- the amount of the energy savings should be sufficient to cover the funds, working, and the commercial costs within an appropriate timeframe.
- the technologies identified must allow the ESCO and the contractor to share in the monitoring protocol, which must be specified before and must not be high-priced.

Additional information requiring consideration derives from these two evaluation standards. Some of the main aspects to be considered are the following ones.

Regarding payback periods, for instance, the conditions may be entirely different for public buildings used for a limited number of hours (typically schools), buildings with extended hours of operation (for example gyms used by sports clubs), buildings used permanently (such as barracks), and finally buildings with complex technological facilities (like hospitals).

In the civil sector, the payback period may be less decisive in comparison with the industry when selecting whether to complete a project. Actually, it is not focus to the similar logic typical to the manufacturing industry that usually led to the denial, a priori, of any project with a payback period of more than 3 years.

Factors such as the net present value (NPV) and the internal rate of return (IRR) take on greater significance. For projects carried out from the point of view of an ESCO with third-party financing, however, the project's capacity to create cash flow having a realistic payback period not directly well-suited with some additional highly planned actions, such as insulation, takes on greater significance. Hence, the funding system becomes a critical variable.

About monitoring, the situation changes as an alternative depending on whether or not the processes carried out involve users, their actions, or habits. Again on the issue of monitoring, certain parameter changes can be officially obtained from chambers of commerce or from other public bodies (e.g. price series of different fuels, electricity cost, cost of technologies, etc.), while for other parameters, such climatic data, the situation is more complex, since to have an official figure it is necessary to refer to data from geographical sites that may be distant and perhaps not representative, whereas if a local metric is used, no prior history may be available to make a comparison.

Energy efficiency technologies can improve various economic features of energy consumption, with significant technological implications. The installation of sensors on major consumption sources lets energy waste which would be tough to notice reading the monthly consumption reported in the bill to be identified and in a smart city vision allows the DSO (distribution system operator) the choice to estimate if using local control and management systems planned to make the supply of electricity and heat less costly.

Heating amenities can be made more effective by installing tools to control combustion and to program the use of the various heating devices, both as a function internal demand and meteorological parameters, and also by adopting technologies with better performance, such as boilers, heat pumps, or cogeneration. In addition to the classical insulation, windows with active solar radiation control or special painting for terraces can be considered on the building envelope. The building automation technologies currently allow effective control, monitoring and management functions, optimizing consumption and maintenance related to other organization requests (for example use control, fire prevention, and safety).

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Renewable electricity and heat sources can have extensive uses in new buildings and in case of restructuring, in order to supply the part of energy demand than cannot be reduced. Concerning the use of the renewable heat sources, the three main solutions deal with different issues: thermal solar energy is mainly used to new buildings or special applications in which sufficiently vast areas are available (evaluating competition with photovoltaic in their application), heat pumps are facing regulations that delay their development, and the use of biomass for thermal applications is related to the particular local logistics (for example rural buildings) or to the development of logistical raw material procurement and distribution chains.

The climatic evolution lead in the previous years to a reduction in wintertime demand for heating and to an increase in the summer demand for air cooling, and this is a factor ESCOs must consider just like the operations that are mandatory due to energy standards in buildings.

One example is the required installation of thermostatic valves on all heating bodies, which will certainly result in a reduction in the average winter consumption with already verified savings of up to 30 %.

ESCOs should also consider proposals to change the use of buildings, for example the centralization of hospital operating rooms or the reformations of the main headquarters of central provincial administrations for which unification is proposed. Equally troublesome is the possibility of installing systems to reuse and recovery energy from both liquid and gaseous effluents in large building complexes (hospitals, universities, etc.). These interventions can be remarkable in terms of energy, but at the same time they should confront themselves with the management procedures, the national and regional standards, and the projected evolution in the use of the buildings.

The operations affecting demand are an additional type of activity that forcibly requires greater collaboration between the customer and the proposing ESCO. This stage would appear certain if energy efficiency is to be modified from reducing consumption from primary sources to reducing end-use demand, a topic never dealt with until now. This type of procedure is grouped in two large categories:

1. the first regards actions on building structures such as insulation, coatings, and restructuring.
2. the second falls within the large theme of building automation.

