Deliverable 5.1
Report on the scenario identified

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Lead contractor: RINA

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<tr>
<th>Dissemination level</th>
<th>STUNNING</th>
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<td>PU Public</td>
<td>X</td>
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<tr>
<td>PP Restricted to other program participants (including the Commission Services)</td>
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<td>RE Restricted to a group specified by the consortium (including the Commission Services)</td>
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<td>CO Confidential, only for members of the consortium (including the Commission Services)</td>
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This document provides a review of baseline scenarios for the application of the innovative business models for the building refurbishment currently applied across Europe and if interesting also in external EU Countries.

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EXECUTIVE SUMMARY

This report has been prepared in the framework of WP5 “Promotion of new business models and validation through business cases” of STUNNING project “SusTainable bUsiNess models for the deep renovation of buildiNGs” (GA: 768287).

The focus of this report is the description of the methodology defined for performing the identification and evaluation of innovative business models for existing buildings’ deep renovation for dedicated key stakeholders towards their validation through business cases.

The aim of the report is two-fold. On one hand, that of creating a dedicated Business Models’ (BM) DataBase (DB) to stimulate the collection of additional data and eventually to find potentially uncovered business cases and target markets, to define BMs clusters, and eventual data filling needs. On the other hand, to select a limited number of basic criteria to be extracted, giving the possibility to identify replicable and adaptable models of business, representative of the typical needs into the refurbishment activities.

On the basis of such analysis, a limited number of basic families of business models were extracted, giving the possibility to the identification of replicable and adaptable models of business, comprehensive of the typical needs into the refurbishment activities.

For each of them the main subcategories were identified, with a special focus on innovative applications of each of them, for the selection of innovative business models.

<table>
<thead>
<tr>
<th>BM category</th>
<th>BM</th>
<th>Main remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSS based on Step-by-Step approach</td>
<td>The Step-by-Step model refers to a timeline of implementation of the retrofitting measures that are spread over a long period, based on an overall plan depicted at the beginning of the renovation work. Main target buildings are residential buildings (single-family and multi-family), with private or public owners.</td>
<td></td>
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<tr>
<td>OSS provided as a complementary business (e.g. by utilities)</td>
<td>Utility (or other stakeholders such as real estate agency or insurance company) take advantage of their existing market position to sell a complete renovation package, which they compose by using subcontractors. Main target buildings are single family houses, with private owners.</td>
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<tr>
<td>OSS provided by multi-disciplinary team cooperation</td>
<td>Multidisciplinary team cooperation is a novel model of business where the project is carried out by a multi-disciplinary team in a cooperative manner. Main target buildings are large buildings, e.g. offices, commercial buildings or multi-family houses, privately owned. Also social-houses are a target.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by joint venture of retailers with industry and contractors</td>
<td>Retailers or building product suppliers enter into contracts with contractors and industry to provide a full renovation package service. Main target buildings are Private single family houses.</td>
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<tr>
<td>BM category</td>
<td>BM</td>
<td>Main remarks</td>
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<tr>
<td>OSS provided by Private-Public-Partnership</td>
<td>In this collaborative model, private and public partners collaborate coordinating their skills and knowledge for long-term contracts (usually 20-30 years). Single-family to multi-family houses, public owner. Also large buildings such as health facilities, commercial buildings could be targeted.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by contractors’cluster cooperation</td>
<td>A team of contractors that may be made entirely by SMEs or by a major contractor and its affiliated partners represents the service provider of the One-Stop-Shop business model. Main target buildings are every type of building and owner, with preference for private single family houses.</td>
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</tr>
<tr>
<td>OSS based on ICT tools</td>
<td>An ICT tool supporting the main player is the key aspect of the Business Model. Target buildings can vary, accordingly to the customers segments intended to address, from private single family houses, to multi-family and large office buildings.</td>
<td></td>
</tr>
<tr>
<td>Energy Supply Contracting (ESC)</td>
<td>Energy Service Company supplies useful energy, such as electricity, hot water or steam to a building owner or building user allowing the ESCO to earn based on the improved performance of the house. Main target buildings are new and existing public, industrial, commercial and large residential sector buildings.</td>
<td></td>
</tr>
<tr>
<td>Energy Performance Contracting (EPC)</td>
<td>Energy Service Company guarantees energy cost savings in comparison to a historical (or calculated) energy cost baseline. For its services and the savings guarantee, the ESCO receives performance-based remuneration in relation to the savings it achieves. Main target buildings are public institutions buildings including special purpose buildings like universities, hospitals, swimming facilities and leisure facilities.</td>
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<tr>
<td>Integrated Energy Contracting (IEC)</td>
<td>Integrated Energy-Contracting (IEC) is a hybrid model aiming to combine useful energy supply, preferably from renewable sources, with energy conservations measures in the entire building. Main target buildings are public, residential, commercial and industrial buildings. Customers target are both public and private organizations.</td>
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</tr>
<tr>
<td>Feed-in remuneration scheme</td>
<td>Feed-in schemes can be used by households and small and medium enterprises who want to generate their own energy using renewable sources. Which market segments are eligible for feed-in support, and therefore can be part of a business model depends on the policy specifics in the country.</td>
<td></td>
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<tr>
<td>Developing properties certified</td>
<td>‘Green’ building certification systems assess a building’s performance according to environmental and wider sustainability</td>
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<tr>
<td>BM category</td>
<td>BM</td>
<td>Main remarks</td>
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<tr>
<td>with a green building label</td>
<td>criteria and provide proof that the building confirms to a certain sustainability standard. Green certification based business models can be done in all market segments and targeting all buildings typology.</td>
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</tr>
<tr>
<td>Building owner profiting from rent increases after the implementation of energy efficiency measures</td>
<td>This business model is based on regulation that allows rent increases after the implementation of energy-efficiency measures. Its attractiveness for the building owner directly depends on the details of the legislation. Applicable for renter-occupied residential buildings, with preference for social housing (multi-family public buildings).</td>
<td></td>
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<tr>
<td>Property Assessed Clean Energy (PACE) financing</td>
<td>Under PACE scheme local governments issue bonds for RET projects. The building owner repays the loan through an additional special assessment payment on its property tax bill for a specified term. All buildings can be targeted, with special focus on residential and commercial buildings.</td>
<td></td>
</tr>
<tr>
<td>On-bill financing</td>
<td>Utilities provide financing (i.e. a loan) for RET and EE measures. The building owners (or building users) repay the loans via a surcharge on their utility bills. The mechanism worked well for small businesses which required simple, turnkey approaches to improve their energy efficiency and for private owners of residential buildings.</td>
<td></td>
</tr>
<tr>
<td>Leasing of renewable energy equipment</td>
<td>Leasing enables a building owner to use a 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. The building owner pays a periodic lease payment to that party. Leasing could be applicable to all types of buildings.</td>
<td></td>
</tr>
<tr>
<td>Energy savings obligations</td>
<td>Energy Saving Obligation schemes, sometimes also referred to as White Certificates, are a policy instrument that obliges energy companies to realise energy savings at customer level. It stimulates business models based on financial incentives offered by energy suppliers to building owners, renters or to energy service companies. Energy savings obligations can be applied to all types of buildings</td>
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### Business models based on new financing schemes

Based on the collected information, the selection of the most promising business models has been performed. The business models were selected according to their capacity to foster the achievement of European geographical coverage target towards the increase of 2-3 % buildings’ renovation. At this scope, the geographical coverage and replicability for a single or more typology of buildings were evaluated for the first screening of innovative BM.

In the following table the most promising business models are reported, in correspondence of the European area in which they are currently applied and they present the higher grade of replicability, considering both climate and building stock characterizations.
<table>
<thead>
<tr>
<th>Area</th>
<th>Climate</th>
<th>Countries</th>
<th>Most promising business models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>Cold continental, with cold to mild summer</td>
<td>DK, FI, SE, NO</td>
<td>Betterhome</td>
</tr>
<tr>
<td>Southern</td>
<td>Mediterranean</td>
<td>CY, GR, IT, MT, PT, ES</td>
<td>Enerphit EPC plus EUROPACE</td>
</tr>
<tr>
<td>Western</td>
<td>Temperate, with warm summer</td>
<td>AT, BE, FR, DE, LU, NL, UK</td>
<td>Energiesprong Remourban</td>
</tr>
<tr>
<td>Eastern</td>
<td>Cold continental, with warm summer</td>
<td>BG, CZ, EE, HU, LV, LT, PL, RO, SK, SI</td>
<td>Enerphit EPC plus</td>
</tr>
</tbody>
</table>

After this first screening, a final decision will be taken (approximately in September 2018) based on the following parameters:

- **Barriers relevance evaluation**: The type and the relevance of each barrier related to a specific business model for sure influence its replicability
- **Market mechanisms**: Geographical context in which the Business Model is applied for sure influence the replicability of the business model itself.

The final selection and application at dedicated Business Cases will be included in D5.2.
INTRODUCTION

This document constitutes the deliverable D5.1 “Report on the scenario identified” of the STUNNING project “SusTainable bUsiNess models for the deep renovation of buildiNGs” (GA: 768287). It reports the activities carried out in the framework of the definition and promotion of new business models for existing buildings’ deep renovation towards their validation through business cases.
1. Background and methodology

1.1. Project background

40 to 45% of Europe’s energy consumption comes from buildings with a further 5-10% required for the manufacturing and transport of construction products and components. As such, the building sector is one of the key enablers for achieving 2050 low carbon economy goals. Only 1 to 2% of the building stock is replaced annually in the EU, hence most of the energy savings required to meet Europe 2050 goals must come from existing buildings. However, today’s measured rate of refurbishment (1.2%) is much lower than the one which should be observed to remain in line with Europe 2050 ambitions. There is a need to accelerate the market uptake and large-scale implementation of energy efficient refurbishment solutions and increase the renovation level to 2-3% per year until 2030. This ambition is reflected in several European regulations and roadmaps, such as the Energy Performance of Building Directive (EPBD), the Energy Efficiency Directive, the SET-Plan (Action 5) and the recent Energy Union Winter Package.

In addition to this, the European building sector is still highly fragmented and not yet able to offer holistic solutions for existing buildings’ deep renovation at acceptable cost and quality. The building process usually involves multiple separated disciplines and players, which leads to additional costs and risk of failure: integration is critical. Additionally, the renovation market is principally supply-driven, which can lead to a mismatch between the offered products and the end users’ needs. Nevertheless, a number of non-technical stakeholders also influences decision making in building renovation. Municipalities, local authorities and local energy/building renovation agencies are for example instrumental in the achievement of the EU renovation targets, especially when addressing the optimal integration of RES, which requires planning, and implementation at a district scale. There is a need to increase awareness of commitment to improved energy-efficiency of the building stock, and to increase the capacity of municipalities to promote and assist the renovation of building stocks, in particular through the use of public procurement tools.

In this context, STUNNING project has been funded by the European Commission within the HORIZON 2020 framework programme (call EEB-08-2017 “New business models for energy-efficient buildings through adaptable refurbishment solutions”), with the overarching goal of “engaging with the whole community of stakeholders and accelerating the adoption of new business models for energy-efficient buildings based on integrated, adaptable and affordable refurbishment packages, which will contribute to reaching the targeted EU renovation rate”.

Indeed, with the involvement of a comprehensive stakeholders community (including industrials and SMEs from the construction sector, energy utilities, capital providers, municipalities, building owners, tenants, research institutes), STUNNING aims to accelerate the adoption and large scale replication of new business models delivering adaptable and affordable refurbishment solutions (including decentralised RES generation), in order to meet the building renovation rate set by the upgraded EPBD. Under the coordination of DOWEL, five players (CSTB, RINA, Solintel and Steinbeis 2i GmbH, all key active members within the ECTP) propose a systemic and integrated approach to address the market rollout of innovative refurbishment packages, supported by an Advisory Board covering the whole refurbishment value chain. The five project objectives are aligned with all the EEB-08-2017 call challenges:

3 RES: Renewable Energy Sources

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768287.
- Supporting the cooperation of diverse, yet dispersed, stakeholders federated in a single stakeholder community built around a web-based knowledge sharing platform addressing technologies and business models for refurbishment in EU28;
- Benchmarking and (geo)clustering innovative refurbishment packages and ranking them according to profitability / energy efficiency indicators;
- Identifying and addressing barriers which still prevent these refurbishment packages from being replicated by value chain players;
- Promoting and validating (through real business cases) novel renovation business models allowing consumers and the market to invest with confidence, thanks to performance-guaranteed energy savings, and addressing end user’s commitment to energy efficiency after renovation;
- Disseminating the support action outputs, with an exploitation strategy for the newly built knowledge-sharing platform, thus continuing to interact with the stakeholders’ community beyond the completion of the STUNNING project and contributing to maximising its impact and more globally the EEB PPP4.

1.2. Approach towards the promotion of new business models and validation through business cases

In the framework of the STUNNING project, specific activities were dedicated to promote across Europe the implementation of innovative and original “refurbishment packages” including both an eco-efficient smart product or process for buildings’ renovation and the related business model for its application.

To this aim, different kind of information gathered along the project have been used and reviewed accordingly.

In particular, the following analysis has been carried out within the project:

- Assessment and identification of the main stakeholders of construction sector with the aim of identifying their main needs and their role in the delivery of the specific renovation packages (both in the delivering of the technical solutions and in the implementation of the related business models);
- Evaluation of the renovation packages in order to evaluate the most relevant KPIs5 and cost-benefits associated to them as well as the main building type for them to be put in practice in a cost effective way, also according to the country of application;
- Preliminary identification of potential success stories implementing promising refurbishment packages.

Based on this review, the following steps were set up towards the promotion of new business models:

1. Identification and evaluation of innovative business models for dedicated key stakeholders, with a two-fold aim. On one hand, that of creating a dedicated Business Models’ (BM) DataBase (DB) to stimulate the collection of additional data and eventually to find potentially uncovered business cases and target markets, to define BMs clusters, and eventual data filling needs, etc. On the other hand, to select a limited number of basic criteria to be extracted, giving the possibility to identify replicable and adaptable models of business, representative of the typical needs into the refurbishment activities.
2. Application of selected business models within real case studies that will be selected covering different built environment.
3. Promotion of the selected and validated business models further analysed in order to find the most promising driving features for their wide scale replicability across Europe.

4 Energy Efficiency Buildings Public Private Partnership
5 Key Performance Indicators
The focus of this report is the description of the methodology defined for performing Step 1 and the related main output in terms of Business Models’ DataBase set up, business model clustering, definition of specific criteria for selecting the most promising business models, etc. This will thus constitute the backbone activity for Step 2 and Step 3.
2. Steps towards setting the scenario for identification of replicable and adaptable business models

As described above, Step 1 activities aimed at fulfilling mainly two major objectives:

- The creation of a Business Models’ DataBase (BM DB), as the basis for the content of the STUNNING Knowledge Sharing Platform;
- The identification of at least **four families of most promising Business Models** (and associated guidelines) to promote new routes to make renovation more profitable and bring the renovation rate up to 3% by 2020.

The following paragraphs provide a short overview of the methodological approaches implemented for satisfying such objectives while main output of the activities are provided respectively in Chapter 3 and Chapter 4.

2.1. Methodology towards Business Models’ DataBase creation

The Business Models’ DataBase has been organized based on:

- The definition of proper **filters** (Category of building, type of building, type of owner), to be provided to the STUNNING Knowledge Sharing Platform developers, in order to enable the users of the platform to identify the best BM according to their specific case;
- The definition of specific BM category and sub-categories, that thanks to specific identification code, will be presented to the platform users’ according to the filters selected;
- The provision of **BM detailed and synthetic description**, according to the St. Gallen Business Model Navigator (www.bmilab.com), including the link with related Refurbishment Package and Business Case (when available), as well as the specific examples application at country level when available.

2.1.1. Filters definition

The concept underpinning STUNNING is to build a community of stakeholders around a web-based knowledge-sharing platform that provides key facts and recommendations on renovation packages (technological solutions, business models and business cases), building upon the knowledge and results of past and ongoing EU projects and initiatives. Stakeholder engagement activities are then articulated around this platform to maximise the impact. Within this Platform, the users will be able to retrieve useful information according to their role in the value chain. When considering new Business Models for existing buildings renovation to be implemented in a specific case the main variables that may influence the choice of the BM are the type of building and the owner of this building to be retrofitted. The two elements (building type and type of owner) are also very connected one to each other. Indeed, BM may significantly vary according to the type of building (for example, the technological solutions to be implemented may vary if a single family house or a commercial building is considered as well as the related products/services’ providers). In addition, the type of owner can influence the type of more convenient BM to be operate since budget, knowledge, decision making and many other factors are strictly dependent on the owners themselves.

Thus, table below provides the main categories of buildings (residential and non-residential) and types of owners (private and public) that have been taken into account within the BM DB. In general, all the EU buildings and type of owners may fall into one of the below categories.
### Table 2.1: Buildings’ category and types of owners

<table>
<thead>
<tr>
<th>Buildings Category</th>
<th>Type of buildings</th>
<th>Type of owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>R - Residential</td>
<td>S - Single family</td>
<td>PR - Private</td>
</tr>
<tr>
<td></td>
<td>M - Multi family (including terraced houses, apartment blocks)</td>
<td>PR – Private</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU – Public*</td>
</tr>
<tr>
<td>NR - Non residential</td>
<td>C - Commercial (Offices, Trade facilities, Shopping centers)</td>
<td>PR – Private</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU – Public</td>
</tr>
<tr>
<td></td>
<td>E - Educational facilities (schools university)</td>
<td>PR – Private</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU – Public</td>
</tr>
<tr>
<td></td>
<td>H - Health facilities (Hospital, etc.)</td>
<td>PR – Private</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU – Public</td>
</tr>
<tr>
<td></td>
<td>P - Public buildings</td>
<td>PU - Public</td>
</tr>
</tbody>
</table>

* Including different typologies of social/public housing.

#### 2.1.1. Business model category and sub-category definition towards innovative business models

Within the construction and building sector, the research on BMs is still limited [6][7]. The first articles in this scope dealt with e-business, e-commerce, and Information Communication Technologies (ICT). Instead, more recent studies focused on the development of the BM concept in relation to the changes characterizing sustainability-oriented constructions [8]. Indeed, the BM innovation in this field might represent a powerful strategy to boost the penetration of energy measures in the built environment, by overcoming the hindrances to energy efficiency investments [9]. BMs can substantially differ in relation to their various interdependent components, such as the proposed value, the involved actors, the key activities, and the necessary resources. Thus, in the last two decades, the Business Model concept was object of a growing attention within the research world and in

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particular in association with the sustainability context. Indeed, among the various sectors, the building industry represents a significant field of intervention for achieving the objectives of sustainability in its three main dimensions: environmental, social and economic. In fact, from the environmental point of view, this sector is responsible of high-energy use, greenhouse gas (GHG) emissions, depletion of natural resources, and generation of waste. Besides, from the social and economic perspective, the building sector is one of the Europe’s largest industrial employers and provides the built environment, which represents a major part of the economic resources of individuals and populations, contributing substantially to the advancement of the national economies\textsuperscript{10,11}.

In the building sector, most of energy use and GHG emissions is due to existing buildings\textsuperscript{12}. Therefore, the implementation of energy efficiency measures in such buildings is widely acknowledged as an effective and meaningful step towards the reduction of building-related sustainability impacts. Indeed, all around the world, policies, standards, and methodologies are driven towards the decrease of energy use in buildings. Furthermore, in the last years, several scientific works focused on the examination of retrofit initiatives to reach the enhancement of energy performance in existing buildings, as well as environment preservation and rational use of resources. Energy retrofits in existing buildings produce also many advantages for society, owners, and building occupants, by e.g.: decreasing CO\textsubscript{2} emissions, reducing utility bills and maintenance costs, generating new job opportunities, and improving well-being and efficiency within workplaces and community areas\textsuperscript{13}. Therefore, such retrofit actions might also represent a new and powerful source of business for the various stakeholders involved within the whole process, including retrofitting service providers, building owners, and financing companies.

Nonetheless, traditional BMs need to evolve and innovate in order to catch up with deep energy retrofit initiatives for existing buildings. In fact, so far, there are no exhaustive studies about the modifications needed in the common BMs when they relate to projects of energy retrofitting\textsuperscript{14}. In this framework, one of the purposes of the BM DB as well as of the STUNNING Knowledge Sharing Platform is that of providing an organized overview of the main BM available and of evaluating their innovations for fostering the existing buildings’ renovation. Table below provides the clustering of BMs assessed within the DataBase of STUNNING Knowledge Sharing Platform and thus available for the STUNNING community. More info are available in Chapter 3. Per each sub-category, geographical coverage as well as innovations beyond the state of the art have been investigated. Within the platform, the user may download a specific factsheet providing relevant BM innovative examples at country level.

\textbf{Table 2.2: BM categories and sub-categories}

<table>
<thead>
<tr>
<th>BM category</th>
<th>BM sub-category</th>
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\textsuperscript{12} Nejat P, Jomehzadeh F, Taheri MM, Gohari M, and Majid MZA. A global review of energy consumption, CO\textsubscript{2} emissions and policy in the residential sector (with an overview of the top ten CO\textsubscript{2} emitting countries). Renewable and Sustainable Energy Reviews 2015;43:843-862.


\textsuperscript{14} Mokhlesian S and Holmén M. Business model changes and green construction processes. Construction Management and Economics 2012;30(9):761-775.
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<td></td>
<td>OSS provided by contractors’ cluster cooperation</td>
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<td></td>
<td>OSS based on ICT tools</td>
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<tr>
<td>Business models based on Product Service Systems (PSS) - Energy Service Companies (ESCO)</td>
<td>Energy Supply Contracting (ESC)</td>
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<td></td>
<td>Energy Performance Contracting (EPC)</td>
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<tr>
<td>Business models based on new and innovative revenue models</td>
<td>Feed-in remuneration scheme</td>
</tr>
<tr>
<td></td>
<td>Developing properties certified with a green building label</td>
</tr>
<tr>
<td></td>
<td>Building owner profiting from rent increases after the implementation of energy efficiency measures (which can be associated to an extension of the building)</td>
</tr>
<tr>
<td>Business models based on new financing schemes</td>
<td>Property Assessed Clean Energy (PACE) financing</td>
</tr>
<tr>
<td></td>
<td>On-bill financing</td>
</tr>
<tr>
<td></td>
<td>Leasing of renewable energy equipment</td>
</tr>
<tr>
<td></td>
<td>Energy savings obligations</td>
</tr>
</tbody>
</table>

### 2.1.1. Business Model description

In literature, several definitions of Business Models are available as well as different way of describing them. In this framework, partners discussed about the best way of providing information related to BM within the STUNNING Knowledge Sharing Platform and the following two approaches have been evaluated and investigated in order to map and describe BM (Figure 1).
• **Osterwalder et al approach**, providing a conventional definition of BM, through the BM “ontology”, later referred to as “canvas” ([https://strategyzer.com/canvas/business-model-canvas](https://strategyzer.com/canvas/business-model-canvas)) \(^{15}\) \(^{16}\), based on nine main blocks to describe BMs, i.e.: 1) customers, 2) value proposition, 3) channels, 4) customer relationships, 5) revenues, 6) key resources, 7) key activities, 8) key partners, and 9) costs.

• **St. Gallen Business Model Navigator** ([www.bmilab.com](http://www.bmilab.com)), made by four blocks:
  - Who (target customer)
  - What (value proposition)
  - How (value chain: processes, activities, resources)
  - Why (revenue model: cost structure and revenue mechanisms)

![Osterwalder approach (on the left) and St. Gallen approach (on the right)](image)

*Figure 1: Osterwalder approach (on the left) and St. Gallen approach (on the right)*

As can be easily guessed, Osterwalder approach is really detailed and broader while St. Gallen approach focused specifically on key points considered as more relevant for the business development.

**STUNNING project Advisory Board** suggests to take into consideration the information clustered into the Osterwalder approach while the project consortium considered that the St. Gallen approach would be smoother for the platform users to be understood. Based on the above considerations, it was agreed to follow the St. Gallen BM approach to provide BM information on the Knowledge Sharing Platform trying in any case to include all the information requested in the Osterwalder approach as merged in figure below. This was mainly due to the need of providing exhaustive information in a user-friendly way to stakeholders (not really aware and used to both the construction sector as well as the Business Model language).