The second group of actions may regard room-by-room optimization of ambient conditions by controlling heat and cooling systems, installation of occupancy and/or ambient light sensors for lighting, CO2 controller, ventilation controller, electric devices switching, intelligent metering, innovative devices capable of communicating and being controlled by the electric grid, and integration with antiintrusion and security systems. These systems are much more cost-effective thanks to the diffusion of new technologies and of wireless communication.

The technological evolution in the field of measuring, monitoring, and building automation can support the installation of energy efficiency equipment by allowing more reliable feasibility studies and cash flow forecast, helping the implementation of EPC contracts and thus of third-party financing. This is a mean to link technical aspects to economic and financial issues and is fundamental even if considering business models that don't involve ESCOs.

Finally, it is important to pay attention to the end-users' behaviors and to develop systems to support the right viewpoint to the internal use of the building. This kind of information should improve together with the information and dissemination campaign aimed at raising the awareness on energy efficiency and with the training activities aimed at qualifying the professionals and the company involved in offering energy services. The qualification process can end up in a certification process.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

6. BUSINESS MODELS

A new Business Model for Renewable Energy aims to provide policy makers and other market actors awareness into the way novel and innovative business models can stimulate the deployment of renewable energy technologies and energy efficiency actions in the built environment.

Today, many obstacles block an increased deployment of renewable energy technologies in the built environment including:

1. Market and social barriers: price distortion through externalities, low priority of energy issues, split incentives, etc.
2. Information failures: lack of awareness, knowledge, and expertise
3. Regulatory barriers: restrictive procurement rules, difficult building permitting processes.
4. Financial barriers: low or no returns on investment, high up-front costs, lack of access to capital.

A business model can be defined as 'a plan to invest in renewable energy technologies, which generates value and leads to an increased penetration of renewable energy technologies in the built sector.

Effective business models represent methods in which the funding and implementation of renewable energy technologies or energy efficiency in buildings is organised in such a way that certain barriers for the deployment of renewable energy technologies are overcome. Based on the main drivers for value creation, business models for renewable energy technologies in the built sector can be classified in three categories.

Product-Service-Systems / Energy Service Companies (ESCOs):

1. Energy Supply Contracting (ESC): An Energy Service Company (ESCO) gives energy, such as electricity or hot water to a building (as opposed to final energy such as pellets or natural gas in a standard utility contract). The ESC model is particularly well suited for generating electricity and heat from renewable energy technologies.
2. Energy Performance Contracting (EPC): An ESCO ensures energy cost limitation in comparison to a historical (or calculated) energy cost baseline. For its services and the savings guarantee the ESCO receives a performance based remuneration.
3. Integrated Energy Contracting (IEC): The IEC model is a hybrid of ESC and EPC aiming to combine supply of useful energy, preferably from renewable sources with energy conservation measures in the entire building. The model is currently being piloted in Austria and Germany.

<u>Business models based on new revenue models</u>:
Making use of a feed-in remuneration plan: Through a feed-in remuneration scheme the producer of renewable energy receives a direct payment per unit of energy produced. A feed-in scheme secures access to a liable and long-term revenue flow, which can behave as a stable basis for a

business model.

Developing buildings certified with a green building label: ‘Green’ building certification systems assess a building’s performance according to environmental and wider sustainability principles. In this business model a construction company certified according to a voluntary ‘green’ certification scheme, demanding to recognize a sales price premium compared to conventional buildings.

Business models based on new financing schemes:

Property Assessed Clean Energy (PACE) financing: PACE financing is a mechanism set up by a municipal government by which property owners invest in renewable energy technologies and energy efficiency actions via an additional tax assessment on their building. The building owners repay the ‘assessment’ over a period of 15 to 20 years through an increase in their property tax bills.
On-bill financing: Utilities provide financing (i.e. a loan) for renewable energy technologies and energy efficiency actions. The building owners (or building users) repay the loans via a surcharge on their utility bills.