According to the above figure, the four main blocks considered in the St. Gallen approach shall consider the following information (taking also in consideration the Osterwalder approach when possible and the STUNNING project context).

- **WHO**: Every business model serves a certain customer group, thus the definition of the target customer is one central dimension in designing a new business model. In the context of STUNNING project, the customers is represented by the owner of the buildings to be renovated, that indirectly and partially depends from the type of buildings that it is considered for the deep renovation. In this context, when possible also the way of reaching and attracting the target customers shall be underlined.

- **WHAT**: The second dimension describes what is offered to the target customer, or, put differently, what the customer values. This notion is commonly referred to as the customer value proposition (Johnson et al. 2008), or, more simply, the value proposition (Teece 2010). It can be defined as a holistic view of a company's bundle of products and services that are of value to the customer (Osterwalder 2004). In the context of STUNNING project, the value proposition is represented by the added value that the selected BM provides to the target customers.

- **HOW**: The third dimension describes how to build and distribute the value proposition, in terms of processes and activities, along with the involved resources (Hedman and Kalling 2003) and capabilities (Morris et al. 2005). In the context of STUNNING project, the key partners for delivering the added value to the target customers as well as the technologies and processes involved in terms of Refurbishment Packages shall be detailed. When considering Refurbishment Package, this could be referred to both RET (Renewable Energy Technologies) including renewable electricity, and heating and cooling, such as:
  - Solar PV
  - Solar thermal for water and space heating (solar boilers)
Small-scale wind turbines on the roofs of buildings for electricity generation
- Biomass heating (e.g. wood pellets)
- Heat pumps and small-scale district heating / CHP plants based on renewable energy (e.g. when installed by a property developer on a large housing or business complex)
- Heat and cold storage systems
- Micro-CHP systems may be included because, although they are not a RET, a micro-CHP system is generally more efficient than traditional electricity and heat production, and may be based on renewable energy in the future.

As well as EE measures and these could include the following:
- Insulation (wall, roof, floor, window, heating and water pipes, crack sealing)
- Low temperature room heating
- Heating boiler controls
- Heat recovery systems (ventilation system, shower)
- Other (water saving showerheads, weatherstrips, smart meters, etc.).

**WHY:** The fourth dimension explains why the business model is financially viable, thus it relates to the cost and revenue model. In essence, it unifies aspects such as, for example, the cost structure and the applied revenue mechanisms, and points to the elementary question of any company, namely how to make money in the business

### 2.2. Methodology towards the identification of most promising and replicable business models

In agreement with the STUNNING Consortium and the Advisory Board, the methodology towards the identification of the most promising and replicable business models has been deeply discussed both internally to the consortium and with the Advisory Board. It was agreed that the business models should be selected according to their capacity to foster the achievement of European geographical coverage target towards the increase of 2-3% buildings' renovation.

Several parameters were evaluated towards the definition of the most promising and replicable business models. For example, the partnership strength in terms of experience, network strength, technical capability, financing capability that are some of the parameters that may be evaluated when deciding a Business Model. It was considered also the coverage of the supply chain for refurbishment activities, since business model in the construction sector mainly coincide with the concept of project delivery method, consisting of planning, design, construction and other services necessary for organizing, executing and completing a building project (existing buildings refurbishment in the case of STUNNING project). In this framework, the fact that the business model may or may not cover all the phases of the project delivery may lay a significant role in the decision of the most promising Business Model.

Nevertheless, no parameter was considered so relevant to justify the selection of one business model rather than another one and thus the geographical coverage and replicability for a single or more typology of buildings were evaluated for the first screening of innovative BM.

Based on this, the buildings category considered were the same of Table 1 while the geographical coverage considered was based on Climate conditions, and therefore similar boundary conditions.
Table 2.3: Geographical areas subdivision.

<table>
<thead>
<tr>
<th>Area</th>
<th>Climate</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>Cold continental, with cold to mild summer</td>
<td>Denmark, Finland, Sweden, Norway</td>
</tr>
<tr>
<td>Southern</td>
<td>Mediterranean</td>
<td>Cyprus, Greece, Italy, Malta, Portugal, Spain</td>
</tr>
<tr>
<td>Western</td>
<td>Temperate, with warm summer</td>
<td>Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, UK</td>
</tr>
<tr>
<td>Eastern</td>
<td>Cold continental, with warm summer</td>
<td>Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia</td>
</tr>
</tbody>
</table>

After this first screening, a final decision will be taken (approximately in September 2018) based on the following parameters:

- Barriers relevance evaluation: The type and the relevance of each barrier related to a specific business model will for sure influence the replicability of this BM
- Market mechanisms: the geographical context in which the Business Model is applied will also influence the replicability of the business model itself.

The final selection and application to dedicated Business Cases will be presented in D5.2.
3. New and adaptable business models for existing buildings deep renovation

As already stated in the introduction, this document aims to be the basis for both providing information to the STUNNING Knowledge Sharing Platform as well as for defining the criteria to identify the most promising business models towards the achievement of proposed targets (wider replicability of promising business models towards the increase of 2-3% buildings’ renovation).

Thus, actual Business Models used by the construction sector have been analytically reviewed and classified in a structured DataBase.

The next step has been the evaluation of the information gathered with the aim of understanding BM main category and related sub-categories, their geographical coverage, advantages and disadvantages as well as the main barriers and potential improvements. This shall be the basis for evaluating the most promising BM or assessing the main gaps to be covered towards their widespread application (Step 2 – see Paragraph 4).

This Chapter thus provides the following aspects per each BMs’ category:

- a short description of each Business Model category, its main features and characteristics;
- a short description of each Business Models’ sub-category and the related BM St. Gallen Approach (used also to feed the STUNNING Knowledge Sharing Platform);
- an analysis of the geographical context of application detailed with the aim of evaluating the actual countries in which the BM is applied and thus understanding on one hand the conditions under which the success of the business model is guaranteed as well as its potential replicability;
- an analysis of potential improvements based on the actual barriers and/or market gaps identified towards the widespread application and success.

The following Business Models clustering has been made, also according to the Refurbishment Package:
### Table 3.1: Refurbishment packages covered by business models sub-categories.

<table>
<thead>
<tr>
<th>BM category</th>
<th>BM sub-category</th>
<th>EE measures</th>
<th>RET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business models based on One Stop Shop (OSS) concept</td>
<td>OSS based on Step-by-Step approach</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS provided as a complementary business (e.g. by utilities)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS provided by Private-Public-Partnership</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS provided by multi-disciplinary team cooperation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS provided by joint venture of retailers with industry and contractors</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS provided by contractors’ cluster cooperation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>OSS based on ICT tools</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Energy Performance Contracting (EPC)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Integrated Energy Contracting (IEC)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Business models based on new and innovative revenue models</td>
<td>Feed-in remuneration scheme</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Developing properties certified with a green building label</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Building owner profiting from rent increases after the implementation of energy efficiency measures</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Business models based on new financing schemes</td>
<td>Property Assessed Clean Energy (PACE) financing (X)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-bill financing</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leasing of renewable energy equipment</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy savings obligations</td>
<td>X</td>
<td>(X)</td>
</tr>
</tbody>
</table>
3.1. Business models based on One-Stop-Shop (OSS) concept

The One-Stop-Shop concept means that a single service provider is responsible for holistic renovation of the building as per the wishes of the building owners, including implementation of energy efficiency measures, or building internal renovation. Thus, the one-stop-shop model foresees that a single actor offers full-service holistic renovation packages including consulting, independent energy audit, renovation work, follow-up (independent quality control and commissioning) and financing.

Ideally, this means that the value proposed by the single service provider and its key activities should more or less be the same for different business models, but the service provider itself could be different. Depending on the in-house capability of the service provider, the partnership and key resources can vary. Moreover, the channels and customer relationship to serve the customers can also be different.

In general, thanks to this business model building owners will get a quality renovated house with little risk and responsibility which usually is the case with traditional handicap renovations. The energy cost shall be reduced, market value of the building may increase, mortgage banks will have a safer asset and there are societal benefits in terms of reduced energy use and greenhouse gas emission. However, there could be uncertainty over who will be responsible for guarantee of the renovation work if the service provider goes bankrupt. Tommerup et al. (2011b) has presented an ideal process of implementing the one-stop-shop business model. The process consists of five phases: investigation of the building, extensive analyses, proposal for renovation, actual renovation and commissioning after renovation. The process provided in the figure below has been expanded adding the sixth phase represented by “marketing” to attract customers.

![Image of implementation process](source: Adapted from Tommerup et al., 2011b)

**Figure 3: Implementation process of a general One-Stop-Shop model for energy efficient renovation**

Marketing

The first step in implementation of a one-stop-shop model is that the company offering such a service must do some kind of marketing to inform the customers about the value proposition and create interest in the full service concept. Marketing may include advertisement in mass media, warehouse displays, interpersonal communication such as local area meetings, and information from real estate agents or energy auditors when a house is newly-bought, etc. Typically, mass media advertisement is useful to inform the customers, while interpersonal communication is important to convince the customers to adopt a product or service.

Preliminary building inspection and energy audit

Building owners interested in the full service concept will contact the one-stop-shop service provider. Similar to a traditional renovation process, the service provider should visit the house to be renovated, conduct a free of cost preliminary building inspection and energy audit and discuss with the building owner about the
renovation requirements and the availability of subsidies. This is an opportunity for the service provider to offer the possibility of a more comprehensive building inspection and a detailed energy analyses by an independent actor. A basis for the analysis is a possible existing energy label, house condition report, drawings, pictures and other relevant documents.

**Detailed building inspection and energy analyses**

Based on the outcome of the preliminary analysis some building owners may opt for traditional renovation process and avoid a more detailed energy analysis. However, others may be inclined to know more about the condition of the building and the possibility to improve energy efficiency. If building owners show such interests, the service provider could arrange an independent company (e.g. in Sweden there are accredited energy auditors and building inspection companies) to do a more detailed inspection of the building and a deeper energy analysis. This service should be carried out by the company in dialogue with the owner and paid for by the owner but refunded if a renovation package solution is bought from the company. The extensive analyses will also provide the company with knowledge that allows for a safe foundation to convince the owner about the benefits of energy renovation packages and to offer fixed price quotations.

**Proposal for package solutions**

In this phase, proposals for renovation package solutions are put together, including quotation for the work, financing and management of the contract work. The main point is that the typical owner needs help in the design and decision making process. The company should be able to carry out this phase within few hours ensuring that the right system for configuration of technical standard solutions is in place including simplified but accurate calculation models. It is possible to prepare packages of standard solutions for buildings of similar architectural design, e.g. houses built during 1970s. The company should provide “fixed prices” for various packages including visualization documentation of the effect on:

- Total and annualized investment cost versus savings in energy cost
- Household economy – short and long term including effect of increased value of the house, etc.
- Indoor environment, e.g. indoor temperatures, draught, air quality and daylight
- Other durability and maintenance issue
- Alternative housing for the family if they needed to vacate the house during renovation
- Time line for the renovation work
- Possibilities for installation of energy feedback instruments (e.g. energy clock, hot water use meters)

**Coordinated execution of the renovation work**

The owner evaluates the packages and if (s)he chooses to accept any of the proposals, any remaining economic and financing issues are clarified and a contract for renovation work is signed. A detailed work description including the time line is set in place, drawings if needed are prepared, and the contract work is carried out. The company obtains the necessary renovation permissions from the authorities and helps the owner to apply for possible loan and/or governmental subsidies. The quality of the renovation work should be checked continuously to make corrections making sure that defined requirements are fulfilled. At the end of this phase, the renovated building is ready for use.

**Quality assurance and continuous commissioning**

The renovated house is inspected by an independent agency to check for the quality of work. A certified energy consultant prepares an energy performance certificate. The heating and ventilation
systems are commissioned for at least two years. One important issue is to check that energy performance is continuously reached. **Energy performance of the building is regularly recorded and compared with estimated energy savings potential.** The owner is presented with a user manual on how to operate the building and explained with information on the consequences for energy use and indoor environment if the building is not operated as prescribed.

### 3.1.1. OSS Business models sub-categories

Sub-categories of the One stop shop BM vary according to the key players/companies which are situated in the first line towards the building owner. These actors in the value chain may have different interests of taking part in developing holistic solutions to this market and can be established actors in the value chain, as well as complementary actors such as a utility company. Independent from who is playing the key role, a major challenge is to organise the necessary cooperation between complementary actors in order to offer a complete package to the building owner.

Figure below illustrates the value chain associated to OSS BM including all relevant existing actors from industry, traditional first line and other stakeholders. The red lines illustrate the trade flow between the actors. In fact, in some cases, industrial companies can also sell directly to the house owner. The full service providers are coloured in light blue in order to represent that currently also these service providers’ BM are based on the coordination of other actors of the value chain, and none so far offer a real complete service. Either implementation or financing is lacking.

![Figure 4: Value chain stakeholders](image-url)

Contractors/carpenters serve the demand for traditional renovation today. Real estate agents play an important role in sale of existing houses. They are in contact with the new house owner which is more likely to upgrade the newly acquired house, compared to persons who have lived there for a long time. Utility can make use of
their close relation with the house owner to offer additional services, such as a major renovation package. Hardware stores sell most of the material, components and systems to renovation projects. A challenge to be coped with is the lack of skills among the retail staff. Technical consulting companies possess high skills for planning of holistic renovation solutions. Insurance / Banking, in tight relationship to the building owners, are also recognised as being “neutral” regarding choice of technical solutions. Their major challenge is their lack of technical competence.

3.1.1. OSS based on Step-by-Step approach

The Step-by-Step renovation model is a wide diffused model of building refurbishment that consists in the repairs or replacement of different building components, such as the windows, plasterwork, roof covering, boiler etc. according to their life duration. One of the benefits of such an approach is that it gets the most out of each building component so that the initial investment is taken advantage of to its fullest.

The need of repairs or replacement of various components arises at different points in time. Inevitably, in the case of a complete retrofit building components that are still intact are renewed unnecessarily before time. In the step-by-step approach this can be avoided.

When applying a step-by-step approach, at least a rough overall plan should be made for all measures including those which lie in the distant future, before starting the work. In this way it can be ensured that an optimal end result is achieved in terms of cost-effectiveness, energy efficiency and quality.

The building owner, being it a private or public owner, in collaboration with the designer (planner) defines a planning for the renovation measures to be carried out and a timeline of implementation. The different contractors are involved by the owner in the renovation project in successive phases, according to the initial plan. The design risk is shared between the owner and the designer, while different contractors assume the construction risks associated to their tasks.

The following points should be included in such forward-looking overall planning:

- Chronological order of the measures: besides the expected time-point for the renewal of the individual components this also depends on the functional context. For instance, for window replacement with airtight windows, the installation of a mechanical ventilation system will also be necessary at the same time. Similarly, a heat pump with low temperature heating can only be installed if the heating load has already been largely reduced by means of insulation measures.
- Energy-relevant quality of individual building components: if the future quality of thermal protection of all building components is determined in advance, then the energy standard of the building that is achievable in the future can be ascertained by means of an energy balancing software program. The future energy costs and savings can also be determined with this. The transparent final goal provides motivation for implementing the necessary building component quality at each step.
- Building envelope – position of the airtight layer and insulation layer: if the approximate location of the airtight layer and insulation layer in the building component structure is specified, then it will be possible to find out whether the two layers can be continued without any gaps at the component connections as far as possible – even in the case of adjacent components which are not being modernised at the same time. This is the only way to achieve a building that is airtight and thermal bridge minimised as a whole.
- For subsequent measures, clarify in advance the points that must be given attention now: a good standard of thermal protection can only be achieved easily and cost-effectively if the interrelationships between measures that are not being implemented at the same time are kept in mind in advance. A typical example is that of a new balcony which is already joined to the (as yet)
uninsulated wall of the house with a thermal separation. What at first does not seem to make sense in terms of construction prevents a massive thermal bridge at a later point in time when the wall insulation is carried out, and therefore makes it possible to realise the full potential for saving energy.

- **Economic efficiency analysis** (optional): if the energy savings achievable over the useful life of the measure are compared with the investment costs which are necessary for improving efficiency going beyond the level for maintenance alone, then it will be easy to recognise whether a measure is successful in economic terms as well. As a rule, this may support the building owner’s decision to implement ambitious efficiency measures. In addition, the building owner can already plan for the necessary investment funds in the long term.

- The step-by-step renovation model was deeply studied and standardised within the EU project EnerPHit that developed the EnerPhit Standard based on the Passive House methodology and concept.

In conclusion, step-by-step modernization permits to building owners with limited financial resources to spread the investment costs for modernisation measures over a longer period of time. Moreover, the model permits to avoid unnecessary renewal or repair of components that are still good in terms of appearance and function. The extra costs for improving the level of thermal protection will often be moderate if energy saving measures are carried out at the same time as repair work that is necessary in any case. This speaks in favour of energy-related modernisation of each building component only when it needs to be repaired anyway.

*Table 3.2: St. Gallen approach for OSS based on Step-by-Step approach business model*

<table>
<thead>
<tr>
<th>WHAT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The business model provides the following advantages for the customer:</td>
</tr>
<tr>
<td>• The individual building components have a different useful life duration. In general, not all building components will need to be repaired or renewed when building refurbishment is intended. With a step-by-step modernisation, one can normally avoid unnecessary renewal or repair of components that are still good in terms of appearance and function</td>
</tr>
<tr>
<td>• With limited financial resources, it allows to spread the investment costs for modernisation measures over a longer period of time</td>
</tr>
<tr>
<td>• Certainty that the agreed energy standard will actually be achieved</td>
</tr>
<tr>
<td>• Increase in property value through independent quality assessment</td>
</tr>
<tr>
<td>• The costs are spread over a longer period of time and are therefore easier to bear for the building owner.</td>
</tr>
<tr>
<td>• A step-by-step modernisation may be developed even without taking out a loan, i.e. only equity may be used. For many building owners, this is the most important reason for carrying out modernisation measures in succession.</td>
</tr>
<tr>
<td>• Full use can still be made of the remaining service life or residual value of components if necessary. In this way one can avoid unnecessary additional investment costs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public building owner or private building owners that intends to renovate their property over a long period of time, targeting high level of energy efficiencies and a certification of the results that will be achieved.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOW:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The building owner, being it a private or public owner, in collaboration with the designer (planner) defines a planning for the renovation measures to be carried-out and a timeline of implementation.</td>
</tr>
<tr>
<td>The <strong>designer (planner) is the key player</strong> in this business model, because he/she is in charge of the whole renovation plan including different steps to be carried-out and the time schedule. The owner maintain an</td>
</tr>
</tbody>
</table>
important role being responsible, in collaboration with an optional project manager, of the entire project. The
different contractors are involved by the owner (eventually by the project manager, if any) in the renovation
project in successive phases, according to the initial plan. The design risk is shared between the owner and
the designer, while different contractors assume the construction risks associated to each of their tasks.

WHY:

Cost structure for the main contractor:
The main cost for the designer are those associated with the training for the use of the tool, accreditation
other than standard design activity costs (salaries, administration and support costs, marketing costs, etc.)

Revenue streams for the main contractor:
- The designer (planner) is remunerated for the service provided. Additional revenues are related to
  the certification procedure (optional).

Innovative business models

Hereafter examples of innovative applications of the above described business model are provided.

<table>
<thead>
<tr>
<th>ENERPHIT</th>
<th>(SWEDEN, DENMARK, FRANCE, SPAIN, ITALY)</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS MODEL</td>
<td>One Stop Shop Model – Step-by-Step approach</td>
<td></td>
</tr>
<tr>
<td>TARGET BUILDINGS</td>
<td>Single-family homes, multi-family houses, commercial building</td>
<td></td>
</tr>
<tr>
<td>RENOVATION DESCRIPTION</td>
<td>The EuroPHit project developed a methodology for the step-by-step business model, based on retrofitting of existing building facilities with passive house components supported by an initial planning of the activities. Within EuroPHit, a certification scheme for step-by-step retrofit with Passive House components was established. The focus of the scheme was on the creation of an EnerPHit Retrofit Plan (ERP) for all energy refurbishment measures, to be implemented independently over a given period of time. Only through this approach can a satisfying result be achieved for stepwise retrofit projects. If energy retrofits are carried out in several individual consecutive steps, then precertification of the building as a Passive House or EnerPHit project is possible. Unlike for certifications of completed buildings, the preparation of a comprehensive EnerPHit Retrofit Plan (ERP) is a prerequisite for this in order to verify the possibility to achieve EnerPHit Standard at the completion. The pre-certificate provides building owners and planners with the security that the standard being aimed for will actually be achieved after completing all steps. The EnerPHit Retrofit Plan (ERP) is a document for building owners, including well-thought-out overall concept for stepwise retrofits and taking into account important interrelations between different energy saving measures permitting to obtain an optimal final result with manageable effort. The ERP can be submitted to a Passive House</td>
<td></td>
</tr>
</tbody>
</table>

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768287.
certifier, who will check the coherence of the described step-by-step process and the fulfilment of the criteria. This gives the building owner the guarantee that the EnerPHit Standard will be met if all steps are carried out as described. The ERP can be certified after the first step has been completed and verified by the certifier. In the subsequent years, the client confirms all other steps with the certifier. Changes to the original concept are possible if the requirements can still be met. This should be clarified with the certifier.

The EuroPHit project completed a total of 6 case study projects. Building types and retrofits measures range from single-family homes to multi-family houses (residential social high-rise buildings) in different EU countries (Sweden, Denmark, Germany, France, Spain, Italy) and a commercial building. Other case study project, still on-going have been started for the step-by-step renovation of public buildings, in particular school buildings.

<table>
<thead>
<tr>
<th>SERVICE PROVIDER</th>
<th>Passive house certifier (designer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY PARTNERS IN THE SUPPLY CHAIN</td>
<td>Contractors and installers, potentially Project Manager</td>
</tr>
<tr>
<td>COST AND REVENUES</td>
<td>The building owner initially invests on the design phase, involving a designer for the planning of the whole retrofitting, while other costs are spread over a longer period of time. The revenues comes from the contractors (for the designers).</td>
</tr>
<tr>
<td>CONTACTS</td>
<td>Website: <a href="https://europhit.eu/content/enerphit">https://europhit.eu/content/enerphit</a></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:info@passivehouse-international.org">info@passivehouse-international.org</a></td>
</tr>
</tbody>
</table>
### SWOT Analysis

<table>
<thead>
<tr>
<th>S: Strengths of the BM</th>
<th>W: Weaknesses of the BM</th>
<th>O: Opportunities for BM widespread coming from country market</th>
<th>T: Threats hindering the BM widespread coming from country market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality assured passive house concept over 20 years</td>
<td>Increased cost due to certified experts accredited by the Passive House Institute (PHI) are required</td>
<td>A well-known and consistent international system could attract future potential buyers of the building</td>
<td>Difficulty to attract customers interest with a building certification approach</td>
</tr>
<tr>
<td>The certification includes basic and advanced energy criteria to be met.</td>
<td>Lack of knowledge among designers/planners for the use of software</td>
<td>Various opportunities to certify existing buildings</td>
<td>Difficulty to transfer certification into real market value on the housing market</td>
</tr>
<tr>
<td>Accurate calculations in passive programs, PHPP</td>
<td>Complex evaluation methodology requiring high level of expertise</td>
<td>A step-by-step plan of renovation, indicating measures to be implemented over time could permit to overcome customers reluctance to face high investments</td>
<td></td>
</tr>
<tr>
<td>High demands on energy efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs spread over a long period of time</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

17 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespread coming from country market, T: Threats hindering the BM widespread coming from country market
3.1.1.2. **OSS provided as a complementary business (e.g. by utilities)**

Key actor in developing a One-Stop-Shop Model for existing buildings renovation could be either real estate agency, insurance company or utility. **The key actors take advantage of its existing market position, to sell a complete package which they compose by using subcontractors.** For those actors that develop a complete service package there are a lot of opportunities:

- Renovation focusing on energy efficiency is a growing business as old houses count for a large share of housing stock
- New partnerships with other companies in order to put in place the necessary skills can open and create new business
- Fulfil the real needs of the house owner: Complete and objective proposals for the job - in contrast to an incomplete and unclear proposal/quotation.

As already mentioned, the first step to develop a new and innovative One-Stop-Shop business model is to understand the customers’ real needs. Regarding renovation, the building owner might not know his own needs, as he has no knowledge about what can be done to the building in order to make it more energy efficient. The decision making process is therefore in this situation a “learning process”. To “teach” and guide him through this, credibility and trustworthiness is a prerequisite. As a consequence, the challenge is to create consortiums with a mixture of credibility, an existing market position, capacity and capability to supply a complete package of good quality. Thus, in the case of stakeholders that decided to expand their business into renovation as a complementary business, they shall involve directly installers to change for example heating system, carpenter to install windows, construction company to improve insulation and/or install windows, and energy auditor to evaluate energy efficiency potential other actors may be also window/door supplier, insulation supplier, painters, heating system suppliers. Table below provides the St. Gallen approach for this BM.

*Table 3.3: St. Gallen approach for OSS provided as a complementary business (e.g. by utilities) business model*

<table>
<thead>
<tr>
<th>WHAT:</th>
<th>Full-service renovation, including financing. This means qualified advice, relevant competitive products and prices, one point of contacts/“hassle free”, quality and delivery guarantee, financing (both mortgage loan and loan with no security), handling of possible subsides.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO:</td>
<td>Owners of single-family houses with energy saving potential (houses with old energy equipment or built before 1970). The network of contacts already available from the main contractor shall guarantee dedicated personal assistance of a team of skilled energy advisers. Main channels to reach these customers may be: information on nationwide television, phone and email, on site visit to homeowners, banks affiliated to a large mortgage credit institution who can refer interested homeowners to the main contractor and can finance possible bought solutions (dedicated personal assistance).</td>
</tr>
<tr>
<td>HOW:</td>
<td>The main service provider is the company (e.g. utility) that decides to expand its business into renovation, thus providing their manager, experienced consulting, administration and marketing personnel. Thus main activities provided by the main contractor are: marketing, advice (primarily on single products to achieve largest energy savings), contacts to partners (e.g. arrangement of customers’ visits), offer for renovation and service/after sales (checking customer satisfaction). The consortium to provide a full renovation service...</td>
</tr>
</tbody>
</table>
shall be then created and mainly made up of various contractors (performing customers visit and installation), suppliers (mainly strong company brands) and a bank and mortgage credit institution.

**WHY:**

**Cost structure for the main contractor:** salary of manager, consultancy, administration and support costs, marketing costs

**Revenue streams for the main contractor:** products’ sales

*Innovative business models*

Hereafter examples of innovative applications of the above described business model are provided.

<table>
<thead>
<tr>
<th>DONG-CLEANTECH CONCEPT</th>
<th>DENMARK</th>
<th>NON ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUSINESS MODEL CATEGORY</strong></td>
<td>One Stop Shop Model – complementary business provided by utility</td>
<td></td>
</tr>
<tr>
<td><strong>TARGET BUILDINGS RENOVATION</strong></td>
<td>Private Single Family Houses (with particular focus of houses built before 1970 and/or houses with oil boiler)</td>
<td></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>The Dong-CleanTech concept was developed by Dong Energy A/S, one of Northern Europe’s leading energy groups, as a full service package solution offered in cooperation with partners for installation of heat pumps, insulation, windows, solar heating and building thermography. Dong Energy took care of advice, sale and coordination, e.g. handled the necessary paperwork and possible application for a national renovation subsidy and offered financing solutions.</td>
<td></td>
</tr>
<tr>
<td><strong>SERVICE PROVIDER</strong></td>
<td>Energy utility</td>
<td></td>
</tr>
<tr>
<td><strong>KEY PARTNERS IN THE SUPPLY CHAIN</strong></td>
<td>Contractors, Products/heating system suppliers, financial institutions</td>
<td></td>
</tr>
<tr>
<td><strong>COST AND REVENUES</strong></td>
<td>Customer pays for the renovation while the service provider takes charge of the salary of product manager, marketing, consultancy, administration and support, earning money from products’ sales.</td>
<td></td>
</tr>
<tr>
<td><strong>CONTACTS</strong></td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>
SWOT Analysis

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dedicated personal assistance for maintaining customer relationship</em></td>
<td><em>BM not in operation from early 2012 due to the change in the core business of the company Dong Energy, that as an oil and gas producer stopped accordingly the activity of actively stimulating energy savings in buildings. However, as part of its energy efficiency obligation target [Energistyrelsen, 2009] Dong Energy gives subsidies for some specific energy saving activities carried out by house owners if they apply for it (Vendsøen, 2012).</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>In Denmark the policy that the buildings will be fossil fuel free by 2035, including electricity supply to be based on renewable resources, led the Danish Construction Association to recommend one-stop-shop service to its members to offer full service holistic energy efficiency renovation of single family houses ([Dansk Bygning, 2012]).</em></td>
<td><em>The energy audit report is not very detailed and comprehensive.</em></td>
</tr>
<tr>
<td><em>Energy audit report or energy performance certificate</em> is mandatory in Denmark when a house is sold and is done by certified energy auditors.</td>
<td><em>Often tax deduction is used for non-energy related measures such as improving kitchen, bathrooms, painting, a new or improved balcony, or house cleaning</em>*. The level of subsidy or tax deduction could increase with increased level of energy efficiency renovation.*</td>
</tr>
<tr>
<td><em>There are tax deductions for labour cost for home renovation and other household work.</em></td>
<td></td>
</tr>
</tbody>
</table>

*Such a document usually contains a list of recommended measures to improve the energy standard of the house. The idea behind the energy audits/certificates is that prospective buyers will factor the energy audit information in the house purchase decision and implement the recommended energy efficiency measures.

**An amendment to the tax deduction programs to incorporate specific requirements regarding energy efficiency of implemented measures may increase homeowners’ interest in energy efficient renovation.

3.1.1.3. **OSS provided by multi-disciplinary team cooperation**

Multidisciplinary team cooperation is a novel model of business where the project is carried out by a multi-disciplinary team in a cooperative manner. The multi-disciplinary team consists of partners with complementary competences, such as architects and designers, constructors, energy-efficiency experts, market and financial experts, technology suppliers, strategy and operations planners. Starting from the initial design phase, the team works together, in strict collaboration with the building owner, in order to select the most feasible intervention technologies and renovation measures to adopt, planning the whole renovation project according to customers’ needs and desiderata, considering also the costs related to planned works.

The cross-fertilisation of gathering different actors together in an early phase of the renovation project permits to define a holistic approach to the renovation intervention. In this way sustainable and energy-efficient retrofitting solutions and innovative solutions for the life time of the facility can be achieved, with an optimal control over the total costs of the renovation project and guaranteed efficiency performances.

The main idea in this business model is that the same team of consultants representing different design disciplines or expert areas will carry on with the project and produce the holistic design service for the building retrofitting.

The team should be able to give a deeper value promise based on their value proposal in the initial competition stage. Value proposal cover the overall offerings each organisations of the team could produce. Value promise is a part of offerings and tailored for the facility question and it is answering to the targets of the client. Value promise should be in core of the contract with the client and the team. Table below provides the St. Gallen approach for this BM.

---

18 S: Strengths of the BM; W: Weaknesses of the BM; O: Opportunities for BM widening coming from country market, T: Threats hindering the BM widening coming from country market
Table 3.4: St. Gallen approach for OSS provided by multi-disciplinary team cooperation business model

<table>
<thead>
<tr>
<th>WHAT:</th>
<th>The business model provides the following advantages for the customer:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Support of a wide network of professional multi-disciplinary team of experts, providing an holistic approach to the renovation project, with high level of flexibility in the design phase</td>
</tr>
<tr>
<td></td>
<td>• Owner directly involved in the definition of the intervention measures to be included in the renovation project</td>
</tr>
<tr>
<td></td>
<td>• Optimal control of the total costs in an early phase of the project</td>
</tr>
<tr>
<td></td>
<td>• Optimal integration of different measures thanks to cooperation between different actors involved in the renovation project</td>
</tr>
<tr>
<td></td>
<td>• Total design and operational concept for retrofitting which covers life cycle of the building</td>
</tr>
<tr>
<td></td>
<td>• Responsibilities and risks are shared between the members of the team</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHO:</th>
<th>The customers’ segments targeted by the multidisciplinary team cooperation business model are large buildings (offices) with private owners, or multi-family buildings, with private or public owners, as in the case of municipalities’ social housing.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The channels used to reach the target customers are mainly those used for design procurement: integrated project delivery method and any methodology which support strong design team integration and design iterations</td>
</tr>
</tbody>
</table>

| HOW:  | The model involves the complete chain of players of the renovation sector, involving them in a collaboration session of design, aiming at define the renovation project, merging different expertise and professional capability. This reflects on a more holistic and innovative result, provided by the team. |

<table>
<thead>
<tr>
<th>WHY:</th>
<th><strong>Cost structure for the service provider:</strong> As the services provided through the team are wider than in the case of traditional design services the cost structure is also wide.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Revenue streams for the service provider:</strong> The revenue stream is based on multi-professional services and services for the life cycle phases of the building. Services for the owner /clients and services for end users.</td>
</tr>
</tbody>
</table>

Innovative business models

Hereafter the innovative application of the above described business models are provided.
ENERGIESPRONG\textsuperscript{19} & NETHERLANDS & ACTIVE \\

<table>
<thead>
<tr>
<th>BUSINESS MODEL CATEGORY</th>
<th>One Stop Shop Model - Multidisciplinary-team collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>TARGET BUILDINGS RENOVATION</td>
<td>Multi-family buildings (social housing sector), public owner</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Energiesprong is a Dutch program that has developed energy renovation kits for the social housing stock built between 1950 and 1970 in the Netherlands. The project involves several actors, Energiesprong plays the role of an Energy Renovation Facilitator, as it succeeded in bringing together different stakeholders as the public building owner (social housing associations) with private contractors. The building owners are widely involved in this process as they take the financial risk because of the bank’s loan, they invest in the energy refurbishment of the houses and they receive the rent and energy bills paid by the tenants until the loan is repaid. Moreover, there is a private company that has the assignment to rate the projects submitted by energy renovation companies as these latter have to guarantee: a 3-day delivery timetable, aesthetic attractiveness of the project and a 30-years insurance-backed energy performance. For what concerns the intervention, the changes interest the roof, the floor, the heating plant, the façade and the walls’ insulation. It is possible to operate on at most 3-4 floors buildings. The process is characterised by the use of prefabricated components and the heating plant is always put outside the house in order to gain internal space and avoid annoying noises. The principal aim is to try to sell to people something they have never been interested to, in other terms, try to create a business model as there is still very little demand for nZEBs. However, for private owners it has been stated that other 3 years, at least, are needed in order to set up the conditions for them to invest in such interventions. Finally, this method does not foresee a free field of action for the architect, as it is basically based on prefabrication and industrialisation models, that for their nature do not take into account a free architectural composition approach. An Energiesprong renovation is financed in two ways: through energy cost savings from tenants and by reduced maintenance and repairs costs for building owners (municipalities, housing associations). The objective is that tenants have the same monthly expenses – they pay the owner (municipality, housing association) an energy service plan instead of the bill of the energy supplier. The housing association can now use this income stream to pay for the renovation. In most markets (including the Netherlands) legislation needs to allow the conversion of the monthly energy bill into a so-called energy plan for the housing association.</td>
</tr>
<tr>
<td>SERVICE PROVIDER</td>
<td>Local technology providers under the coordination of the Energiesprong teams (market developers) acting as facilitators</td>
</tr>
</tbody>
</table>

\textsuperscript{19} \url{http://energiesprong.eu/}
KEY PARTNERS IN THE SUPPLY CHAIN

Local authorities, financial partners, technology providers, installers.

COST AND REVENUES

The costs for the service providers are that related to the renovation work (prefabricated components and heating plant), salaries, etc. Revenues are based on a standard remuneration for each intervention.

CONTACTS

http://energiesprong.eu/

SWOT Analysis

- **S**: Strengths of the BM
  - Holistic solution to all energy and energy savings demands
  - Quick to install once manufactured (less than a week)
  - Offsite manufacture, high accuracy
  - Non-intrusive retrofit, with no need to move out during the works
  - Energy performance contract generated to guarantee the long-term performance of improvements
  - Improvements to residents’ quality of life
  - Aesthetic improvements
  - Evidence so far is that energy performance is not a problem and the retrofitted homes are net suppliers

- **W**: Weaknesses of the BM
  - Potential planning issues
  - First deployment will only cover certain types of houses

- **O**: Opportunities for BM widespread coming from country market
  - Funding opportunities for a pilot scheme
  - Very visible
  - Drives innovations and integration of solutions; e.g., new high-performance packages rather than improving existing solutions
  - Innovation in technology very fast (prices dropped 30%; installation times have halved since the project start)

- **T**: Threats hindering the BM widespread coming from country market
  - Lack of expertise and contractors in each of the proposed countries (at the moment)
  - New business model
  - Requires a decent building stock and cost could increase for properties in the need of deep renovation works

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20 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespread coming from country market, T: Threats hindering the BM widespread coming from country market
<table>
<thead>
<tr>
<th>KVA CASE&lt;sup&gt;21&lt;/sup&gt;</th>
<th>FINLAND</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUSINESS CATEGORY</strong></td>
<td>One Stop Shop Model – Multidisciplinary-team collaboration</td>
<td></td>
</tr>
<tr>
<td><strong>TARGET BUILDINGS RENOVATION</strong></td>
<td>Large office building (e.g. Hippostalo building in Tampere, Finland)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The business model suits the projects where clients are seeking for large scale changes and upgrading of technical service systems and spaces. A good location of the facility in question is often required; otherwise the project is not economically feasible.</td>
<td></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>The full-service provider in case of KVA concept is represented by a team of architects. Indeed, they rely on their expertise and knowledge for managing and providing holistic renovation project. This concept was born in the framework of Nordic Built initiative to accelerate the development of sustainable building concepts – combining key Nordic strengths, providing arenas for collaboration and realising concrete projects that demonstrate world-class scalable solutions. The programme was initiated by the Nordic ministers for trade and industry and carried out in the period 2012-2014. In this context, the project proposal “Equilibrium” for the complete refurbishment of the Hippostalo Building in Tampere won the first price in Finland. Indeed, it was developed by a multi-disciplinary team that collaborated for the definition of a holistic renovation project, including both EE and RET. The team, managed by the KVA Architects, included also other technical experts, such as a Mechanical Engineer, Workplace Specialist, Sustainability Consultant.</td>
<td></td>
</tr>
<tr>
<td><strong>SERVICE PROVIDER</strong></td>
<td>The team of KVA Architects represents the service provider.</td>
<td></td>
</tr>
<tr>
<td><strong>KEY PARTNERS IN THE SUPPLY CHAIN</strong></td>
<td>The other consultants and contractors involved within the multi-disciplinary team, during the entire development of the project, including the design phase, are the key partners.</td>
<td></td>
</tr>
<tr>
<td><strong>COST AND REVENUES</strong></td>
<td>High cost related to the high number of players involved in the project since the design phase.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:ritva.kokkola@kva.fi">ritva.kokkola@kva.fi</a></td>
<td></td>
</tr>
</tbody>
</table>

3.1.1.4. OSS provided by joint venture of retailers with industry and contractors

Another possibility for implementing a One-Stop-Shop model for renovating existing buildings is by means of a joint venture of retailers with industry and contractors. Consortium of industry actors with complimentary products defines a full service package which they even can brand. Directly involved stakeholders are the retailers together with industry actors with more than one relevant product, which means that the company has a very strong interest in succeeding with a broader concept. Table below provides the St. Gallen approach for this BM.

Table 3.5: St Gallen approach for OSS provided by joint venture of retailers with industry and contractors business model

<table>
<thead>
<tr>
<th>WHAT:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Added values for the clients shall be found in the one-stop shop package that offers all kind of renovation services. Indeed customers shall have:</td>
<td></td>
</tr>
<tr>
<td>• Easy access to energy saving renovation services under one roof, getting all from one trusted vendor (nationwide single-point contact retailers) providing knowledge on holistic renovation as well as on energy efficient use of the house</td>
<td></td>
</tr>
<tr>
<td>• Flexible funding and frequent customer benefits based on different ways of buying: all installed, partly installed, just products, flexible project schedules</td>
<td></td>
</tr>
<tr>
<td>• Project management (help obtaining approvals from local authorities and apply for subsidies, quality assurance, energy certificate, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHO:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Target clients are owners of single family houses built in 60-80, that urgently need renovation. Target clients can be attracted also from the physical network of retailers having their stores. Dedicated personal assistance can be provided in this case. Marketing through local newspaper or association magazines, local community networks, direct mail, invitation to local information evenings, on site visit to the homeowners.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOW:</th>
<th></th>
</tr>
</thead>
</table>

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22 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespreading coming from country market, T: Threats hindering the BM widespreading coming from country market
Key partner is the retailer (or a building product supplier) that of course may have specific contracts with other contractors, local retail stores as suppliers (insulation, heat pumps, heating systems, ventilation systems, doors, etc.) or various partners with expertise in building physics and energy and heating, planning and installations, energy auditors and certificate suppliers, banks. Key partner shall thus ensure the following activities: marketing, selling of all products needed in house renovation as well as most of the services which needed in house renovation (e.g. planning, installation, etc) potentially through an “energy saving renovation” service center inside the store.

Thus key resources shall be a large variety of well known brands products, proper distribution network, customers’ database, administration and marketing personnel as well as project managers.

**WHY:**

Cost structure for the main service provider: material and products costs, labour costs (salaries and overheads, marketing costs, travel costs, subcontracting of the renovation work).

Revenue streams for the main service provider: Payment from customers from the services and products purchased, commission from products suppliers

### Innovative business models

Hereafter the innovative application of the above described business models are provided.

#### K-RAUTA AND RAUTIA - FINLAND

<table>
<thead>
<tr>
<th>BUSINESS MODEL CATEGORY</th>
<th>TARGET BUILDINGS RENOVATION</th>
<th>DESCRIPTION</th>
<th>SERVICE PROVIDER</th>
<th>KEY PARTNERS IN THE SUPPLY CHAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Stop Shop Model - joint venture of retailers with industry and contractors</td>
<td>Private Single Family Houses (all houses in the need of renovation)</td>
<td>This business model is offered from early 2012 by the two hardware store chains K-Rauta and Rautia of the Kesko group (<a href="http://www.kesko.fi">www.kesko.fi</a>). K-Rauta is an international specialty store for builders, renovators and interior decorators. It operates in Finland, Sweden, Estonia, Latvia and Russia. Rautia is a nationwide hardware and builders’ supplies store chain to serve builders and renovators at over 100 locations throughout Finland. The energy renovation service concepts in both chains are basically the same, where trusted local renovation companies complete the renovation work. The company Raksystem Anticimex conducts building inspection and provides independent advice. Financing is also included in the package solution.</td>
<td>Two hardware store chains K-Rauta and Rautia of the Kesko group (well-known brands and distribution network) - Retailer cooperating with contractors and industry partners.</td>
<td>Product and material suppliers and manufacturers (insulation, heat pumps, heating systems, ventilation systems, fireplaces, windows, doors, lamps, all other buildings materials), installation companies, energy auditors, financial institutions and bank, renovation service providers (planning, installations, renovations, energy surveys, heat camera inspections).</td>
</tr>
</tbody>
</table>
**COST AND REVENUES**

Customer pays for the renovation as well as suppliers pays commissions while the service provider takes charge of the material and product, salaries & overheads, marketing, travel, subcontracting from the other partners.

**CONTACTS**

Website: https://www.k-rauta.fi/remontti

Email: verkkokauppa@k-rauta.fi

**SWOT Analysis**

- **S**: Solutions are sold in easy and understandable packages/modules
- **W**: The availability of energy advice service needs to be better advertised and the quality improved to attract more homeowners to avail such a service (Mähäpää et al., 2011).
- **O**: There are tax deductions for labour cost for home renovation and other household work.
- **T**: In Finland, energy audit report is voluntary and not mandatory.
- **W**: Different options for renovation (all installed, partly installed, just products, flexible project schedules) are offered at flex price given before buying and with flexible funding.
- **O**: Public funded energy advisers may encourage homeowners to adopt energy efficiency measures as the energy advisers are mandated to provide independent advice which improves their trustworthiness.
- **T**: Often tax deduction is used for non-energy related measures such as improving kitchens, bathrooms, painting, a new or improved balcony, or house cleaning. The level of subsidy or tax deduction could increase with increased level of energy efficiency renovation.
- **W**: All other building and housing materials products and services also offered from same vendor.
- **O**: Rautakoski in Finland offers energy related short term and one year training to its personnel (In Rauta and K-Rauta chains) who are called as energy experts and energy masters, respectively.
- **T**: The Finnish homeowners are often concerned that equipment suppliers capitalise on homeowners’ limited knowledge on energy and building renovation issues (Sitra, 2011).

**ENRA**

**FINLAND**

**NON-ACTIVE**

**BUSINESS MODEL CATEGORY**

One Stop Shop Model- joint venture of retailers with industry and contractors

**TARGET BUILDINGS RENOVATION**

Private Single Family Houses (all houses in the need of renovation)

**DESCRIPTION**

The ENRA concept was offered by a group of companies offering different individual energy renovation services or solutions in a holistic package. The technical solutions offered were energy efficient windows and doors, heat pumps, internal extra insulation or new insulation, and demand-based ventilation with heat recovery.

**SERVICE PROVIDER**

The core company Rustholli was a renovation service provider, then substituted by the company NordBuild - a retail approach

**KEY PARTNERS IN THE SUPPLY CHAIN**

Product and material suppliers and manufacturers (insulation, heat pumps, heating systems, ventilation systems, fireplaces, windows, doors, lamps, all other building materials), installation companies, energy auditors, financial institutions and bank,

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23 S: Strengths of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespread coming from country market; T: Threats hindering the BM widespread coming from country market
<table>
<thead>
<tr>
<th>COST AND REVENUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>renovation service providers (planning, installations, renovations, energy surveys, heat camera inspections). Customer pays for the renovation as well as suppliers pays commissions while the service provider takes charge of the material and product, salaries &amp; overheads, marketing, travel, subcontracting from the other partners.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACTS</th>
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</thead>
<tbody>
<tr>
<td>n/a</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SWOT Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S: The service provider actively looks for customers through local meetings.</td>
</tr>
<tr>
<td>W: Since May 2011 the concept is on break and is not offered by anyone as the core company Husfloh (a renovation service provider) went bankrupt at the end of 2010. Nevertheless, the reason for bankruptcy was not due to their launch of the one-stop-shop concept as it formed only a marginal share of the company revenue. The concept is now owned by the company Nordbuild</td>
</tr>
<tr>
<td>O: There are tax deductions for labour cost for home renovation and other household work.</td>
</tr>
<tr>
<td>T: In Finland, energy audit report is voluntary and not mandatory.</td>
</tr>
<tr>
<td>O: Public funded energy advisers may encourage homeowners to adopt energy efficiency measures as the energy advisers are mandated to provide independent advice which improves their trustworthiness.</td>
</tr>
<tr>
<td>T: Often tax deduction is used for non-energy related measures such as improving kitchens, bathrooms, painting, a new or improved balcony, or house cleaning. The level of subsidy or tax deduction could increase with increased level of energy efficiency renovation.</td>
</tr>
<tr>
<td>T: However, the availability of energy advice service needs to be better advertised and the quality improved to attract more homeowners to avail such a service (Mahapatra et al., 2011).</td>
</tr>
<tr>
<td>T: The Finnish homeowners are often concerned that equipment suppliers capitalize on homeowners’ limited knowledge on energy and building renovation issues (Uitra, 2011).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BOLIG ENØK</th>
<th>NORWAY</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS CATEGORY</td>
<td>One Stop Shop Model - joint venture of retailers with industry and contractors</td>
<td></td>
</tr>
<tr>
<td>TARGET BUILDINGS RENOVATION</td>
<td>Private Single Family Houses (all houses built in 1960-80s – homeowners who have the capacity to increase their mortgage loan)</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>The Norwegian company Bolig Enøk is a newly established daughter company of one of the two major insulation actors in Norway; Glava AS. Bolig Enøk offers a Project Manager service to owners who have a need for renovation of their single family houses. The Project Manager is responsible for the complete renovation process including technical analysis, recommendations, project management, contact with all involved actors such as main contractor, subcontractors, authorities, and assists the homeowner with application for relevant grants. Bolig Enøk planned to issue the invoice for the complete project and thereby take on the risk towards the customer. The house is considered as a system. All products and craft services are provided through local tendering. These suppliers will therefore see an interest in developing this as a new business opportunity and unscrupulous actors will be avoided. All analysis, renovation recommendations,</td>
<td></td>
</tr>
</tbody>
</table>

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24 S: Strengths of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespread coming from country market, T: Threats hindering the BM widespread coming from country market
products, solutions and service providers will be evaluated during and after renovation. The best competence possible, courses and certification will be undertaken to build credibility. These actions should be addressed to all co-partners, local authorities and customers. This service including energy efficient renovation, including specific products should be recommended by Enova (public enterprise promoting sustainability). Through certification of the Project Managers and by tendering, the homeowner should be assured he/she gets a neutral counseling. Through on-site visits and analysis, the Project Managers will make the house owner aware of his/hers opportunities to renovate the house into a good energy efficient standard, with a plan of action (what to do first), how to do it (offer certified carpenters) as well as a cost plan and subventions opportunities for the renovation process. Based on the analysis, competitive offers for holistic renovation are offered the house owner. Competent project management facilitates and reduces the risk of the renovation process. Through accumulated experience from the projects, stereotypes open for replicas will be made. The service includes updated information about all available subsidies to the project. These factors will increase the attractiveness of the service for the house owner compared with the option of doing itself.