Leasing of renewable energy equipment:

Leasing enables a building owner the usage of renewable energy installation without having to buy it. The installation is owned or invested in by another party, usually a financial institution such as a bank. Leasing can be a central component of the business model of an ESCO or of a company that introduces a new technology to the market.

Business models based on Energy Saving Obligations: Energy Saving Obligations are a policy instrument that obliges energy companies to realise energy savings at the level of end users. It stimulates business models based on financial opportunities offered by energy suppliers to building owners, renters, or energy service companies.

The analysis of the business models included an analysis of the organisational and financial plan, the existing market and policy context and an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT). Some of the analysed business models are specific to a certain kind of market (e.g. new vs old, owner-occupied vs. rented, residential vs. commercial buildings), whereas others can easily be generalized. Practical experience with the models varies among countries.

Strong role of policy makers required. Business models can have an important role in improving the operation of renewable energy technologies in the built sector. They offer prospects for building owners, like enabling access to funds, funding of up-front costs, outsourcing of technical and economic risks, and providing additional energy related services. In many cases business models need only a supportive role by government, through changes of laws. Nevertheless, business models alone will not guide to an extensively increased operation of renewable energy technologies. The analysed business models usually just lead to a deployment of cost-effective technologies because they are unable to improve the returns on investment of renewable energy technologies and energy efficiency measures by themselves. Furthermore, business models cannot tackle all barriers, for example no business model addresses the barrier of ‘low priority of energy issues’, which keeps building owners from acting. This implies that a strong role of policy makers is still

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC “Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας” 2014-2020.

required.

The built sector is a complex sector where obstacles for an increased deployment of renewable energy technologies vary between market sectors. In existing and new, large commercial, residential, and public buildings, ESCO models can address the barriers of high upfront costs and access to capital. In small residential and commercial buildings this can be achieved by PACE or on-bill financing. These business models make a life cycle approach feasible where building owners can spread the investment costs across the project lifetime.

Business models for non-cost-effective technologies
These days, there are already many cost-effective chances for a deployment of renewable energy technologies and energy efficiency actions (e.g. insulation of buildings, solar water heating in sunny climates), although cost-effectiveness mostly depends on the background situation. For technologies that are (still) not cost- effective, business cases may be based on supporting policy measures such as feed-in remuneration systems. 'Green' certification of buildings can stimulate investments in renewable energy technologies even when they are not cost-effective.

Energy saving obligations are introduced by governments to stimulate energy efficiency actions and energy services by the contribution of energy suppliers. This policy measure promotes for example the role of ESCOs and on-bill financing but in reality, it only aimed on energy efficiency. The scope of energy saving obligations could be widened to involve renewable energy technologies in the built sector.

Proposals for policy makers

Policy makers should first analyse the cost-effectiveness of renewable energy technologies and energy efficiency actions in different markets of the built sector within their authority.
To support cost-effective renewable energy technologies in old and new large commercial, residential and public buildings policy makers can stimulate ESCO models, by supporting market facilitators, enabling access to funding and improving procurement processes for public buildings.

Recommendations for building owners

Public building owners act as a special role, as they can serve as a role model and a means to drive the implementation of government intentions for renewable energy technologies deployment and energy efficiency in the built sector. Governments can be practical in applying suitable business models.

Public building owners can:

Apply certification with voluntary 'green' building labels to new buildings and during significant reconstruction of existing facilities, and directly support ESCO business models by using these models in the public building stock. This may demand a modification in public procurement rules.
This provides a distinctive prospect for local governments to become effective in increasing the deployment of renewable energy technologies in the built sector.

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.

Conclusions

Το έργο BENEFIT συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση και από Εθνικούς πόρους των συμμετεχουσών χωρών στο πλαίσιο του Προγράμματος Interreg IPA- CBC "Ελλάδα – Δημοκρατία της Βόρειας Μακεδονίας" 2014-2020.