**SERVICE PROVIDER**
Building product supplier - insulation manufacturer. As they lacked competence in sustainable heating systems, they later acquired a supplier of such systems. The company now finds new entrances in the market by offering renovation project management services to homeowners via do-it-yourself stores. Project management approach where industry actor plays in cooperation with retailers and constructors. Due to the broad competence of the Project Manager, the homeowner gets technical analysis, recommendations and project management of the renovation process served by one person. The Project Manager takes care of contacts with all involved actors such as main contractor, sub contractors, authorities and financing institutions.

**KEY PARTNERS IN THE SUPPLY CHAIN**
Contractors, local retail stores, various partners with expertise in building physics and energy and heating (e.g. energy experts (Sintef, Glava, KVT)).

**COST AND REVENUES**
Customer pays for the energy audit and analysis report (about 1000 euros including VAT) and for the renovation (about 10500-300000 euros including VAT) while the service provider takes charge of the salaries of the project managers (major of the cost and thus the effective use of PM hours is the most critical factor for profitability), marketing, travel, administration and support. The homeowner will be invoiced for the complete project by Bolig Enøk, which thereby take on the full risk towards the customer. The Project Manager Service (Product) will be offered at competitive terms (Price) as Bolig Enøk achieves good rates through their tendering process, and thereby also secure profitable business. By distributing the idea of a holistic approach through different medias (Promotion), potential customers awake their interest to visit information evenings arranged by Bolig Enøk and there describe how the service solves the customer’s needs. During such events and followed up by on site visits (Place) the personal contact and trust will be established.

**CONTACTS**
Website: https://boligenok.no/
3.1.1.5. OSS provided by contractors’ cluster cooperation

In today’s construction industry a movement from conventional competition and contract models towards new partnership and collaborative business models can be observed. These partnership business models comprise nowadays management and manufacturing methods and correspond more to real businesses in the construction industry. This progress of the market within the construction sector leads to a usage of new business models also in order to overcome traditional price-driven competition towards a more collaborative construction industry working environment and a value-driven competition. Moreover, each large building retrofitting project needs slightly different business models according to building ownership, building typology, requirements, barriers such as available financing, actors engaged, guarantees, referenced projects, etc. The actors in the retrofitting project life cycle should be able to choose the optimal business model, and should be able to realise it (organisation, contracts, resources, knowledge, and technical competences). Solid and well-defined methodology and tools (ICT) are needed for the project based on development and implementation of these novel business models.

An individual SME is limited in many ways to reach these goals. The only solution is a collaborative, cluster or networked based approach.

In this context, it may happen that the service provider of the One-Stop-Shop business model is represented by a team of contractors that may be made entirely by SMEs or by a major contractor and its affiliated partners. Small-medium sized construction companies may thus enter into partnerships with other actors such as suppliers of key components/material and architect/engineering company if these capabilities do not exist in house.

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25 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespreading coming from country market, T: Threats hindering the BM widespreading coming from country market
Indeed, in case of SME cluster collaboration, generally, the SMEs scope, competences and resources are limited for developing large construction investments, for example large real-estate retrofitting projects. Mainly in the public sector, where the competition is based on the "lowest price" criterion, the SMEs have many difficulties to win the projects. An important opportunity is the adaptability and flexibility of SMEs to different contractual arrangements. This can be implemented only by a group of companies covering all required competences, in well-organised collaborative approach. The operation and maintenance organisation and end-users should be directly involved. These actors have key impact on high performing buildings (retrofitted buildings) and with that also on the overall outcome (economic, environmental, social) of the retrofitting project.

In this framework, SMEs operating in the construction field and in the same region may look for a holistic coverage of the construction industry market, applying business models which can be profitable by fulfilling a wide spectrum of clients’ requirements. Clusters of regionally active construction SMEs have an increasingly need to be organised into networks or strategic alliances. This will answer to the business opportunities, which require individual resources such as specific expertise, workforce or equipment. For widening the range of competences some of them enter even wider association such as e.g. German Facility Management Association (GEFMA).

Nevertheless it has to be underlined that when the client is from the public sector, it is necessary to define the leader of the SME cluster to be possible to contract projects. Definition of the leading SME partner can be a problem. Legal issues have to be cared about (contract forms, assurances in the case of SME bankruptcy, responsibilities and guarantees for longer time).

Table below provides the St. Gallen approach for this BM.

**Table 3.6: St. Gallen approach for OSS provided by contractors’ cluster cooperation business model**

<table>
<thead>
<tr>
<th>WHAT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cluster of SMEs with a very informal structure can act as a big company but yet without expensive bureaucracy. Since the structure is not fixed, a cluster can adjust to each project both in size and differentiation of expertise. Deep specialisation is possible if the cluster is formed to cover all the necessary functionalities (all for one and one for all). Information on good practices, best (the most appropriate) retrofitting technologies, materials and system implemented is a valuable knowledge base for future projects.</td>
</tr>
<tr>
<td>• Dislocated partners (often even internationally) are motivated for a daily use of ICT instead of meeting in person with encouraging of teleworking, videoconferencing, common data storage, knowledge base.</td>
</tr>
<tr>
<td>• Since there are more independent partners, the vulnerability of the whole cluster is lower.</td>
</tr>
<tr>
<td>• The change of one partner in case of a problem is faster and more transparent to all partners than in case of problems in one department of a big company.</td>
</tr>
</tbody>
</table>

Added values are also:

| • Comprehensive approach and integrated design |
| • Sustainable performance based on life cycle approach |
| • Overall project management |
| • Supervision of retrofit work |
| • Quality assurance scheme and its implementation |

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https://www.gefma.de/
Commissioning and handover

**WHO:**
Individual houses (one owner), non residential buildings (mix or individual ownership), multifamily buildings (many owner), public buildings (schools, hospitals, offices) may be targeted by the service provider represented by the cluster of contractors.

**HOW:**
Key activities are: marketing, consultancy on best technologies, cluster set-up and management, negotiation and bidding. Key partners shall be found for financing (ESCO, bank, ECO fund, etc) and investment schemes as well as subsidies.

**WHY:**
Cost structure: Direct project costs involved in traditional renovation (labour, material, free of cost building inspection), overhead, supporting costs (i.e. guaranties), marketing costs, costs for post-renovation commissioning and information material

Revenue streams: Combination of different financing sources (client’s own funds, subsidies, bank loan, ESCO, etc.), payment from customers for renovation work, commission from suppliers

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**Max Bogl Case**

Hereafter the innovative application of the above described business models are provided.

<table>
<thead>
<tr>
<th>MAX BOGL CASE</th>
<th>GERMANY</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS MODEL CATEGORY</td>
<td>One Stop Shop Model – contractor’s cluster cooperation</td>
<td></td>
</tr>
<tr>
<td>TARGET BUILDINGS RENOVATION</td>
<td>Every type of building (local, regional, national and international clients of the network of the service provider)</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Max Bogl business model is based on fostering its partnering approach and to include all project partners into the project execution at the very beginning of a construction project in order to maintain communication. Main features of broad-based construction SMEs like Max Bögl are vertical integration and a broad product portfolio. As it turned out, a positive evolution of this business model can be achieved by four basic preferences which need to be considered (extension of the targeted market/product segments, entry/expansion of niche segments, specialization on PPP and concessions, introduction of construction-related services) and can be categorized into three strategic fields (expansion of product portfolio/along value chain, specialization, geographical expansion). Thus, added values proposed to the customers are: service variety, orientation and performance, ecological policy and facility management. Key activities foreseen are: project financing, planning, execution, operation, partnership and project development.</td>
<td></td>
</tr>
<tr>
<td>SERVICE PROVIDER</td>
<td>A broad-based construction SME (very large construction, technology and service company) in the German construction industry (Max Bogl) that foster its partnering approach to include all project partners into the project execution at the very beginning</td>
<td></td>
</tr>
</tbody>
</table>
of the construction project in order to maintain communication (Integrated Project Delivery)

**KEY PARTNERS IN THE SUPPLY CHAIN**
Architects, Planners, Suppliers, RTD, Governamental bodies, ESCOs

**COST AND REVENUES**
Cost structure: capital expenditure (CAPEX), revenue stream: Guaranteed maximum price contract, unit prices, general contractor and contractor contract, insurance and financial services

**CONTACTS**
Website: [https://www.max-boegl.de/en/](https://www.max-boegl.de/en/)
Email: info@max-boegl.de

**SWOT Analysis**

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good regional and national networking and much power to bind local commodity producers.</td>
<td>A broad-based construction SME has to face several challenges during its work (e.g. there is much overhead which has to be financed).</td>
</tr>
<tr>
<td>Existing access to subcontractors</td>
<td>In competitive situations with similar construction companies like specialists, a broad-based construction SME as a generalist has to deal with the efficiency of those highly specialized companies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity to expand internationally/nationally due to very high equity capital ratio and to get access to PPP projects.</td>
<td>It is a challenge to overcome the balancing act between local autonomy and central control.</td>
</tr>
<tr>
<td>Fluctuations in demand can be compensated by a systematic risk management and product diversification</td>
<td>During construction projects there exists the risk of scarcity of resources (especially personnel and subcontractors) if own capacities for project executions and orders are not sufficient simultaneously.</td>
</tr>
<tr>
<td>Opportunity to include all project partners into the project execution at the very beginning of the construction project</td>
<td></td>
</tr>
</tbody>
</table>

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27 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespreading coming from country market, T: Threats hindering the BM widespreading coming from country market
<table>
<thead>
<tr>
<th>PREFERENCES CASE</th>
<th>GERMANY</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUSINESS MODEL CATEGORY</strong></td>
<td>One Stop Shop Model – contractor’s cluster cooperation</td>
<td></td>
</tr>
<tr>
<td><strong>TARGET BUILDINGS RENOVATION</strong></td>
<td>Every type of building (local, regional, national and international clients of the network of the service provider)</td>
<td></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>Prefair business model is a collaborative business model comprising the management and manufacturing methods for buildings refurbishment towards a more collaborative construction industry working environment and a value-driven competition. In order to improve the collaborative work between all participating project partners the Hochtief AG introduced the PreFair business model in 2003 and caused a paradigm shift in the construction industry. Within the PreFair business model the entire know-how and the potential of innovation of all project partners are concentrated in one team at the earliest date. The planning process is then deployed in a holistic approach. Key activities are: risk and safety management, planning management, expertise in structural design, expertise in technical building services, budget development, regular progress report, contractual model development, integration of customer network into planning, needs and feasibility analysis, financing, facility management.</td>
<td></td>
</tr>
<tr>
<td><strong>SERVICE PROVIDER</strong></td>
<td>Leading construction group (HOCHTIEF) that foster its partnering approach to include all project partners into the project execution at the very beginning of the construction project in order to maintain communication (Integrated Project Delivery)</td>
<td></td>
</tr>
<tr>
<td><strong>KEY PARTNERS IN THE SUPPLY CHAIN</strong></td>
<td>Architects, Planners, Suppliers, ESCOs</td>
<td></td>
</tr>
<tr>
<td><strong>COST AND REVENUES</strong></td>
<td>Cost structure: capital expenditure (CAPEX); Revenue stream: Cost-plus-fee contract, maximum cost contract, package price contract, budget contract, financing</td>
<td></td>
</tr>
<tr>
<td><strong>CONTACTS</strong></td>
<td>Website: <a href="https://www.hochtief-solutions.com/solutions_en/23.jhtml?pid=7463">https://www.hochtief-solutions.com/solutions_en/23.jhtml?pid=7463</a> Email: <a href="mailto:info@hochtief.de">info@hochtief.de</a></td>
<td></td>
</tr>
</tbody>
</table>
SWOT Analysis

- The company is responsible for prices, deadlines, and quality. At the end of the planning performed in the preconstruction phase, the company names the estimated budget, which is considered binding.
- The planning itself is improved by the usage of professional planning management and innovative technologies; the building goal is also well defined. Those aspects reduce the risk of planning gaps which can lead to higher costs and longer building periods in the construction phase.
- The planning and construction periods are minimized also by the partnering model applied to all the involved actors, the professional coordination and the synchronization of the planning processes.

- High flexibility in the contract selection (i.e. alternative price models). The offered price models – Maximum price contract, Budget contract, Cost plus Fee contract and Lump-sum Contract – allow clients to select the optimal one for them.
- This business model has a limited applicability for smaller customers/contracts and SMEs.
- There is no possibility to combine the steps from the two phases.

- In 2013, the Hochtief AG decided to specialise towards the four major fields of transportation infrastructure, energy infrastructure, social and urban infrastructure as well as towards the contract mining business meaning that the Hochtief AG tries not to focus on covering the entire value chain any more per se. In fact, these business areas could not be addressed by Pretil anymore, because one of Pretil’s main ideas is the full value chain coverage.

### PROJEKT LAVENERGI

#### DENMARK

#### PROJEKT LAVENERGI

**BUSINESS CATEGORY**

One Stop Shop Model – contractor’s cluster cooperation

**TARGET BUILDINGS RENOVATION**

Private Single Family Houses (with particular focus of houses built in 1970-1980)

**DESCRIPTION**

The concept “ProjektLavenergi” is a holistic energy renovation concept offered by Adsboell, which is a well-known and trusted local contractor in southern Demark. Its activity originates from being a partner of Green Business Growth, a private-public partnership for energy efficient buildings in the region of southern Denmark with the aim of creating growth in green building and renovation. Adsboell works together with a network of pre-selected partners that are well known and/or trusted in the market. The craftsmen used can be trained in relevant courses arranged by the mentioned partnership to become “energy-craftsmen” with special knowledge of energy efficient renovation.

**SERVICE PROVIDER**

Energy service approach - medium sized contractor

**KEY PARTNERS IN THE SUPPLY CHAIN**

Local utility company, products/heating system suppliers, financial institutions, Green Business Growth Partnership

**COST AND REVENUES**

Customer pays for the renovation while the service provider takes charge of the salary of project manager, marketing, travel, administration and support.

**CONTACTS**

Website: https://www.ads.dk/

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28 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespreading coming from country market, T: Threats hindering the BM widespreading coming from country market
**Email:** info@ads.dk

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**SWOT Analysis**

<table>
<thead>
<tr>
<th>C</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>The service provider actively looks for customers through local meetings (dedicated personal assistance for maintaining customer relationship through e.g. Open house arrangement).</td>
<td>This concept was planned to be applied to single-family houses, but currently applied to multifamily houses only.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Denmark the policy that the buildings will be fossil fuel free by 2035, including electricity supply to be based on renewable resources, led the Danish Construction Association to recommend one-stop-shop service to its members to offer full service holistic energy efficiency renovation of single family houses (Dansk byggeri, 2012).</td>
<td>The energy audit report is not very detailed and comprehensive.</td>
</tr>
<tr>
<td>Energy audit report or energy performance certificate* is mandatory in Denmark when a house is sold and is done by certified energy auditors.</td>
<td>Often tax deduction is used for non-energy related measures such as improving kitchen, bathrooms, painting, a new or improved balcony, or house cleaning**. The level of subsidy or tax deduction could increase with increased level of energy efficiency renovation.</td>
</tr>
<tr>
<td>There are tax deductions for labour cost for home renovation and other household work.</td>
<td></td>
</tr>
</tbody>
</table>

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*Such a document usually contains a list of recommended measures to improve the energy standard of the house. The idea behind the energy audits/certificates is that prospective buyers will factor the energy audit information in the house purchase decision and implement the recommended energy efficiency measures.

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<table>
<thead>
<tr>
<th>ENRENOV</th>
<th>SWEDEN</th>
<th>PROPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUSINESS CATEGORY</strong></td>
<td>One Stop Shop Model – contractor’s cluster cooperation</td>
<td></td>
</tr>
<tr>
<td><strong>TARGET BUILDINGS RENOVATION</strong></td>
<td>Private Single Family Houses (all houses built in 1960-80 and heated with resistance heaters, but all houses in the need of renovation are of interest - Homeowners who have capacity to increase their mortgage loan)</td>
<td></td>
</tr>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>This business model proposes that a traditional small to medium size construction/renovation company coordinates with an energy audit company and heating system installers/retailers to offer full service energy efficiency renovation packages. Energy auditors/building inspectors are responsible to inspect the condition of the building, conduct energy analysis, and suggest packages of energy efficiency measures. Energy audit is mandatory when a house is sold and the auditors have the opportunity to discuss with the potential buyers about energy efficiency renovation measures. Heating system retailers or installers can also be key partners as homeowners interested to install a new heating system usually contact the heating system retailers/installers.</td>
<td></td>
</tr>
<tr>
<td><strong>SERVICE PROVIDER</strong></td>
<td>Small to medium size construction/renovation company</td>
<td></td>
</tr>
</tbody>
</table>

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29 S: Strengths of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespread coming from country market, T: Threats hindering the BM widespread coming from country market
KEY PARTNERS IN THE SUPPLY CHAIN

Heating system retailers/installers, energy auditor

COST AND REVENUES

Customer pays for the renovation and detailed energy audit and analysis report and suppliers of building products and heating systems for commission while the service provider takes charge of the costs involved in traditional renovation (labour, material, free of cost of building inspection, etc.), marketing, post-renovation commissioning and information material.

CONTACTS

Website: http://www.nordicinnovation.org/

SWOT Analysis

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer all types of home renovation services</td>
<td>This model is proposed and currently it has not been applied yet</td>
</tr>
<tr>
<td>Single-point contact</td>
<td>No financing measure included in the business model</td>
</tr>
<tr>
<td>Free-of-cost preliminary building inspection/energy audit report</td>
<td>No guarantee on energy saving performances</td>
</tr>
<tr>
<td>Detailed energy analysis/building inspection by independent agency</td>
<td></td>
</tr>
<tr>
<td>Free of cost price estimation for the renovation work</td>
<td></td>
</tr>
<tr>
<td>Fixed price for the total work as agreed in the contract</td>
<td></td>
</tr>
<tr>
<td>Guarantee on the renovation work for two years</td>
<td></td>
</tr>
<tr>
<td>Free of cost information on energy efficient use of the building</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help apply for subsidies and obtain construction permissions</td>
<td>Difficulty to convince the customer on the advantages of holistic view instead of step-wise actions for overall energy performance and costs.</td>
</tr>
<tr>
<td>Coordinate with banks to facilitate mortgage financing</td>
<td>Need to involve well trusted energy audit actors</td>
</tr>
</tbody>
</table>

3.1.1.6. OSS based on ICT tools

In this business model the key player is supported by an ICT tool supporting home-owners as well as designers in the initial planning of the renovation work. The tool usually act as a guide to optimize the application of the overall retrofitting process by for example collecting all the information related to the initial state of the building to be renovated and the preferences, the needs and desiderata of the building owner. The ICT toll processes the information gathered and suggests an optimised approach to the renovation project. The main advantage is the possibility to effectively manage the whole process in a comprehensive way. The possible disadvantages of the model are the resources needed to produce all process descriptions and checklists needed. It may also be difficult to make sure that all adopt the new working models. The commitment of the whole organisation is needed.

As the idea is very much based on creation and availability process descriptions, checklists and tools, the maintenance and keeping the material up-to-date has to be carefully checked. Thus it is highly important to be able to create reliable initial information about the building and rely on the initial model. In order to make reliable assessment about the saving potentials in terms of energy and costs, the actors involved must be able to use appropriate tools for energy performance assessment, and be able to make justified conclusions about the

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savings. Here the quality of the initial information is highly important. In addition, a solid understanding of the users’ behaviour and willingness to commit to energy savings is essential.

**Table 3.7: St. Gallen approach for OSS based on ICT tools business model**

<table>
<thead>
<tr>
<th>WHAT:</th>
<th>The business model provides the following advantages for the customer:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Holistic approach to the renovation project, with the support of an ICT tool</td>
</tr>
<tr>
<td></td>
<td>• Effective process management with the aid of sufficient initial information</td>
</tr>
<tr>
<td></td>
<td>• Automation of the process via the ICT tool, that supports for the identification of the best technical solutions and interventions to be implemented</td>
</tr>
<tr>
<td></td>
<td>• Comprehensive renovation intervention, including correct evaluation from the life-cycle perspective of energy-efficiency and overall costs</td>
</tr>
<tr>
<td></td>
<td>• Continuous improvement of the process</td>
</tr>
</tbody>
</table>

| WHO:  | The business model specifically targets **private buildings’ owners** in the need of renovation and in particular multi-family buildings. Other possible building are private office buildings. Bigger projects are better from the organizational point of view. |

| HOW:  | The ICT tool supports the key player, in order to map the main project objectives and constraints and to suggest an optimized plan of renovation. |

| WHY:  | **Cost structure**: |
|       | • Work cost (it makes 75% or more of the whole costs) |
|       | • Marketing cost (it is only a fragment of the whole work costs) |
|       | • Planning costs (they are a small part of all cost structure, but decision can have an important impact on the final costs) |

<table>
<thead>
<tr>
<th>Revenue streams:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Saved costs and increased profit with the help of well-structured and well-managed process</td>
</tr>
<tr>
<td></td>
<td>• More efficient sales and thus better profit with the help of effective client profiling, initial data management and well-focused offering</td>
</tr>
<tr>
<td></td>
<td>• Payment is agreed and differs from project to project</td>
</tr>
<tr>
<td></td>
<td>• The cost of additional work and changes should be priced separately</td>
</tr>
</tbody>
</table>

**Innovative business models**

Hereafter the innovative application of the above described business models are provided.
### TARGET BUILDINGS RENOVATION

**Multi-family buildings, office buildings**

### DESCRIPTION

In this one-stop-shop business model, the main contractor is the Design Company (designer), which bases its renovation plan on an initial customer’s and building profile depicted through the support of an ICT tool. The tool aids to define the main motives, targets and expectations of the customer and to correctly manage the initial (condition and damage related) data of the building. The initial energy audit is performed by an external energy consultant, providing the data needed to the tool to plan the energy-savings intervention measures. A good understanding of customer’s motives and expectations, an optimal energy audit and analysis of building conditions are essential to formulate right targets for design and construction. Thanks to the support of the ICT tool the design company can proficiently manage the entire renovation project, acting as a Project Manager, on the basis of the information collected. Although a careful investigation of the building’s condition and possible damages causes extra cost in the beginning of a renovation project, good knowledge about building’s initial condition often saves costs of actual design and construction for example because less changes need to be conducted during the process. The business model is based on the consideration that the ability to profile customers and better understand customers’ objectives and simultaneous strong management of building specific initial information to understand the technical and energy related needs and potentials are becoming more and more fundamental. These information may form an excellent base to successfully operate in the building renovation market through tailored design offering. The collaboration of Project Manager (PM) and Principal Designer (PD) becomes more and more important and the PM’s traditional role to especially take care of economic issues is not enough anymore. The support of a tool for the profiling of both the customers (building owner) and the building status, permits to better understand customer’s motives and expectations, helping formulate right targets for design and construction. This is done through best practice checklist that suggest the measures and the technologies to consider for the renovation project.

### SERVICE PROVIDER

Design company, namely the Project Manager (PM) and Principal Designer (PD)

### KEY PARTNERS IN THE SUPPLY CHAIN

ICT tool developers, consultants (energy auditors), project managers, contractors

### COST AND REVENUES

Work cost (it makes 75% or more of the whole costs); marketing cost (it is only a fragment of the whole work costs), planning costs (they are a small part of all cost structure, but decision can have an important impact on the final costs).

### CONTACTS

n/a
SWOT Analysis

C: • The main strength is the possibility to effectively manage the whole process as the principal designer. The improved management of the overall process is based on the preparation of:
  □ checklists and checklist-like tools for different tasks and process phases
  □ new strategy and process description for the management of all project related materials
  □ marketing material which makes use of success cases to support the sales
  □ possibly a template for project preparation phase with emphasis on the above mentioned identified major themes
  □ clear new way of working, which is also conveyed to the client and is beneficiary for the whole process, where all parties understand what is expected and what their responsibilities are in different phases of the project; it should also in a clear way convey to the client why it is a more cost efficient way of managing the project.

W: • Resources needed to produce all process descriptions and checklists needed.
  □ it may be difficult to make sure that all adopt the new working models. The commitment of the whole organisation is needed.
  □ As the idea is very much based on creating and availability process descriptions, checklists and tools, the maintenance and keeping the material up-to-date may also cause problems.
  □ In order to make reliable assessment about the saving potentials in terms of energy and costs, the actors involved must be able to see appropriate tools for energy performance assessment, and be able to make justified conclusions about the savings. Here the quality of the initial information is highly important.
  □ In addition, a solid understanding of the users’ behaviour and willingness to commit to energy savings is essential.

O: • Communication strategy and process description which defines the roles, tasks and responsibilities of the PO, PM and other partners of the team, both internally within the company and with the client to improve communications
  □ New templates for offering and contracting considering better management and understanding the client needs and building’s initial information to support the sales.

T: • It is highly important to be able to create reliable initial information about the building and rely on the initial model (created by another consultant).
the home-owner is offered tailor-made solutions based on his/her specific preferences, covering energy improvements on the building envelope and heating, cooling, ventilation and hot water systems inside the building. The process is holistically-planned, optimising the value chain by minimising efficiency losses, miscommunication issues and avoiding lock-in effects through digital instruments (namely a platform). In short, the digital solution creates a leaner process for the installer, enabling a better renovation service for the owner.

**SERVICE PROVIDER**
Installers (a cutting-edge one-stop-shop solution launched by supply-side actors: Danfoss, Grundfos, the ROCKWOOL and VELUX Groups) enabling a burden-free renovation process, enabled by training and digital tools for the installers

**KEY PARTNERS IN THE SUPPLY CHAIN**
Installers (In Denmark it was created a network of 3500 installers (from 105 organisations), five banks and mortgage providers and four utilities)

**COST AND REVENUES**
The financial model of BetterHome is very simple: there are no payments between BetterHome and the installers or the building owners. BetterHome receives its whole budget from Danfoss, Grundfos, the ROCKWOOL and VELUX Groups, who, in return, retrieve indirect sale revenues. While BetterHome and its owners have an incentive to increase the sale revenues of their products, the installers are not obliged to exclusively sell these brands. In the end, the renovation contract is only between the building owner and the installer. The banks play an important role in making the renovation project a reality. The home-owner discusses the intention to renovate their house with their usual bank. The bank screens together with them their financial capabilities and refers them to BetterHome, since they trust the quality and process of the model. The bank continues to follow the journey of the clients to assist them with additional financial guidance and support. Unlike most one-stop-shops, the first inspection of the building, by an installer, is free of charge even if the project does not materialize. This enables a better first meeting, where the discussion can move beyond the focus on costs.

**CONTACTS**
Website: https://www.betterhome.today/
Email: betterhome@betterhome.today
**SWOT Analysis**

- **S**: Strenghts of the BM; **W**: Weaknesses of the BM; **O**: Opportunities for BM widespreading coming from country market, **T**: Threats hindering the BM widespreading coming from country market

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The success of this BM relies on the fact that it is a home-owner-centric business model where the installers have an advanced service-oriented role. BetterHome trains and guides the installers on how to approach the home-owner, from the first contact to the finalisation of the process.</strong></td>
<td><strong>The energy audit report is not very detailed and comprehensive.</strong></td>
</tr>
<tr>
<td><strong>Creation of supportive and innovative digital tools, enabling and simplifying the renovation process for the installer and for the home-owners. An online application helps minimise the extra work for the installer. Every step is clearly outlined, from the first contact with the home-owner to the finalisation of the project. The installer fills in simple checklists on the state of the building, information fed into the online application to calculate energy savings and indoor air improvement depending on different packages of measures. Furthermore, the installer can easily extract a renovation proposal for the building owner based on the information gathered. From a product-centred approach to a service-oriented approach, where digital solutions are central.</strong></td>
<td><strong>Often tax deduction is used for non-energy related measures such as improving kitchen, bathrooms, painting, a new or improved balcony, or house cleaning. The level of subsidy or tax deduction could increase with increased level of energy efficiency renovation.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In Denmark the policy that the buildings will be fossil fuel free by 2035, including electricity supply to be based on renewable resources, led the Danish Construction Association to recommend one-stop-shop service to its members to offer full service holistic energy efficiency renovation of single family houses (Dansk byggeri, 2012).</strong></td>
<td><strong>The available financial subsidy scheme for energy renovations in Denmark is modest and rarely decisive for the building owners' decision to invest. In countries with substantial public support schemes for energy renovations, this can be incorporated into the business model.</strong></td>
</tr>
<tr>
<td><strong>Energy audit report or energy performance certificate is mandatory in Denmark when a house is sold and is done by certified energy auditors.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>There are tax deductions for labour cost for home renovation and other household work.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In Denmark, quality assurance is heavily regulated, including guarantees for the building owners. In Denmark, the four companies behind BetterHome are highly respected and associated with quality. Through the cooperation in BetterHome, the companies have worked together to also raise the reputation of the installers.</strong></td>
<td></td>
</tr>
</tbody>
</table>

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32 S: Strenghts of the BM; W: Weaknesses of the BM; O: Opportunities for BM widespreading coming from country market, T: Threats hindering the BM widespreading coming from country market

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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768287.
3.1.1.7. OSS provided by Private-Public-Partnership

The Public Private Partnerships (PPP) is a well-accepted delivery model in the construction sector, involving a contract between a public sector authority, the public building owner, and a private contractor in charge of the management and the development of the building renovation project.

The private party provides the service to the public authority, assuming substantial financial, technical and operational risks in the renovation project.

In this collaborative model, private and public partners collaborate coordinating their skills and knowledge for long term contracts (usually 20-30 years). The selected contractor involves designers, maintenance services providers and other subcontractors needed stipulating specific contracts with each of them, during the whole project duration, being the only contact point for the public building owner.

PPP models are mostly used in very complex projects that require high level of integration. Since PPP delivery method is widely used around the world, many types of financing contracts may be used under this scheme: usually, for instance, the PPP contractor finances the initial investment and the client pays a constant fee for using the property during the contract. In some cases, a private sector consortium may create a special company called a "special purpose vehicle" (SPV) to develop, build, maintain and operate the asset for the contracted period.

PPP model may be considered as an expansion of DB and it is usually exploited in the case of multidisciplinary projects where team members have to strongly collaborate. Because of the mix of responsibilities and finance schemes, PPP delivery models provide opportunities for both public and private sector. However, PPP are complicated delivery models in the construction sector that require strong involvement of the different stakeholders, therefore PPP delivery method may cause an increase in time and cost of projects delivery and increase potential risks associated to the different steps of development.

Table 3.8: St. Gallen approach for OSS provided by Private-Public-Partnership business model

<table>
<thead>
<tr>
<th>WHAT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Private Partnerships (PPP) business model provides the following advantages for the customer:</td>
</tr>
<tr>
<td>- The public owner identifying the need of a refurbishment of a public building contracts with a private contractor, in charge of the whole complex renovation project</td>
</tr>
<tr>
<td>- Simple structure with only two prime players: public owner and contractor</td>
</tr>
<tr>
<td>- The contractor has full responsibility for the design, construction, financing and final result achieved, assuming the relative risks</td>
</tr>
<tr>
<td>- Through the term of a contract, the government pays a guaranteed structured monthly fee that ensures financial predictability through a fixed cost of occupancy while avoiding unexpected costs and project delays</td>
</tr>
<tr>
<td>- The private contractor takes responsibility for functions such as operating and maintaining the building, with a long-term contract</td>
</tr>
</tbody>
</table>
WHO:
Public building owners planning complex renovation projects that require high level of integration (e.g. administration buildings, schools, universities, hospitals etc.) and wish to include maintenance services over a long period in the same contract

HOW:
The public owner has a single reference contact with the private contractor that is in charge of all the aspects of the project, including the choice of sub-contractors to perform design, construction and maintenance services during the renovation project and all over the contract duration (20-30 years)

WHY:
Cost structure:
The financing system is that the PPP contractor finances the initial investment and the public owner pays a constant fee, usually monthly, for using the property during the contract.
Revenue streams:
The private contractor receives a monthly fixed fee from the owner.

Innovative business models
Hereafter the innovative application of the above described business models are provided.

<table>
<thead>
<tr>
<th>REMOURBAN</th>
<th>UNITED KINGDOM</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS CATEGORY</td>
<td>One Stop Shop Model</td>
<td></td>
</tr>
<tr>
<td>TARGET BUILDINGS RENOVATION</td>
<td>Single-family to multi-family houses, built from 1900 to the 70s</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>REMOURBAN (REgeneration MOdel for accelerating the smart URBAN transformation) is a smarty city project and its ultimate goal is to design and deliver a model to show how sustainability can be integrated into the regeneration of towns and cities to develop ‘Smart Cities’. The REMOURBAN model will take advantage of the crossover between energy, mobility and ICT to develop a new method for developing smart cities. The project triggers strategic partnerships between innovative organisations both public and private and it draws on pioneering solutions from the Energy, ICT, and Mobility sectors in three “Lighthouse” cities, identified as demonstrators, Valladolid (Spain),</td>
<td></td>
</tr>
</tbody>
</table>
Tepebasi/Eskisehir (Turkey) and Nottingham (UK), and two Follower cities, Seraing (Belgium), and Miskolc (Hungary), as replicators.

In Nottingham the project is a partnership between NCC (Nottingham City Council), NTU (Nottingham Trent University), NCH (Nottingham City Homes), NEP (Nottingham Energy Partnership), INFOHUB Ltd. and SASIE Ltd. (two local SMEs).

The project is focusing on a variety of property typologies in Nottingham within the Sneinton area ranging from single-family to multi-family houses, and in age, from 1900 to the 70s. A large number of the properties (65%) in the area are social housing, owned by Nottingham City Council (public owner) and managed on their behalf by Nottingham City Homes. However, the energy efficiency retrofit work will be open to all tenures, including private owners, within the defined streets and property types so that households, regardless of ownership, will benefit from the project.

In each of the retrofitted property a centralized intelligent control system will be installed, which will optimize energy use and storage to suit predicted demand profiles. The project will include both EE measures (mainly walls insulation) and RET measures: the connection to a district heating pipeline. The intervention will use a single buffer vessel at each of the low raise blocks to act as a thermal storage unit regarding the distribution into the individual flats. The thermal storage unit will be connected to larger scale solar thermal installation on the roof of the blocks to add additional onsite generation from renewables.

The project will address at the same time the cities of Valladolid in Spain, Nottingham in United Kingdom and Tepebasi/Eskisehir in Turkey. Two follower cities, Seraing in Belgium and Miskolc in Hungary, will act as
<table>
<thead>
<tr>
<th>SERVICE PROVIDER</th>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY PARTNERS IN THE SUPPLY CHAIN</td>
<td>Contractors: RET installer and construction company</td>
</tr>
<tr>
<td>COST AND REVENUES</td>
<td>Residents pay a flat charge for their power.</td>
</tr>
</tbody>
</table>

**CONTACTS**

Website: https://www.ntu.ac.uk/research/groups-and-centres/projects/remourban-city-demonstrator-project

Email: Ruth.Stallwood@nottinghamcity.gov.uk

**SWOT Analysis**

- **S**: Strategic partnership between public and private sectors, with special benefit for SMEs proposing innovative solutions in the field of RET or EE measures
  - Central control of the project by the public authorities

- **W**: For a successful implementation, this business model requires strong involvement of the different stakeholders, in particular of the public building owner
  - Possible increase of time and costs associated to the strong involvement required by all the players involved
  - Higher risk associated to the collaborative approach of the model

- **O**: Large scale retrofitting projects, targeting both public building and private building belonging to the neighboring area, permitting strong impact for the project and high visibility

- **T**: Part of the model success is based on the responsiveness of other building owners interested to renovate their house, success of involvement has to be carefully evaluated
  - Scarce adhesion of building owners in the area could affect the whole results achieved by the project

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3.1.2. **OSS Geographical context and application at country level**

A relevant driver for the widespread of the Business Models based on One-Stop-Shop concept is the need to have a solution for managing the fragmentation of the Construction sector. Indeed, the renovation market is dominated by handicraft-based individual solutions and the OSS based Business Models perfectly answer to the **need of having an overall contractor offers full-service renovation packages including consulting, independent energy audit, renovation work, independent quality control and commissioning, and financing.** Given this BM geographical application, table below provides a short overview of the innovative business models available (both active and non-active). The different business models differs according to the type of joint venture of different stakeholders with the main service provider, responsible for the overall renovation.
### Table 3.9: Geographical application of innovative business models

<table>
<thead>
<tr>
<th>Business models based on One Stop Shop (OSS) concept</th>
<th>Innovative Business Models</th>
<th>Applicability at building level</th>
<th>North Europe</th>
<th>South Europe</th>
<th>Western Europe</th>
<th>Eastern Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSS based on Step-by-Step approach</td>
<td>ENERPHIT: certification scheme for step-by-step retrofitting with Passive house components</td>
<td>Residential (single and multifamily) and commercial buildings</td>
<td>Sweden, Denmark</td>
<td>France, Italy, Spain</td>
<td>Germany, United Kingdom</td>
<td>Bulgaria</td>
</tr>
<tr>
<td>OSS provided as a complementary business (e.g. by utilities)</td>
<td>DONG-CLEANTECH case (non active): full-service renovation, including financing, provided by an energy utility in cooperation with key partners</td>
<td>Private single family houses</td>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSS provided by multi-disciplinary team cooperation</td>
<td>ENERGIESPRONG: an independent market development team setting a new standard for comfortable, super energy efficient refurbishments (and new built solutions) with guaranteed performance as well as a new financing approach towards a mass demand for high quality retrofits.</td>
<td>Multi family buildings (social housing sector)</td>
<td>Italy</td>
<td>France, Germany, Netherlands, United Kingdom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KVA case: multi-disciplinary team made by architects managing key partners with the aim of providing a full service retrofitting.</td>
<td></td>
<td>Large office buildings</td>
<td></td>
<td>Finland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSS provided by joint venture of retailers with</td>
<td>K-Rauta and rautia case (active): Full-service renovation (on customer choice from do-it-yourself to turn-key) Including financing and provided by two hardware store chains. Different options for renovation (all installed, partly installed, just</td>
<td>Private single family houses</td>
<td></td>
<td>Finland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business models based on One Stop Shop (OSS) concept</td>
<td>Innovative Business Models</td>
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<td>North Europe</td>
<td>South Europe</td>
<td>Western Europe</td>
<td>Eastern Europe</td>
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<td>------------------------------------------------------</td>
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</tr>
<tr>
<td>industry and contractors</td>
<td>products, flexible project schedules) are offered at fixes price given before buying and with flexible funding.</td>
<td>Private single family houses</td>
<td>Finland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENRA (non-active):</strong> full-service renovation, not including financing, offered by a group of companies providing different individual energy renovation services or solutions in a holistic package.</td>
<td>Private single family houses</td>
<td>Norway</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bolig Enok case:</strong> Competent project management facilitate the full service renovation package for the building. All products and crafts services are provided through local retailers and stores.</td>
<td>Private single family houses</td>
<td>Spain</td>
<td>United Kingdom, Belgium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSS provided by Private-Public-Partnership</td>
<td><strong>REMOURBAN case:</strong> it is based on strategic partnerships between innovative organisations both public and private and it draws on pioneering solutions from the Energy, ICT, and Mobility sectors</td>
<td>Single-family to multi-family houses, public owner</td>
<td>Spain</td>
<td>United Kingdom, Belgium</td>
<td></td>
<td>Hungary</td>
</tr>
<tr>
<td>OSS provided by contractors’cluster cooperation</td>
<td><strong>Projekt Lavenergi:</strong> holistic renovation, including financing, based on external air tightening and insulation of the house and provided by medium size contractor in cooperation with key partners</td>
<td>Private single family houses</td>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ENRENOV:</strong> a traditional small to medium size construction/renovation company coordinates with an energy audit company and heating system</td>
<td>Private single family houses</td>
<td>Sweden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business models based on One Stop Shop (OSS) concept</td>
<td>Innovative Business Models</td>
<td>Applicability at building level</td>
<td>North Europe</td>
<td>South Europe</td>
<td>Western Europe</td>
<td>Eastern Europe</td>
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<td>------------------------------------------------------</td>
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</tr>
<tr>
<td>Max Bogl case: a broad base construction SME fostering its partnering approach to include all project partners into building renovation execution at the very beginning (Integrated Delivery Project approach)</td>
<td>installs/retailers to offer full service energy efficiency renovation packages</td>
<td>Every type of building and owner</td>
<td></td>
<td></td>
<td></td>
<td>Germany</td>
</tr>
<tr>
<td>Prefair case: the entire know-how and the potential for innovation of all project partners are concentrated in one team at the earliest date to provide a full service package in a holistic approach</td>
<td></td>
<td>Every type of building and owner</td>
<td></td>
<td></td>
<td></td>
<td>Germany</td>
</tr>
<tr>
<td>OSS based on ICT tools</td>
<td>TEA Design Company case: the main contractor is a Design Company that bases its renovation plan on an initial customer’s and building profile depicted through the support of an ICT tool.</td>
<td>Multi family buildings, Office buildings</td>
<td></td>
<td></td>
<td>Finland</td>
<td></td>
</tr>
<tr>
<td>BetterHome (active): a reliable and smooth renovation process provided by the installers, properly trained and guided in better structuring the renovation process. As in a conventional process, the installer and the building owner enter a contract.</td>
<td>Private single family house</td>
<td></td>
<td></td>
<td>Denmark, Sweden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.1.3. OSS Further potential for innovation

As highlighted in paragraphs above, different types of actors (renovation company, insulation company, energy utility, building product warehouse) can provide the business models based on One-Stop-Shop concept. There are differences in how customers are contacted, while the similarities are more on how the service is provided. One major issue is how to offer independent but quality advice to the customers in order to improve trustworthiness of the business proposition. In some models, financing is not available, and guarantee on energy savings is lacking in all models, with the only exception of Energiesprong. When comparing the different kind of business models mentioned above, they are of course quite similar on the “customer side” even if “the customer potential” depends on the main service provider’s amount of clients. For example, K-Rauta has a wider customer segment due to the retailer store while for the Bolig Enok project manager needs to identify the segments and do targeted marketing towards selected segments. The same counts for the key activities, although there is one major difference that the retailer may focus on communication towards customer visiting the hardware store. According to the type of main service provider there is a different need in the types of partners to complete the requested portfolio of competence. Given this, even though there is strong business potential for one-stop-shop energy renovation concept, still it has been somewhat difficult to start or run such a business (e.g. Dong Energy Cleantech and ENRA concepts have ceased to operate).

In the perspective of making these business models more innovative, table below provides various suggestions to promote energy efficient renovation of detached houses not only in Nordic countries. These actions have been mainly clustered into two main category influencing the BM success:

- **The marketing strategies**: independent of the business model the responsible company needs to make some strategic choices. Each company has also to take into respect the current regime of regulations and incentives. This may therefore differ from country to country.
- **The policy instruments**: independent of the costs-revenues streams, policy may influence the choices of the main service provider of the business model.

*Table 3.10: Recommendations for One Stop Shop model widespread*

<table>
<thead>
<tr>
<th>Marketing Strategy</th>
<th>Actively search for customers. Potential customers shall be seek:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selection and definition of target group</strong></td>
<td></td>
</tr>
<tr>
<td>in innovative and open minded persons who are most likely to go for a holistic renovation project since the one-stop-shop renovation market is at the very early market phase,</td>
<td></td>
</tr>
<tr>
<td>in people that have the capacity to finance the investments, for example by increasing their mortgage loan within what may be secured by the value of the house as renovation is an expensive investment,</td>
<td></td>
</tr>
<tr>
<td>in people that has recently bought houses that may consider renovating their houses, depending of the operational radius of the company the geographical location of the potential customers must be defined.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition of the service and differentiation factors</th>
<th>Two aspects shall be considered in the definition of the holistic renovation service to be provided to customers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>in particular, it is a necessity for securing a holistic renovation that the first step of the service is to make an analysis of the house and present a plan with recommended energy efficiency measures. Indeed, the plan is the</td>
<td></td>
</tr>
</tbody>
</table>
basis for discussion with the house owner what should be done and in which order it should be implemented considering the house owner's budget.

- The One-Stop-Shop model for holistic renovation **with high ambitions on energy savings** shall be offered by an existing company which wants to expand their business in order to have this additional service incorporated into a wider menu of services of that company. The next step of developing this strategy is to identify and highlight the factors the company can use for differentiating from (competing – which hardly exists) or substituting services in the market. Such factors must build on the strengths of the company or strengths achieved through alliances with other actors.

| Build credibility | As the service is new and may be perceived as risky by house owners, it is therefore crucial that the one-stop-shop is credible and the credibility has to be maintained through quality assurance to secure satisfied customers. To buy a complete package including quality control and certification from the same company needs a high degree of trust. Few companies have such a strong reputation/brand that a house owner would not ask for an independent control. One way of building trust is through cooperation with well-reputed research organisations or public bodies. The leading partner in the one-stop-shop is responsible for the quality of the service. However, quality assurance regarding all participating companies is essential. Extra training as well as one-stop-shop “school programs” might be launched as part of the different business models. |
| Partnerships | The company which is responsible for the service has to consider which parts of the service may be delivered by in-house resources of the company and which must be covered by other actors. Some of this may be supplied through ordinary sub-contracting, while other may be considered too critical for which a stronger partnership agreement may be needed. Key elements to be judged in this respect are own capabilities and capacity, need of control and risk management. |
| Communication strategy | As the One-Stop-Shop Model is a relatively new model for holistic renovation, it is important to be able to define an ad-hoc communication strategy for potential new customers to be motivated for high ambition energy renovation. This strategy shall thus include the following aspects:

- **Exemplify**: demonstrate to the customer what this is about.
- **Engage**: let the house owner be engaged with his own ideas and wishes.
- **Enable**: show how he/she can do this within his budget. Inform about available public incentives.
- **Encourage**: Give the customer some sort of positive confirmation about his decision. Example: Work with public actors which promote energy efficient renovations. In this way the customer can see that it is not only the one-stop-shop company which wants to sell something.

For any type of one-stop-shop business for high ambition renovation, **it is important also to use “non energy benefit” arguments in addition to the energy benefits for promoting the service**. The pitfalls of selling only on payback time argument should be avoided. The best would be to find what is important for the homeowner and avoid he/she regretting in future of not doing
holistic renovation. The one-stop-shop’s core mission is to make sure that the measures taken are the best in a holistic and long run perspective.

### Policy instruments

| **Regulation** | Considering that actually there are no building level energy efficiency standards for renovated buildings, while such standards exist for new buildings, the following aspects shall be put in place to enhance One-Stop-Shop BM wide diffusion:
| | 
| | - Regulations might be changed to have energy efficiency standards of renovated buildings and minimum energy efficiency requirements for products to be installed (there are few requirements in Danish building code BR10). A step-wise long-term national plan for energy efficiency improvement of buildings will signal the stakeholders that action has to be taken.
| | - In each country it might be made mandatory to have detailed energy and building condition audit report for all houses of certain age (e.g. those built before the 1980s). A joint audit by the independent energy auditors and building consultants might provide a basis for a set of high quality recommendations of energy efficiency measures to be implemented, either at a time or in phases to improve the energy performance of the house.
| | - Energy efficiency subsidies linked to energy audit of the building may encourage the homeowners to go for energy efficiency renovations.
| **Economic incentives** | Investment subsidies to reduce the cost burden may be useful to promote energy efficiency renovations as investment cost is one of the important factors influencing homeowners’ choice of energy efficiency measures (Nair et al., 2010). On the other hand, grants given to energy efficient single products may result in sub-optimizing.
| | A subsidy or tax deduction scheme might be introduced for preparation of a detailed building inspection and energy audit report, which will form the basis for energy efficiency renovation of houses. The report should be prepared by an independent actor to increase the trustworthiness of the suggested measures to be implemented.
| **Financing** | In the Nordic countries the most cost efficient option to finance energy efficiency renovation of single-family houses is mortgage refinancing. However, the need to self-finance the amount not covered in the mortgage loan and a higher cost for the top loan (typically amount above 75% of the appraised value of a house) may hinder the homeowners to go for energy efficiency renovation. **Government shall provide soft loans or subsidies to cover the investment cost beyond the mortgage (base) loan.** Attention should be given to mortgage financing limitation for energy efficient renovation of recently bought houses. **Banks may consider an energy efficient renovation plan prepared by an entrepreneur and pre-evaluate the post-renovation value of a house in collaboration with real estate agents.** Based on this evaluation banks could confirm the homeowner and the entrepreneur that certain amount of investment cost would
be covered by mortgage refinancing. The rest may be covered by government sponsored soft loan or investment subsidies.

<table>
<thead>
<tr>
<th>Evaluation of potential guarantee on energy savings</th>
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<tbody>
<tr>
<td>At present it is less likely that a guarantee will be given due to uncertainties regarding energy savings potential and also in the context of varying household energy behaviour. However, such concepts exist for industrial and public buildings (the ESCO concept) and may emerge for residential buildings. It is possible that service providers may consider offering a guarantee on energy savings based on theoretical calculations. Also, it should be emphasised that the energy efficiency improvements bring along other benefits like improved thermal comfort or indoor air quality.</td>
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<table>
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<tr>
<th>Follow up and information pack</th>
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<tbody>
<tr>
<td>Information campaigns shall be addressed taking into account that:</td>
</tr>
<tr>
<td>• Authorities shall encourage people to think holistically when doing a renovation of their houses. Messages such as “don’t miss the opportunity to …” may be promoted in order to create a “pull-effect” in the market.</td>
</tr>
<tr>
<td>• The energy (e.g. cost reduction) and non-energy benefits (improved thermal comfort or indoor air quality) of energy efficiency improvements shall be highlighted and availability of economic incentives may create customer interests in energy efficient renovations.</td>
</tr>
<tr>
<td>• Campaigns stressing the loss incurred by residents due to non-adoption of energy efficiency measures may be more effective than the one projecting the gains made by adoption of such measures (Yates and Aronson, 1983). This is because people act more to avoid a loss than to achieve a gain (Kahneman and Tversky, 1979).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Training installers/sellers</th>
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<tbody>
<tr>
<td>The installers/sellers should be trained to give comprehensive information about energy efficiency alternatives and holistic renovation. Indeed, installers/sellers have a significant influence on homeowners’ choice of energy efficiency measures (Nair et al., 2012). However, they seem to have a lack of knowledge and interest in holistic energy efficiency renovations. The service providers of one-stop-shop may collaborate with public authorities and research and education institutes or create their own training centers to impart such training. There are already public-private collaborative research projects (Build up skills projects) running in 21 European countries, including the Nordic countries, to identify and improve skills of construction professionals to construct new low energy buildings and renovate existing buildings to low energy standards.</td>
</tr>
</tbody>
</table>

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<tr>
<th>Demonstration projects</th>
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<tr>
<td>One way to promote the one-stop-shop market is to provide public funding for a few demonstration projects to test different business models. Such projects will bring together actors interested in one-stop-shop concept and they will gain important experience. In such demonstration projects the full-scale energy renovation actions could be realised in shorter timeframe than in traditional piecemeal renovations. Advertisement of results of successful demonstration projects may attract more customers and entrepreneurs.</td>
</tr>
</tbody>
</table>
3.2. Business models based on Product Service Systems (PSS) - Energy Service Companies (ESCOs)

Product service systems are business models which make use of the delivery of the function of a product combined with a relevant service (COWI, 2008). In the area of energy, these are business models offering energy related services beyond the simple sale of energy. Energy Service Companies (ESCOs) are the most prominent examples of PSS business models in the energy sector.

Typically an Energy Service Company (ESCO) acts as a general contractor and implements a customized service package (consisting of e.g. design, installation, (co-)financing, operation & maintenance, optimization, fuel purchase, user motivation). As key features, the ESCO’s remuneration is performance based, it guarantees for the outcome and all-inclusive costs of the services and takes over commercial as well as technical and operational risks over the project term. (Bleyl et al., 2008). All the tasks shown in figure below (left side) such as planning, construction and financing, the ongoing components of the service package (operation and maintenance, purchasing of fuel, quality assurance and measurement & verification) as well as compliance with the legislative framework have to be covered either by the building owner or the ESCO throughout the contractual period. For implementation, the building owner assigns a customized energy service package and demands guarantees for the results of the measures taken by the ESCO. The necessary components for implementing energy projects are summarized in figure below (right side).

Outsourcing of up-front financing of RE or EE equipment is often the key driver to engage with an ESCO. Nevertheless, the ESCO service package does not necessarily need to include financing. Financing can be provided by the building owner, the ESCO or a third financing partner, depending on who has better access to capital and financing conditions. Combinations of the above options are also possible to account for the specific project and the actors involved. In reality, a mixture of financing sources is often the best choice in order to balance risks. If the ESCO does not provide financing itself, it can still take on the role as a facilitator supporting the building owner to get access to third party financing solutions. Two basic ESCO business models can be distinguished, which provide either useful energy (Energy Supply Contracting - ESC) or energy savings (Energy Performance Contracting - EPC) to the end user. In addition to the two basic models, a hybrid model labelled as Integrated Energy-Contracting (IEC) was introduced and is being piloted mainly in Austria and Germany. IEC aims to combine useful energy supply, preferably from renewable sources, with energy conservations measures in the entire building.
3.2.1. PSS Business models sub-categories

3.2.1.1. Energy Supply Contracting (ESC)

The ESC model is a proven model to implement efficient supply from fossil and renewable sources in new and existing public, industrial, commercial and large residential sector buildings. **It is effective in reducing final energy demand, because the ESCO pays for the final energy needed and is remunerated for its useful energy output only.** However, efficiency gains are usually limited to the energy supply system. Indeed, under an Energy Supply Contracting (ESC) model, an Energy Service Company (ESCO) supplies useful energy, such as electricity, heat, or steam under a long-term contract to a building owner or building user. The output is measured and verified in Megawatt hours delivered. ESC models run under long-term contracts of typically **10 to 15 years**, depending on the technical lifetime of the equipment deployed. Extended project terms or building cost allowances allow including measures with longer payback times like facades with integrated PV modules or entire building shells as well. This business model gives the building owner the opportunity to **outsource technical and economical risks associated with energy supply related activities**, including the planning, installation, operation and maintenance and financing of equipment for heating, cooling or electricity generation **to a professional party and to buy services instead of individual components**. ESC often includes supply of final energy through the ESCO, however on its own accounts.

The ESCO’s remuneration is performance based and depends on the useful energy output delivered. Thus, the ESC model provides an incentive to increase efficiency of the final energy conversion and to reduce primary energy demand. It guarantees for the outcome and all costs of the services and takes on the commercial as well as technical and operational risks of the project. ESC may accelerate the uptake of RET, if RET are cost competitive over the lifecycle of the project because ESCOs have an inherent interest to reduce life-cycle costs.

Figure below provides the energy sources taken into account in the ESC BM (a) as well as a scheme of the revenue streams (b).

![Figure 6: ESC energy sources taken into account (a) as well as a scheme of the revenue streams (b).](Image)

Table below provides the St. Gallen approach for ESC BM.
Table 3.11: St. Gallen approach for Energy Supply Contracting

**WHAT:**
The benefits of ESC are a significant boost in efficiency, clear and optimized operational costs, more supply assurance and the usage of the most recent safety standards. The customer no longer needs to worry about their energy supply concerns since this business model gives the building owner the opportunity to **outsource technical and economical risks associated with energy supply related activities**, including the planning, installation, operation and maintenance and financing of equipment for heating, cooling or electricity generation to a **professional party and to buy services instead of individual components**. The focus of the ESC service model is on the efficiency of the energy supply with the aim to bring the efficiency to its maximum while at the same time providing security of supply. ESC often includes supply of final energy through the ESCO, however on its own accounts. In addition there is an **increase in environmental performance**.

**WHO:**
It is a proven model in new and existing public, industrial, commercial and large residential sector buildings (for which specifications of minimum project sizes to be economically viable exist).

**HOW:**
The **key player is the ESCO** that supplies useful energy such as hot water, steam, (back-up) electricity or compressed air from a wide variety of technologies based on conventional or renewable sources.

The **business model encompasses the entire process** from the purchasing of fuel to the delivery and invoicing of energy. Indeed, financing, engineering design, planning, constructing, operation and maintenance of energy production plants as well as management of energy distribution are often all included in the complete service package.

**Technologies applied typically** are efficient boilers ((bio-)gas, wood chips, and pellets), combined heat and power (CHP) systems (gas turbines and reciprocating engines), district and small-scale heating networks, solar thermal and solar PV installations. ESC is particularly suitable for the implementation of RET like solar or geothermal applications, as their energy outputs can usually be measured with little effort through electricity or heat meters.

**WHY:**

**Cost structure:** The ESCO is responsible for the implementation and operation of the energy supply package at its own expenses and risk, according to the project-specific requirements set by the client.

**Revenue streams:** The ESCO is remunerated for the useful energy delivered, depending on the actual consumption in combination with a flat rate for operation & maintenance. In particular the ESCO’s remuneration is made up of the following three price components:

1. **Energy price** (per MWh of useful energy metered), which covers the marginal ‘consumption related’ cost per MWh of useful energy supplied. To account for final energy price developments during the contractual period, the ESCO’s energy price will be adjusted by using statistical energy price indices depending on the fuel used (e.g. gas or biomass index). Thus, the risk related to final energy price development remains with the ESCO’s client. In order to rule out incentives to sell more energy, the ESCO’s calculation of the energy price should include consumption related cost only (the marginal costs), i.e. exclusively the expenditure for fuel and auxiliary electricity. If the
1. If the energy price is at the marginal cost, there is no incentive for the ESCO to sell more, because the price equals the ESCO’s costs.

2. The service (or basic) price for energy supply (flat rate) includes all operational cost, i.e. the cost for operation & maintenance, personal, insurance, management etc. of the energy supply infrastructure as well as entrepreneurial risk. During the contractual period, the prices are usually adjusted (typically every year retrospectively) by using statistical indices such as wage or investment good indices. The service price for energy efficiency (flat rate) is determined in analogy to the above service price including all operational cost of the energy efficiency measures.

3. If the ESCO (co)-finances the equipment its remuneration also includes a fee for its capital costs minus any subsidies for the RET equipment which it may have received.

3.2.1.2. Energy Performance Contracting (EPC)

The EPC model is based on delivering energy savings compared to a predefined baseline. In the Energy Performance Contracting (EPC) model, an Energy Service Company (ESCO) enters into arrangements with property-owners to improve energy efficiency of their property by implementing various measures. Thus, the application span of Energy Performance Contracting involves the entire building as one incorporated energy-consuming unit. In other words, under an Energy Performance-Contracting (EPC) business model, an Energy Service Company guarantees energy cost savings (also labelled as ‘Negawatt-hours’) in comparison to a historical (or calculated) energy cost baseline. For its services and the savings guarantee, the ESCO receives performance-based remuneration in relation to the savings it achieves. Generally, savings achieved can only be measured indirectly as difference between consumption before and after implementation of the EE and RE measures (relative measurement: savings = baseline - ex post-consumption).

The standard scope of services encompasses the entire building. RET may play a role but with most EPC projects the focus is on the implementation of energy conservation measures. EPC models run under long-term contracts of typically ten years, depending on the payback time of the energy savings measures and the specification of the building owner.

ESCOs can also finance or arrange financing for the operation, and their remuneration is directly linked to demonstrated performance regarding the level of energy savings or energy service.

In conclusion, more than a funding model, an EPC is a programme of practical engineered energy efficiency measures that are implemented in buildings to deliver real energy savings such as HVAC, lighting, controls and building fabric improvements. In addition, to ensure the building is used in the most efficient way, building occupants receive training on energy efficiency practices.

Indeed, when measuring savings through a comparison between a baseline and post-retrofit energy costs, two major difficulties may occur:

- The baseline itself may be difficult to determine with enough accuracy due to a lack of availability of historic data (e.g. from bills or meters).
- The determined energy cost baseline is not a constant but subject to changes in climate conditions (e.g. ambient temperatures, solar radiation etc.) and in energy prices. Besides, utilization of the building may change. These changes need to be taken into account when calculating energy cost savings. Especially the changes in utilization may cause considerable difficulties for the ESCO and the facility owner in adjusting the baseline.
The intention is to keep the total energy consumption to a minimum – by way of demand side energy efficiency methods. To ensure promised energy savings have been achieved over the contract duration, a procedure termed “measurement and verification” is used. Adhering to an internationally recognized protocol such as the International Performance Measurement and Verification Protocol (IPMVP), customers can be assured that guaranteed savings have actually been delivered despite changes to the climate, the building and its use over time. The procedure is subject to the EPC contract, regulating the partnership between the ESCO and the customer. The contract regulates general issues such as property rights, usage of the systems and partnership duration. Furthermore, it stipulates the amount and structure of the investment, its implementation, how it is controlled as well as the maintenance of the energy saving measures which have been taken. It particularly determines the extent and distribution of the annual savings.

Figure below provides the energy sources taken into account in the EPC BM (a) as well as a scheme of the revenue streams (b).

![Figure 7: EPC energy sources taken into account (a) as well as a scheme of the revenue streams (b).](image)

Table below provides the St. Gallen approach for EPC BM.

**Table 3.12: St. Gallen approach for EPC model**

**WHAT:**

The key benefits include risk transfer, the ability to modernise a building’s energy infrastructure without necessarily having the funds and accessing external expertise. The key focus is on saving energy at the point of use first, before optimizing the supply of that energy.

For many potential customers financing is the most attractive part of EPC services for public buildings.

**WHO:**

The main target market is currently largely limited to public institutions buildings (at a federal, state and regional levels) including special purpose buildings like universities, hospitals, swimming facilities and leisure facilities. This is because a large project is a prerequisite (energy cost baselines can be set at 100,000 €/y).
### HOW:

The ESCO is responsible for the implementation and operation of the energy efficiency package at its own expenses and risk, according to the project specific requirements defined by the client and the ESCO. Purchasing of final energy (electricity, fuels) mostly remains with the building owner.

EPC full service spectrum thus include: financing, planning, construction, energy management, risk transfer, operations, maintenance & repair.

Considering the Refurbishment Package, an EPC contract may feature savings for all energy carriers such as electricity, gas or water. Typical measures are energy management and controls, HVAC-technologies like air conditioning systems, hydraulic adjustment of distribution networks or lighting. Sometimes an exchange of boilers or adjustment of district heating connections is also undertaken. In addition, the scope of services frequently also includes influencing the behaviour of building occupants through information campaigns and incentive programmes.

### WHY:

**Cost structure:** Transaction and measurement and verification costs of EPC projects are high. The ESCO is responsible for the implementation and operation of the energy package at its own expenses and risk, according to the project-specific requirements set by the client. Typically this includes the implementation of the measures, their operation & maintenance, pre-financing of the investment and taking over risks according to the project specifications defined in the contract. If the ESCO (co)-finances the equipment, the remuneration must also cover capital costs.

**Revenue stream:** The ESCO’s remuneration in an EPC model is often labelled as ‘Contracting rate’. It is usually calculated as a percentage of the savings achieved through the EE and RE measures. In case of underachievement the ESCO needs to compensate for the losses, but it will receive an additional remuneration in case of overachieving the savings guarantee. After the end of the contract term, the facility owner benefits from the full energy cost savings, but all operation and maintenance expenses are on his accounts. The contracting rate needs to cover all expenses of the ESCO for the defined scope of services throughout the contractual period (‘all inclusive prices’). In addition to the resources necessary (high transaction and operational costs), the baseline determination and adjustment can cause a considerable degree of insecurity and monetary risks for the (prospective) project partners. Determining and adjusting the baseline is a crucial issue in the EPC business model and needs to be undertaken for all performance based billing periods over the entire contract term.

### Innovative business models

Innovative approach of the EPC model aims at including new contract models, additional services or specific objectives as quality-based products, in order to open up EPC to more customers groups by meeting their specific requirements. With this scope the following models were developed:

**EPC light**

The *EPC light* business model aims at achieving energy savings mainly through optimization and organizational measures with **low or no investments** in technical equipment. The ESCO acts as an external energy manager taking over the responsibility to operate and optimize the energy related installations (heat boilers, building automation, lighting control). Usually the contract duration is short (2-3 years), since pay-back of high investments on hardware is not necessary. In this model the energy savings are still guaranteed by the ESCO. This model is very interesting for customers with little capacity.
or few resources for sustainable energy management. The first EPC light pilot project was developed in Pankow district, in Berlin, Germany, during the guarantEE project.

**EPC plus**

The EPC plus business model extends the service of the ESCO to comprehensive structural measures on the building shell like insulation or window replacement. These services are usually not part of the classical EPC because of excessively long pay-back periods. The contractual arrangement contains special regulation on financing. Usually the customer has to pay a share of the investment through a grant or by combination of EPC with subsidy programs. EPC plus is very suitable in buildings with high need for renovation. The combination of both structural renovation (EE) and energetic optimization (RET) leads to high energy savings up to 50%. The ESCO can involve a cluster of SMEs, responsible of jointly supplying EE measures and RET services.

**3.2.1.3. Integrated Energy Contracting (IEC)**

The Integrated Energy-Contracting business model is a hybrid of ESC and EPC and combines two objectives:

Reduction of energy demand through the implementation of energy efficiency measures in the areas of building technology (HVAC, lighting), building shell and user behavior. Efficient supply of the remaining useful energy demand, preferably from renewable energy sources. It is methodologically based on the above described ESC model and is supplemented by a deemed savings approach for the energy efficiency measures. Compared to standard ESC models, the IEC approach extends the range of services and thus the energy and emissions savings potential to the whole building. In other words, IEC is based upon the widespread Energy Supply Contracting business model and is supplemented by quality assurance instruments and deemed savings approaches for the energy efficiency measures.

The latter serves as a substitute for the potentially complex and costly measurement and verification of energy savings undertaken in the EPC business model. Therefore, IEC reduces transaction costs particularly for smaller projects. As compared to standard Energy Supply Contracting, the range of services and thus the saving potential to be utilized is extended to the overall building or commercial enterprise. The scope is not limited to the supply of heat energy. Instead, the model is intended to be used for all energy carriers and consumption media such as heat, electricity, water or compressed air.

As with ESC and EPC, the IEC business model offers the building owner the choice to outsource technical and economical risks associated with the implementation of RET and EE measures to a professional third party and to buy services instead of individual components. IEC may turn out to be particularly suitable to combine supply from renewable sources with energy conservation.

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34 https://guarantee-project.eu/bestpractice/berlin-epc-light-pankow/
35 http://epcplus.org/
36 Deemed savings are an approach to estimating energy and demand savings, usually used with programs targeting simpler efficiency measures with well-known and consistent performance characteristics. This method involves multiplying the number of installed measures by an estimated (or deemed) savings per measure, which is derived from historical evaluations. Deemed savings approaches may be complemented by on-site inspections (source: http://www.epa.gov/statelocalclimate/resources/glossary.html).
measures and thus accelerate the uptake of RET, provided RET are cost competitive over the lifecycle of the project because ESCOs have an inherent interest to reduce life-cycle costs.

Basically the IEC business model builds on the ESC with similar price components and is supplemented with a flat rate price for the energy efficiency measures. To avoid or at least to reduce the (potential) EPC problems, the supposedly exact measurement and verification of the actual savings under an EPC approach is replaced by quality assurance and simplified measurement and verification procedures (e.g. deemed savings). The individual Quality Assurance Instruments (QAI) for the installed EE measures secure the functionality and performance of the measures, but not their exact quantitative outcome over the entire project cycle. The objective is to simplify the business model and to reduce (transaction) cost by balancing measurement and verification cost and accuracy. Appropriate QAI’s need to be defined for each EE measure, e.g. a one-time performance measurement for a new street lighting or a one-time thermographic analysis for verifying the quality of a refurbished building shell. These QAI’s replace the annual measurement and verification of the EPC savings guarantee.

Figure below provides the energy sources taken into account in the IEC BM (a) as well as a scheme of the revenue streams (b).

![Figure 8: IEC energy sources taken into account (a) as well as a scheme of the revenue streams (b).](image)

Table below provides the St. Gallen approach for IEC BM.

**Table 3.13: St. Gallen approach for One Stop Shop model**

<table>
<thead>
<tr>
<th>WHAT:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Integrated Energy Contracting (IEC) business model provides customer with the following advantages:</td>
<td></td>
</tr>
<tr>
<td>• Guarantees for the total cost savings and overall performance of the energy services</td>
<td></td>
</tr>
<tr>
<td>• Affordable renewable heat and electricity</td>
<td></td>
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<tr>
<td>• Reduced energy costs</td>
<td></td>
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<tr>
<td>• Increased green, sustainable eco-friendly credentials</td>
<td></td>
</tr>
<tr>
<td>• Reduced carbon footprint</td>
<td></td>
</tr>
<tr>
<td>• Project facilitation</td>
<td></td>
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</tbody>
</table>
- Market facilitation
- Contracting initiative

**WHO:**
The IEC business model builds on the Energy Supply Contracting (ESC) model, which is known and applied in public, residential, commercial and industrial buildings. The scope of services and thus energy savings potential is extended to the overall building or enterprise and to all consumption media, such as heat, electricity and water. At the same time methodological problems of Energy Performance Contracting (EPC) as mentioned earlier, e.g. related to creating and adapting baselines, are avoided or at least reduced, e.g. by avoiding the need for a baseline and its adaption in the course of the project. Thus, commercial and public buildings (universities, campuses, hospital sites and larger schools, etc.) as well as the residential sector can be targeted. Thus, customers target are public and private organizations responsible for the management and energy costs of buildings in the same location.

**HOW:**
The ESCO is responsible for the implementation and operation of the energy efficiency package at its own expenses and risk, according to the project specific requirements defined by the client and the ESCO.

In some cases, a joint venture between the following players may be created:

- An environmental consultants (to provide information required to understand the ROI on the different renewable energy technologies);
- An energy company (to implement run and maintain the technologies implemented (e.g. CHP and PV))
- A building construction company to implement the building renovations

Purchasing of final energy (electricity, fuels) mostly remains with the building owner. IEC combines energy efficiency and RET measures. All technologies listed in the ESC and EPC business model descriptions are applicable.

**WHY:**

**Cost structure:** The ESCO takes over the implementation and operation of the energy service package at its own expenses and responsibilities according to the project specific requirements set by the client.

**Revenue stream:** The ESCO will get remunerated for the useful energy delivered, depending on the actual consumption as well as a flat rate service remuneration for Operation & Maintenance, including quality assurance. The ESCO's remuneration is made up of the following three price components:

- **Energy price (dependent on actual consumption):** To rule out incentives to sell more energy, the ESCO is to calculate the consumption related cost only (in economic terms: the marginal cost), i.e. exclusively the expenditure for fuel and auxiliary electricity. During the contractual period, the prices will be adjusted every year retrospectively by using statistical energy price indeces depending on the fuel used (e.g. gas or biogas index), which are defined in the IEC contract.

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37 Return On Investment
• **Service (or basic) price Energy Supply (flat rate):** all operation related cost, i.e. the cost for operation & maintenance, personal, insurance, management etc. of the energy supply infrastructure as well as entrepreneurial risk. During the contractual period, the prices will be adjusted every year retrospectively by using statistical indices such as wage or investment good indices. **Service price Energy Efficiency (flat rate):** In analogy to the above service price all operation cost of the energy efficiency measures.

• **(Optional) Capital cost** of energy efficiency and supply investments: if (co-)financed by the ESCO, the ESCO will get an annuity remuneration for its capital cost minus subsidies and building cost allowances. During the contractual period, the prices will be adjusted by using statistical indices such as 6-Months Euribor.

### 3.2.2. PSS Geographical context and application at country level

As the PSS Business Models are not strictly dependent or applicable only to a specific type of buildings or buildings’ owner, but they are dependent from the size of the project mainly (existing large commercial, residential and public buildings) there are no specific EU area in which they are particularly applied. Nevertheless, some countries despite others may have better conditions (incentives, regulatory framework, etc.) that may foster these BMs development. For example, **ESCOs are almost non-existent in the Nordic residential sector** mainly due to the difficulty to give guarantee on energy/cost savings and due to the fact that the small size of individual projects means that profits may not be significant (Mahapatra et al., 2011b) and with relatively high risk. The providers of one-stop-shop service for energy efficient renovation of single-family houses can be called ESCOs if they can arrange financing and give some kind of guarantee on energy and/or cost savings similar to the ESCO RENESCO Ltd (earlier Sun Energy Baltic Ltd) in Latvia (RENESCO, 2011)³⁸.

Moreover, in some parts of the world, so called public ‘Super ESCOs’ have been proposed or implemented, e.g. Energy Efficiency Services Limited in India, FEDESCO³⁹ in Belgium or HEP ESCO⁴⁰ in Croatia. The scope of their (planned) activities is extremely broad and ranges from market and project facilitation for (potential) clients and ESCOs to acting as a full-fledged ESCO themselves. Moreover, these organisations may be tasked amongst others to solve financing bottlenecks and undertake general information campaigns (Limaye, 2011). The success of this broad concept remains to be seen. The portfolio of Super ESCOs may require a more focussed approach, particularly regarding market development and pro-ject facilitation activities.

Table below provides some further examples of geographical application of the above described Business Models.

<table>
<thead>
<tr>
<th>Business model</th>
<th>Geographical context</th>
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</thead>
</table>

³⁸ http://www.renesco.lv/services/renovating/en
³⁹ https://www.energinvest.be/references/fedesco
| Energy Supply Contracting | In **Germany**, ESC has for example a market share of 85%-90% of the ESCO market (Bleyl, 2011). While Energy Performance Contracting is talked about a lot, its market share in the German ESCO market is only between 10% and 15% (Prognos 2009, ViW 2009). In Germany, the most recent market estimate indicates that there are about 250 companies active in the energy services market, mostly using the ESC model (Eikmeier et al., 2009). The total volume of the German energy services market is estimated to be about € 2 billion annually, of which about 60% takes place in the residential buildings (Bunse et al., 2010). |
| Energy Performance Contracting | EPC projects are found particularly in cities or regions where independent market and project facilitators such as energy agencies engage on behalf of buildings owners in preparing concrete projects and putting them out on the market for ESCOs to bid for. Indeed, the initiation of policy supported implementation programs such as the Federal Energy Management Program (FEMP) in the US, the Berlin Energy Saving Partnership or the Federal Contracting Campaign (BundESCOntracting) in **Austria** are an important enabling factor for the growth of EPC projects. In some European countries such as **Germany** often there are energy agencies (e.g. Grazer Energie Agentur[^41] or Berliner Energieagentur[^42]), who develop concrete EPC projects, mostly on behalf of the client, prepare calls for proposals and model contracts and put them out on the market to bid for. In the Anglo-Saxon EPC markets, two EPC models are differentiated mainly with regards to who finances the investment: ‘Guaranteed Savings’ refers to a service model without financing by the ESCO, whereas ‘Shared Savings’ includes financing in the ESCO’s service package. |
| Integrated Energy Contracting | IEC is mainly applied in Austria and Germany. |

[^41]: See [www.grazer-ea.at](http://www.grazer-ea.at)
[^42]: See [www.berliner-e-agentur.de](http://www.berliner-e-agentur.de)
3.2.3. PSS Further potential for innovation

The Energy Contracting service concept shifts the focus of energy supply and management from buying or selling units of final energy (like fuel oil, gas or electricity) towards the desired benefits and services derived from the use of the energy carrier (e.g. keeping a room warm, air-conditioned or lit)\(^{43}\). EC is an instrument to minimize life-or project-cycle cost, which takes the operation of the building into account. As the ESCO’s remuneration depends on the output of the services provided and not the inputs (like fuel or man-hours) consumed, the concept induces an intrinsic interest for the ESCO to increase efficiency and to reduce final energy demand.

For building owners, Energy Contracting models offer the opportunity to out-source activities related to (sustainable) energy, including the planning, installation, operation and maintenance, and financing of equipment for heating, cooling or electricity generation to a professional third party. EC reduces the need for internal capacity to deal with these issues and for managing a variety of different suppliers and interfaces, thus allowing building owners to concentrate on their core business. However, building owners still need a certain understanding of energy related issues in order to negotiate contract conditions and supervise the ESCO.

ESCO models are well replicable, but they do require specialist knowledge to operate the business model. In general, the ESCO implementing the scheme will have a much better knowledge of available RET, their characteristics, relevant suppliers, and available incentive and financing schemes than a building owner. Therefore one of the major advantages is that the ESCOs is more likely to take advantage of opportunities for the deployment of RET, leading to an increase in deployment. Such opportunities will increase with increasing competitiveness of RET versus conventional technologies and if additional incentive schemes are implemented.

The following figure provides a synthetic comparative assessment of the ESCO business models, namely the ESC, the EPC and the IEC as well as the value chain and the differences between different types of models.

\begin{center}
\textbf{Table 3.15: Comparative Assessment of ESCO Business Models and differences value chain}
\end{center}

<table>
<thead>
<tr>
<th>Main conclusions for ESC model:</th>
<th>Main conclusions for EPC model:</th>
<th>Main conclusion for IEC:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ESC is particularly suitable for the implementation of RET like solar or geo-thermal applications, because their energy outputs can usually be measured with little effort through electricity or heat meters. In comparison to the EPC model, ESC reduces the expenses for measurement and verification and the risks associated with the savings guarantee significantly.</td>
<td>• EPC provides a comprehensive approach to end-use efficiency improvements. RET may play a small role.</td>
<td>• IEC allows for combining energy savings and supply of energy in an integrated approach. Therefore, in comparison to standard ESC, higher end-use energy saving potentials can be achieved. Moreover, RET may play a key role.</td>
</tr>
<tr>
<td>• However, large demand-side energy efficiency potentials</td>
<td>• With a market share of about 10 % of the ESCO market, the market uptake of EPC is significantly lower than for ESC. The market is mainly limited to the public sector and special purpose buildings such hospitals, swimming facilities or universities.</td>
<td>• IEC is an innovative model. Practical experiences are still limited, but 8 pilot projects in Austria have proven the feasibility of the model. Some experienced ESCOs have expressed interest in developing</td>
</tr>
</tbody>
</table>

\(^{43}\) Thus Energy Contracting can be considered a tool for moving towards a thinking of ‘economics of stock’. ‘Economics of stock’ imply major long-term investments in facilities to produce and deliver fuels and electricity, with concomitant long-term finances and contracts, business relationships and risks (Patterson, 2010).
remain untapped, because the scope of services is limited to the provision of useful energy.

- Transaction costs for ESC projects require a minimum project size, which can be expressed as a minimum energy cost baseline of about €20,000. The ESC model is thus not suitable for individual or small multi-family houses.
- In order to rule out incentives to sell more energy, the energy price component should be set at marginal cost. This implies that the ESCO’s calculation of the energy price should include variable cost only, i.e. exclusively the expenditure for fuel and auxiliary electricity. If the energy price is at marginal cost, there is no incentive for the ESCO to sell more energy, because the price equals its cost.
- No energy cost baseline is needed for the business model to work. If desired by the building owner, savings achieved can still be calculated by comparing to a historic or calculated baseline.

<table>
<thead>
<tr>
<th>Business models</th>
<th>Energy costs base</th>
<th>Energy performance contract</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value chain</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Primary energy  | Crude oil, natural gas, coal, ... | => MWh, e.g. climatized rooms: Energy management, controls, HVAC, efficient lighting, peak load management, thermal insulation, user motivation ...
| Secondary/ final energy | Heating oil, electricity, district heating, biomass, ... | => NWh, Renewable energy systems: CHP plants, solar systems, EE-measures ... |
| Typical products & measures | Useful energy service | Energy savings service |

The following SWOT Analysis summarizes the main strengths and weaknesses of the ESCO models taking into account the building owner perspective.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
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</thead>
</table>

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768287.
Investment in cost competitive (over the contract term) RET and EE measures, since ESCO has the intrinsic incentive to reduce life cycle costs. **cost competitive technologies**

Payment for outputs and results (services) instead of inputs and components (e.g. technology), thus the technical as well as financial and operational risks can be outsourced to an ESCO and the building owner can request guarantees for the total cost and overall performance of the energy service package. **reduced “hassle factor” for building owner**

Easier access to capital to overcome high up-front cost of RE and EE investments, since some ESCOs provide financing themselves and/or take the role of facilitator for third party financing solutions. **reduced “hassle factor” for building owner**

Modular and customized service package according to the specifications of the building owner. **performance based payments provide incentives to maximize efficiency**

ESC and IEC are particularly suitable for RET, because their energy outputs can be measured directly without needing a baseline. Thus, in comparison to the EPC model, the expenses for measurement and verification and the risks associated with the savings guarantee are significantly reduced. **RET application**

Little dependence on supporting policy measures as EC project are market based. **power and market based model.**

Energy Contracting is limited to cost-effective measures, but subsidy schemes can be integrated in the models either through the building owner or the ESCO. **limitation to cost-effective measures**

If the ESCO is responsible for investing in equipment with long pay back times, long contracting periods are required which result in mutual long-term dependencies and require a long-term business perspective of the ESCO and the client. For premature contract termination, buy out clauses can be agreed in the contract. **long contracting period**

ESCO projects require minimum project sizes, which can be expressed in minimum annual energy cost baselines. Today the EPC model is applied for large projects only with minimum energy cost baselines of € 100,000 per year and markedly above. For ESC minimum energy costs are about 20,000 €/year. **minimum project sizes required**

The scope of services of an ESC scheme is limited to the energy supply. ESC does not maximize the full potential for energy efficiency improvements and CO₂ reductions in the building. **limitation to energy supply**

EC-models cover the entire project life cycle in one contract and require technical, economical, financial, legal and organisational know-how. In this context the role of independent market and project facilitators has proven to be key to overcome the challenges related to the complexity, particularly for EPC projects. **complexity**

**OPPORTUNITIES**

ESCO and IEC are suitable for smaller projects (in comparison to EPC), and thus have a larger market potential. The ESC-model is known and applied in residential and commercial housing and industry in addition to public buildings.

In many countries around the world, ESCO markets are growing as building owners realise the added value of outsourcing activities related to sustainable energy.

**THREATS**

ESCO business models depend on the willingness of a building owner to out-source comprehensive service packages.

Hiring sufficiently qualified personal with interdisciplinary skills may be a barrier for ESCO development.

Although EC-models are a market based instrument, some (legislative) policy support is required to solve existing barriers, e.g. by
<table>
<thead>
<tr>
<th>Supportive policy measures, for example energy saving obligations for energy suppliers, are expected to lead to a growth of the market for energy services.</th>
<th>- Allowing public entities to conclude multi-year contracts with ESCOs, which do not count against public deficit limits,</th>
</tr>
</thead>
<tbody>
<tr>
<td>With rising fossil fuel prices, RET and EE measures deployed by ESCOs become more attractive.</td>
<td>- Addressing the barrier of ‘split incentives’ between building owners and renters/occupants. This applies particularly to the residential but to a lesser extent also to the commercial building sector.</td>
</tr>
<tr>
<td></td>
<td>- Allowing life-cycle cost optimization across separate investment and operational budgets. This is a key barrier which for private and public organisations.</td>
</tr>
</tbody>
</table>
3.3. Business models based on new and innovative revenue models

New and innovative revenue models have been a main driver for new business models in some traditional industries (Wuestenhagen & Boehnke, 2006). For the deployment of RET there are business opportunities in the intelligent use of available government incentives which contribute to revenues. New revenue streams may also emerge from realizing the additional value of the intangible climate or environmental benefit of a product, for example of a house with a high rating by a voluntary ‘green’ building certification scheme.

3.3.1. “New and innovative revenue models” Business Models sub-categories

3.3.1.1. Making use of feed-in remuneration scheme

Today, there are already many cost-effective opportunities for a deployment of RET and EE measures (e.g. insulation of buildings, solar water heating in sunny climates, etc.), although cost-effectiveness largely depends on the background situation. For technologies that are not (yet) cost-effective (e.g. efficient technologies based on innovative materials, etc.), business models may be based on supporting policy measures such as feed-in remuneration schemes.

A feed-in scheme is a policy by which the producer of renewable energy receives a direct payment per unit of energy produced. This feed-in remuneration can be a tariff, which like a preferential price covers the full generating costs, or it can be a premium, which provides a ‘bonus’ for the producer to cover the financial gap between the generation costs of using renewable energy versus using conventional (fossil) energy.

Feed-in schemes have emerged as one of the most common and successful (in terms of leading to an increased deployment of RET) incentive schemes covering the higher cost of RET versus conventional technologies by compensating the owner of the RET installation with a higher price for the renewable energy. A feed-in remuneration scheme creates opportunities for business cases as it can cover the financial gap between RET and conventional technologies. Feed-in tariffs or feed-in premiums for electricity from renewable sources are the most common. A renewable heat incentive has been implemented in the UK44 for the first time and in the Netherlands (SDE+ premium feed-in tariff)45.

Through a feed-in remuneration scheme the producer of renewable energy receives a direct payment per unit of energy produced. A feed-in scheme guarantees access to a predictable and long-term revenue stream, which can serve as a stable basis for a business model.

In addition to the tariff scheme, in which the producer gets a fixed price for the supply of energy, and the premium scheme, in which the producer gets a premium in addition to income from selling the energy on the market, hybrid forms are also possible. In these, the premium is chosen to complement the income from the market, to jointly cover the generation costs. So, in practice, the producer gets a fixed amount, but from two different sources. This hybrid form is similar to a feed-in tariff for the investor, but it has different consequences for government expenses. A feed-in scheme typically publishes rates per

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44 https://www.gov.uk/domestic-renewable-heat-incentive
45 http://www.res-legal.eu/search-by-country/netherlands/
energy unit for eligible production (e.g. in €/GJ or €/kWh). If a producer is eligible, a contract (or agreement) can be obtained from the government that allows the producer to claim the specific tariff (or premium) for every unit produced. This agreement fixes the conditions and levels of the tariff, typically 8-20 years depending on the technology. So once an agreement is entered into, this is virtually risk free if the government is considered to be trustworthy. Some feed-in schemes only cover energy that is delivered to the grid, whereas other schemes also cover auto-production (using generated energy for own purposes).

‘Net-metering’ electricity producers that use (part of) the production for own consumption can use so-called ‘smart meters’ that keeps track of the electricity supplied to the grid and the electricity taken from the grid. The owner of the smart meter will need to settle the net demand and supply from and to the grid (consumption and production may not coincide in time) and thereby level out the energy bill. This has an advantage, since the buying price of energy (which may include taxes) is usually higher than the selling price. For example, an individual who has a solar-PV installation will weigh the costs of his installation against the kWh he no longer needs to buy (e.g. 20 ct/kWh), while a grid-supplier needs to calculate with the selling price (e.g. 5 ct/kWh). Thus, for individuals who produce their own electricity, the financial ‘break even’ point is closer than for grid-suppliers. Note that foregone taxes are effectively an additional subsidy for auto-producers. Moreover, net-metering may require an adjustment of legislation. Smart meters may or may not be used in conjunction with a feed-in scheme.

To avoid operational overhead for the government, feed-in schemes do not look at specific projects and real costs, but instead use cost estimates per category. As a result, within a category some initiatives may be economically viable whereas others are not. To build a viable business model based on a feed-in scheme, the investor thus has to undertake a careful assessment of the project economics taking into consideration e.g. climate conditions for solar PV or heat pumps, technology costs, and fuel prices, e.g. prices of biomass for a biomass boiler.

In the case of STUNNING framework, feed-in schemes can be used by households and small and medium enterprises who want to generate their own energy using renewable sources (e.g. solar-PV or bio-mass heating). Such business models by households or SMEs can focus on production for own use, or for the sale of energy to the grid (or for heat to a nearby user). Feed-in schemes typically differentiate in categories by size of the installation, technology and fuel used. The level of remuneration is based on the category specific generation costs, but the actual payment is based on production (Gifford et al., 2011).

Table 3.16: Examples of stakeholders involved in the feed-in based BM
Figure above shows how a building owner generates renewable energy, first for own use and the excess is supplied to the grid. In a feed-in tariff situation, the building owner gets a fixed tariff for the electricity injected to the grid, i.e. supplied to the network operator (i.e. energy does not enter the market). Note that the use of certificates and the use of a smart meter are optional.

Table above shows how a building owner generates renewable energy, but needs to purchase additional energy from the market to meet total demand. Note that the premium is based on certificates from the production side, and the use of a smart meter, which is still possible.

Table below provides the St. Gallen approach for the feed-in based BM.

### Table 3.17: St. Gallen approach for the feed-in based business model

**WHAT:**

The main advantages of a feed-in based business model are the following:

- A feed-in agreement assures the producer/building owner of a predictable long-term source of income from a usually reliable counterpart (government or network operator), for the duration of typically 8-20 years. This can significantly reduce the financial risk of the project.
- A feed in tariff can cover the financial gap between the generation costs of using renewable energy versus using conventional (fossil) energy.
- Investors/building owner may combine the use of a feed-in scheme with other available support mechanisms such as soft loans or fiscal incentives to improve the financing conditions.
- Feed-in schemes are generally transparent and relatively simple, although the number of categories and eligibility criteria may grow over time.
- There is an incentive for entrepreneurs (building owner/SME) to find low cost projects, that ‘out-perform’ the benchmark on which the category is based, e.g. at locations with very favourable climatic conditions or if the entrepreneur has access to comparably cheap supply of biomass. The scheme thus leaves room for profit by ‘smart’ entrepreneurs with an above average business case.

**WHO:**

Feed-in based business models are applicable for all market segments: new and existing buildings, public, commercial/industrial and residential buildings. Which market segments are eligible for feed-in support, and therefore can be part of a business model depends on the policy specifics in the country or region. Notably, in the domestic building segment, a feed-in scheme may provide opportunities for entrepreneurs who use demand aggregation (e.g. through district heating or by providing energy services to groups of customers).

**HOW:**

The two main actors in a feed-in scheme are the institution that makes the payment available (government, network operator) and the recipient (home-owner, building manager, or energy service company).

In principle, feed-in schemes, and associated business models, **can be designed for all technologies** that generate heat or power (or both). Many RET require high up-front investments and when this is poses a barrier for investors, a part of the feed-in tariff may be made available as investment subsidy.
WHY:

Cost structure: Costs of RET installation

Revenue streams: In practice, the tariff or premium is based on the estimated generation costs over the lifetime of the installation, which makes it most suitable for technologies that are available off-the-shelf, e.g. solar PV for electricity generation or heat pumps for heat production, and less so for innovative (and diverse) or unique technologies. Some schemes primarily cover electricity production and an additional 'bonus' is made available if associated heat is put to productive use. The actual payment can be executed through a government agency, the energy supplier, or through the network operator. Payment in many instances is based on certificates, or 'guarantees of origin', in which case a government agency or certified third party company will be involved in verifying production and issuing certificates. If tariff levels are based on category specific generation costs, an (independent) institute may be involved in advising government on costs. A feed-in scheme is a policy, and the tariffs (and budgets) are therefore fixed by the government. The cost of this support is either recovered from the government budget (i.e. from tax payers), or from a network operator mark-up on energy bill (i.e. from energy consumers, as is the case for the German scheme).

Tariffs are based on cost estimates at a certain moment before payment. The actual implementation of an initiative that applies for the tariff can be up to years later. If in that time the real costs have increased, the rates are too low to make a solid business case. This is a risk for the producer in the project development stage. If real costs have decreased, the feed-in scheme allows for windfall profit for investors, decreasing the scheme's cost-effectiveness and potentially leading to political opposition.

The administrative costs of metering may be significant compared to the total income from the feed-in scheme. This is especially the case for metering renewable heat production, because additional heat metering is needed that is more expensive than electricity metering. Solutions to this include using proxies and estimates, and using smart meters.

Innovative business models

Feed-in remuneration schemes are very specific for each country, and for this reason it is not possible to trace general rules for the application. At the same time, no relevant innovation can be noticed concerning this typology of revenue model. A detailed overview on the important legislation on the support schemes, grid issues and policies can be found online, on the RES LEGAL portal. The portal covers all the EU 28 Member States, the EFTA Countries and the Members of the Energy Community.

3.3.1.2. Developing properties certified with a green building label

‘Green’ building certification systems assess a building’s performance according to environmental and wider sustainability criteria and provide proof that the building confirms to a certain sustainability standard. ‘Green’ certification of buildings can stimulate investments in RET even when they are not cost-effective. However, because such certification is voluntary, it typically only works in niche markets.

46 http://www.res-legal.eu/home/

47 Note that this business model analysis is based on the use of voluntary building certification schemes. It does not include mandatory energy performance certification as required by the EU Directive on the Energy Performance of Buildings and translated into national law in the EU member states.
In this business model a property developer or architect designs and builds buildings certified according to a voluntary ‘green’ certification scheme, expecting to realize a sales/rent price premium compared to conventional buildings.

This premium should compensate for the additional costs related to the ‘green’ features of the building, and for the costs of the certification. Drivers for an increasing demand for certified buildings include:

- Corporate Social Responsibility (CSR) considerations of corporations, for whom ‘green’ buildings are part of their ‘green’ image,
- Reduced operating costs of ‘green’ buildings,
- Enhanced levels of comfort for building users, which in commercial buildings may lead to higher productivity and less sick leave,
- Regulation which mandates ‘green’ certification, for example for public buildings, and turns voluntary schemes into mandatory ones.

Independent of policy incentives, a business model also exists if a property developer can achieve a higher sales price for a building which is certified according to a voluntary ‘green’ building label. This is frequently the case in the North American and some Asian markets.

Most ‘green’ building certification systems cover a range of environmental and broader sustainability criteria related to energy and water use, indoor environment, and materials used, some systems also include criteria on functionality and comfort, economic questions and innovation (Nelson et al., 2010). Normally, a building must fulfil most of the criteria set by the certification systems. There are a variety of voluntary certification systems globally. The most widely used are the U.S. Green Building Council’s LEED standards and the UK based ‘Building Research Establishment Environmental Assessment’ (BREEAM). There are also schemes which focus exclusively on energy related criteria, e.g. the U.S. and Canadian Energy Star label for buildings, the German ‘Passive house’ standard, the French ‘Haute Qualité Environnementale’ (HQE) standard and the Swiss ‘Minergie’ standard. In addition to certification systems there are also building rating systems, which do not issue a formal certificate. These rating systems support project developers by setting clear standards on what constitutes a green building. As rating a building is cheaper than undergoing a formal certification process, rating systems are frequently used for residential buildings (Nelson et al., 2010).

48 The terms ‘green’ and ‘sustainable’ are often used interchangeably in this context (Nelson et al., 2010). In this report, only the term ‘green’ is used.
Figure 9: Schematic depiction of the business case of developing a property certified according to a green label

Table below provides the St. Gallen approach for the green certification based BM.

Table 3.18: St. Gallen approach for green certification based model

WHAT:
Main added value of having a building with a green certification are:
- Certification gives the buyer certainty of environmental features of the building. The owner can expect lower operating costs and additional benefits such as increased comfort for building users.
- Building certification can be used for marketing / image building. Possible increase of the economic value of the asset
- Ability to get a premium price for property certified according to a ‘green’ standard
- Reduced operating costs of ‘green’ buildings.
- Enhanced levels of comfort for building users, which in commercial buildings may lead to higher productivity and less sick leave.
- Regulation which mandates ‘green’ certification, for example for public buildings, and turns voluntary schemes into mandatory ones.

WHO:
Green certification based business models can be done in all market segments, i.e. for new and for existing buildings, for commercial, residential and public properties, and for rented and owner-occupied properties. In other words, Private and public owners of existing single-family houses, multi-family buildings, apartment blocks, commercial/industrial/ institutional buildings, building owner portfolio

Particular focus shall be done on the real estate market segment: high-end office properties located in central business districts of large cities, corporate headquarters of multinational companies but also newly built public buildings are typical examples of buildings designed and built according to the highest level of certification. Originally, most certification systems have focused on certification of new properties. Today, most certified ‘green’ buildings space exists in commercial buildings, and a significant proportion of the certification is in existing buildings. For residential buildings, the focus continues to be on new properties. Trust and confidence of building owners in the sustainability certification and its provider shall be particularly cared for acquiring new customers (mainly through local and mass media, websites, local meetings).

HOW:
Key partners of the BM are mainly:
- Owner of the building willing to making its building greener
- Architects/building developer
- Contractors/installers and product suppliers
- Energy utility/auditor
- Institution who develops and manages the certification system
Main stakeholders involved are project manager, product providers, administration and marketing personnel, renovation employees and logistics, distribution network plus sustainability certification provider.

Which technologies can be included in business models based on ‘green’ building labels depends on the certification scheme: all ‘green’ certification schemes include energy efficiency measures. Under both the LEED and BREEAM certification systems, the installation of on-site renewable energy technologies is evaluated positively and contributes to the performance rating.

Key activities are renovation works, construction/project management, building inspection and energy audits, post renovation information/support to customers plus application for approval of certification body.

**WHY:**

*Cost structure:* Costs are related to marketing, salary of construction/project manager, product costs, administration, travel, subcontracting plus sustainability certification cost. Certification is used to underpin and prove the building’s environmental qualities. The design and construction of certified ‘green’ buildings is generally more expensive than of similar developments without improved environmental properties. In addition, there are costs related to the certification itself. A property developer must thus be able to cover the additional costs via a premium to the sales price of the property.

*Revenue stream:* On the sale or rent of a premium building, customer payment for renovation, products purchased, detailed energy audit, commission for suppliers.

### 3.3.1.3. Building owner profiting from rent increases after the implementation of energy efficiency measures

Building owners who do not occupy a building themselves or housing corporations can profit from additional revenue opportunities after undertaking investments in RET and EE measures if they are allowed to charge higher rent from their tenants after the renovation. Indeed, for building owners who do not occupy the building themselves and for housing corporations, revenue opportunities from an investment in energy efficiency arise when they are allowed to charge a higher rent from the tenants after the renovation. The higher rent takes the tenant’s energy savings into account. This helps overcome the barrier of split incentives, i.e. the lack of incentives to realize building improvements when owner and occupant are different parties.

This business model is based on regulation that allows such rent increases and is being introduced in a number of countries. Such regulation is possible in situations where regulation on maximum rents and/or maximum allowable rent increases exist. This is usually the case in the social housing sector.
but such regulation may also exist in the wider residential rental sector where buildings are owned by private persons or property companies.

**Figure 10: Schematic depiction of the rent increases based model business model**

The business model is based on a change in legislation regulating the rental sector. **Its attractiveness for the building owner directly depends on the details of the legislation**, e.g. how much of the energy savings or of his up-front investment a building owner is allowed to recover. It is unlikely that being able to charge higher rents to tenants will be the sole driver for a property owner’s decision to undertake renovation measures. However, the higher rents may still play a significant role in the decision. It is expected that in its current form the business model is mostly applied for the implementation of energy efficiency measures which are usually more cost-effective than RET. But theoretically the business model may also be applied for the implementation of RET, e.g. for the installation of a heat pump which reduces energy costs for the tenant. There are only few new business models and innovative policy instruments which specifically address the barrier of split incentives. This implies that this business model, potentially supported by additional incentives, may play an important role in catalyzing energy improvements of the existing building stock in the large rental sector.

The application of the business model is limited to countries or regions that have a regulated rental sector. However in the regulated rental sector mostly large property owners are active, such as social housing corporations which frequently have the long time horizon, access to capital and technical expertise required to plan and undertake renovation measures. Table below provides the St. Gallen approach for the rent increases based BM.

**Table 3.19: St. Gallen approach for rent increases based model**

<table>
<thead>
<tr>
<th>WHAT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main added value of having a renovated building are:</td>
</tr>
<tr>
<td>• Building renovation can be used for marketing / image building. Possible increase of the economic value of the asset</td>
</tr>
<tr>
<td>• Ability to get a higher rent tariff</td>
</tr>
<tr>
<td>• Reduced operating costs of ‘renovated’ buildings.</td>
</tr>
<tr>
<td>• Enhanced levels of comfort for building tenants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable for renter-occupied residential buildings in jurisdictions where the rental sector is regulated through determined maximum levels of rent or maximum allowable rent increases. However in the regulated rental sector mostly large property owners are active, such as social housing corporations which frequently have the long time horizon, access to capital and technical expertise required to plan and undertake renovation measures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOW:</th>
</tr>
</thead>
</table>

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49 The absolute volume of buildings in the social housing sector in the EU is significant. The relative share of social housing in the total building stock in EU countries is estimated to be on average 13%. In most EU countries the social housing sector is regulated.
Directly involved actors are property owners (housing corporations, individuals, corporate or institutional investors) and tenants. The business model also involves governments which set the rental regulations and other actors involved in the building sector such as installers of energy efficiency measures and energy auditors.

Theoretically both EE measures and installation of RET could be undertaken under this scheme. Practically, the regulation is expected to be mostly used for energy efficiency measures because they are usually more cost effective.

**WHY:**

**Cost structure:** Cost of the retrofitting intervention

**Revenue stream:** A building owner in a regulatory environment that allows higher rents for buildings with higher energy performance decides to undertake improvements to the energy performance of his property. To compensate for his investment, he increases the rent of his tenants who profit from lower energy costs. In doing so, the building owner aims at recovering his investment through the higher rents over a reasonable period of time.

**Innovative business models**

RentalCal\(^{50}\) is an international research project funded by the European Union under the H2020 framework. The project aims at develop a methodology for the profitability assessment of energy efficient retrofitting investments in the rental housing sector. Therefore, the second objective of RentalCal aims at providing comparable and transparent information on the profitability of energy efficiency investments that can be used both for the assessment of investment decisions, and for the comparative analysis of existing barriers in the private rental housing stock of participating countries. Moreover, RentalCal specifically aims to prepare the ground for investment in the existing rental housing stock, all across EU.

RentalCal links together eleven partner organisations - universities, public research institutes, and practitioners in the field of real estate economics, housing policy and energy efficiency. The RentalCal consortium partners represent housing markets from eight EU member states (Czech Republic, Denmark, France, Germany, Great Britain, Poland, Spain and the Netherlands), each with a distinct regulatory and socioeconomic framework for housing provision.

### 3.3.2. “New and innovative revenue models” Geographical context and application at country level

<table>
<thead>
<tr>
<th>Business model</th>
<th>Geographical context</th>
</tr>
</thead>
</table>
| Making use of feed-in remuneration scheme | Feed-in schemes are currently the most commonly used incentive tools for renewable energy production worldwide. The German EEG has been among the most well-known and effective feed-in schemes and this success can be largely attributed to its policy stability (Lensink et al., 2007). Other notable feed-in schemes that are relevant (but not necessarily limited) to the built environment include the Dutch MEP/SDE (AgentschapNL, 2011), the German MAP pro-

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\(^{50}\) [http://www.rentalcal.eu/about-the-project](http://www.rentalcal.eu/about-the-project)
<table>
<thead>
<tr>
<th>Business model</th>
<th>Geographical context</th>
</tr>
</thead>
<tbody>
<tr>
<td>gramme (BMU, 2011, and (part of) the UK Low-carbon buildings programme. There is a lot of experience with feed-in schemes for electricity, but little for heat. The UK Renewable Heat Incentive (RHI) is the first scheme for renewable heat (DECC, 2011).</td>
<td></td>
</tr>
</tbody>
</table>

Developing properties certified with a green building label

So far, voluntary ‘green’ building certification systems have gained most traction in the U.S. and the UK, which have the largest number of certified buildings and are home to the two largest voluntary certification schemes, **LEED and BREEAMS**. In 2010, the U.S. Green Building Council announced that it had achieved 1 billion square feet (about 93 million m²) of LEED certified commercial building space. BREEAM has achieved 200'000 certified buildings and over a million registered for assessment since it was first launched in 1990. Voluntary building certification is less widespread in continental Europe. Italy and Spain, for example, use the certification tools Protocollo **ITACA and VERDE** respectively which are based on the Sustainable Building Tool (SBTool) developed in Canada in the 1990s. Germany has introduced a building certification system only in 2009, the **German Sustainable Building certificate**, which is one of the most comprehensive certification systems worldwide, as it includes a wide range of criteria including economic and social ones (Nelson, 2010). Moreover, there is a certain overlap between the voluntary ‘green’ certification programs in Europe and energy performance labelling as mandated by the EU Directive on Energy Performance of Buildings (EBPD).

Building owner profiting from rent increases after the implementation of energy efficiency measures

The application of the business model is limited to countries or regions that have a regulated rental sector.

The regulation of the rental market differs widely across Europe. The same applies specifically for social housing and its regulations, although most social housing is managed by social housing corporations (Fresh, 2011).

Regulations that help overcome the split incentive barrier in the rented sector are not common in Europe, although awareness of the need for such schemes is growing. This was demonstrated by a survey among real estate professionals and property owners’ associations in many EU member states (UIPI & CEPI, 2010). Few countries have actually adapted their rent regulations to allow for increased rents after renovation (UIPI, 2010; IEE workshop, 2011). **European countries with existing policy to address the split incentive issue in the rental market are the Netherlands, France, Germany, the UK, Italy and Sweden** (IEE workshop, 2011; UIPI & CEPI, 2010). In the Netherlands, the tenants’ law, more specifically the rental price evaluation system for social housing, is expected to be adapted in the course of 2011 to allow rental price increases by housing corporations for energy improvements made (Aedes, 2011). In France, the tenants’ law was adapted in 2009 enabling landlords that realise energy improvements to share the energy saving benefits with their tenants. A specific
### Business model | Geographical context
---|---

| Feature of the regulation, similar to the one in the Netherlands, is that a tenant has to give consent to the landlord to undertake the renovation. Furthermore benefits to the landlord cannot exceed half of the energy cost savings (UIPI & CEPI, 2010). In Germany, there is a green rent index to reward energy improvements. This index is not widely used though, as the opportunities for landlords to increase rental prices for investments into energy improvement are limited. Moreover, RET are not eligible for the index, yet (Nelson et al., 2010; UIPI & CEPI, 2010). In the UK the national energy efficiency plan of the government (‘Green deal’) aims to establish financing options (‘pay-as-you-save schemes’) for tenants when landlords realise energy efficiency improvements to their house (UIPI & CEPI, 2010).

In **Belgium, Austria and Bulgaria** discussions are ongoing to address the split incentive problem (UIPI & CEPI (2010) and IEE workshop (2011)). And in the future, it is expected that more EU member state will introduce similar regulation driven by the proposed revision of the EU Energy Service Directive. The proposed revision acknowledges split incentives as a barrier for energy efficiency. Article 15 of the proposed directive states that Member states should take action to remove the split incentive between the owner and tenant, for example by means of a change of law (European Commission, 2011).

There is no indication that similar regulation exists outside of Europe. In most cases, the business model requires supporting policies or services. For example the assessments of a building has to be done by an energy label or audit, which implies that the country already needs to have implemented the respective requirements set in the EU Energy Performance of Buildings Directive (EPBD), or have a similar system in place. In addition, the business model may be regulated by additional policy, such as specific rules protecting tenants.
3.4. Business models based on new financing schemes

The regulatory environment plays a crucial role for business models for the deployment of RET and EE measures. Many of the business models that are based on new and innovative revenue models or financing schemes are actually driven by incentive schemes initiated and financed by government. In addition, regulatory schemes such as obligations to deploy RET can be an important driver for investments in RET in the built environment. However, obligations tend to not lead to direct business cases for the market actor who takes the initiative to install RET. But theoretically, an obligation can trigger innovative schemes such as a financing scheme. Such financing schemes emerge for example as a consequence of energy saving obligations for utilities. Indeed, high upfront costs are a major barrier for an increased deployment of RET. Innovative financing schemes may therefore create business models, if the financing schemes help to overcome the barrier of high upfront costs. As public budgets are limited, new and innovative financing schemes are emerging which do not burden government budgets.

3.4.1. “New financing schemes” Business Models sub-categories

3.4.1.1. Property Assessed Clean Energy (PACE) financing

The Property Assessed Clean Energy (PACE) concept has for example been widely discussed and piloted in the US. Under this scheme, local governments issue bonds for RET projects. The building owner repays the loan through an additional special assessment payment on its property tax bill for a specified term (Institute for Building Efficiency, 2010). When the property changes ownership, the remaining debt is transferred with the property to the new owner. In other words, PACE financing is a mechanism set up by a municipal government by which property owners finance RET and EE measures via an additional tax assessment on their property. The property owners repay the ‘assessment’ over a period of 15 to 20 years through an increase in their property tax bills. When the property changes ownership, the remaining debt is transferred with the property to the new owner.

Figure above shows a typical organisational set-up of a PACE financing model, where the local government finances the programme, for example via issuing of municipal bonds. When a building owner decides to participate in the programme he needs to register and undergo certain eligibility checks, which are generally less thorough than when for example applying for a bank loan, because the debt will not stay with the owner but with the property. The check typically focuses on the land title and the property tax payment history (RAEL, 2009). The programme administration pays the

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51 Assessments are comparable to loans as the property owner pays off its debt in installments over a period of various years. But legally, PACE assessments are not considered to be loans (NREL, 2010).

52 In the US, property tax payments are made annually or in arrears. Payment modalities may be different in other countries.
installer directly, i.e. the up-front investment costs do not pass through the hands of the building owner. In return, an assessment is placed on the owner’s property which is secured by a senior lien. Thus in the event of foreclosure (and forced sale), the local government will be paid back the PACE loan before any other claims against the property. If the owner sells the house before the end of the repayment period, the remaining debt, repayment obligation and the equipment are transferred with the property to the new owner.

The local tax agency acts as the collecting agent for the repayment. For a US$ 20,000 tax assessment at an interest rate of 6% over 15 years, the annual re-payment would for example amount to US$ 2,060. Generally, PACE financing instruments aim at structuring RET and EE measures in a way that the additional property tax payment is lower than the cost savings achieved, thus aiming at annual net cost savings for the building owner.

Assessing which measures are cost-effective requires at a minimum a rough energy audit of the property. Such services may be facilitated within the frame of the PACE financing programme, e.g. the administrative body can recommend service providers or may even offer energy audits themselves. These may be crucial for the programme to succeed, as building owners need to know in advance if the investment is cost-effective. The ownership of the RET system or EE technologies financed through a PACE financing programme lies with the property owner. Thus, the property owner could legally be eligible for additional subsidies or incentives, e.g. a feed-in remuneration or tax benefits.

Whilst municipal bonds are the most typical way of financing a PACE programme, other options are possible, such as bank loans, general local government funds or existing revolving funds (see NREL, 2010 and RAEL, 2009). Depending on the type of financing used by local governments, interest rates for home owners may differ substantially.

**Table 3.20: St. Gallen approach for PACE business model**

<table>
<thead>
<tr>
<th>WHAT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PACE financing overcomes the barrier of high-up front costs for the home-owner.</td>
</tr>
<tr>
<td>• If the property tax assessment can be transferred together with the property to the new mortgage holder, the PACE model helps to overcome the hesitancy of homeowners who may move house every 5 to 7 years to make long-term investments into RE and EE measures (NREL, 2010).</td>
</tr>
<tr>
<td>• If RET are installed and contribute to a significant share of electricity demand, the property owner effectively fixes his energy costs for the next 15-20 years at the level of the additional property tax payment. This is attractive if electricity prices are expected to rise.</td>
</tr>
<tr>
<td>• PACE financing improves access to capital and allows for repayment terms of 15 to 20 years, much longer than typical home equity loans.</td>
</tr>
<tr>
<td>• PACE financing reduces transaction costs for the homeowner as the programme is specifically set-up to finance RET and EE measures (RAEL, 2009). Home owners may consider the local government to be a more trustworthy source of information on opportunities for RET and EE measures than for ex-ample industry organisations (Bailey, 2009). Similarly, investors may regard local government as a trustworthy partner.</td>
</tr>
<tr>
<td>• RET and EE measures undertaken with PACE financing are chosen based on having positive net annual cash flows. If the realized energy savings are indeed higher than the additional property tax payments, the value of the property increases and the owner may realize a higher price when selling the house. If this is not the case, and realized energy savings are less than the additional property tax payments, there is a risk of a negative impact on the value of the property.</td>
</tr>
</tbody>
</table>
**WHO:**
The PACE business model can in principle be applied to **all buildings for which the owner is eligible for property taxes**, with a particular focus on **small and residential and commercial buildings** since these business models make a life cycle approach possible where building owners can spread the investment costs across the project life time. The model is relatively new, and current programmes in the U.S. apply to owners of existing free-standing residential houses and commercial buildings.

**HOW:**
Directly involved actors are the building owner, who decides to install the RET / EE measures, and the city or local government who issue the loan and collect the repayments. Property owners who have access to PACE financing should consider if financing conditions via PACE financing are attractive compared to other alternatives such as direct bank loans or own capital. It is also important to take into consideration that an investment which leads to annual cost savings, i.e. where the annual energy cost savings are higher than the additional tax payments, probably leads to an increase in the value of the property. On the other hand there is a risk that the property value decreases if the special tax assessment minus the energy cost savings create additional costs to a prospective buyer.

Applicable technologies are RET, such as solar PV or solar thermal, efficient boilers, and energy efficiency improvements.

**WHY:**

**Cost structure:** Up-front long term financing: 100% funding covers 100% of a projects hard and soft costs and frees up disposable income for families and capital for businesses, low interest rates for terms up to 20 years, while standard bank loan rarely exceeds 5-7 years.

**Revenue streams:** 20 years repayment – positive cash flow. Annual energy savings -> annual PACE payment

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**Innovative business models**

EUROPACE\(^{53}\) is an Horizon2020 EU funded project started in March 2018 that will develop, pilot and standardise the PACE financing scheme (on-tax financing mechanism) for residential energy efficiency retrofits in European cities. On-tax financing is a type of financing mechanism used to collect the repayment for money that was lent for investments in building improvements that meet a 'valid public purpose', e.g. save or produce energy. EuroPACE is a form of on-tax financing and it builds upon an existing relationship municipalities have with their citizens – the property tax system. Within three years the project intends to Assess Market Readiness in EU, conducting market review to determine viability and attractiveness of EuroPACE financing across Europe.

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The city of Olot, Spain is currently developing an EuroPACE pilot focusing on residential buildings. Several European cities, including Bilbao, Frankfurt, Kassel, Ladornac, Lisbon, Macerata, Pisa, Porto, Prague, and Toledo, have already expressed their interest in EuroPACE. Finally, the project will create a Toolkit, in order to facilitate the replicability of the approach and to scale it over EU countries.

The overall financing mechanism can be schematized as it follows:

- 100% up-front financing
- Long-term financing, up to 20 years
- Can be combined with utility, local, regional, and state incentive programs
- Financing is attached to the property – can be transferred to a new owner upon sale
- Financing is repaid with regular property taxes

3.4.1.2. On-bill financing

On-bill financing programs are another model for addressing the barrier of high up-front costs and access to capital: a utility provides capital to a home-owner for the installation of RET or EE measures. The home-owner repays the investment via its energy bill. In other words, utilities provide financing (i.e. a loan) for RET and EE measures. The building owners (or building users) repay the loans via a surcharge on their utility bills. Preferably the overall utility bill should still be lowered, though, because of the associated energy cost savings. It is possible to structure the programme in a way that the loan stays with the utility meter, and thus can be transferred to the new owner if the house is sold.

With an on-bill loan programme, a personal loan is issued to the building owner, repaid as a line-item on the utility bill (repayment periods are often set at around 5 years). However, it is legally not linked to the property or the utility meter. In on-bill tariff programmes on the other hand, the building owner also repays the loan via the utility bill (repayment periods are often set at around 10 years), but in this case it is considered an ‘essential service’ and part of tariff, that the utility charges its customers (Brown & Conover, 2009). The obligation for payments stays with the property and is transferred to the next owner in the case of sale of the property as with PACE financing. Generally, the target for the investments in RE and EE measures is to generate positive cash flows for the property owner. As a consequence, the repayment periods vary depending on the expected energy savings and the useful life of the installed measures (Brown, 2010).

Figure below shows a simple model of how an on-bill financing programme may work. In this example a utility provides a loan to a building owner for the installation of RET. The building owner in turn repays the principal and interest via its utility bill. The utility does not only administer the programme and collect payments via electricity bills, but it also finances the investments from its own capital.
What:
For building owner / user
- Overcomes the barrier of high-up front costs, as it allows building owners to apply RET and EE measures with limited or no own capital outlay.
- Interest rates may be significantly lower than if the building owner would arrange for financing himself.
- If set up well, the programme can be very simple for the building owner or user.
- Generally, investments are structured in a way that there are net energy cost savings for the building owner. For the customer, it is easy to see potential cost savings on his utility bill by comparing bills before and after the installation of RE and EE measures (Brown & Conover, 2009).
- In an on-bill tariff programme, the liability stays with the utility meter, and may thus be not classified as personal debt. As a consequence, lower in-come borrowers or persons who are unable to take on additional debt, may also participate in the programme (Brown & Conover, 2009).
- Frequently, the utility guarantees for the performance of the installed equipment thus the building owner or user is not liable if technical problems occur. In on-bill tariff programmes this is more frequently the case than in on-bill financing programmes (Brown, 2009).

For the utility
- In on-bill tariff programmes, utilities have the ability to disconnect customers from utility services in case of default on the loans.
- Linking payments to utility bills offers a relatively secure way of recovering the loan. As a consequence, it may be possible to offer attractive interest rates due to the lower default risk. However, engaging with lower income property owners may still increase the risk of default for the utility.
- An on-bill financing programme may be a way to increase customer retention in liberalized markets.
- An on-bill financing programme may allow a utility to meet targets sets under energy saving obligations.

Who:
- Owners of free-standing residential homes and small commercial buildings who want to upgrade existing buildings.
• Owner-occupied buildings, but can also work for renter occupied buildings as the concept may allow tenants to pay for (via the utility bill) and profit from energy efficiency improvements.

The mechanism worked well for small businesses which required simple, turnkey approaches to improve their energy efficiency and for private owners of residential buildings seeking financing for modest energy efficiency measures, for example in small and residential and commercial buildings since these business models make a life cycle approach possible where building owners can spread the investment costs across the project life time.

HOW:

On-bill financing programmes are set-up by utilities. In addition, they involve building owners, who decide to initiate RET and EE measures through on-bill financing. Utilities are frequently able to finance the programmes themselves as they have sufficient equity capital and access to debt facilities. However, the utility may also rely on additional partners for financing, such as banks or government bodies, e.g. through revolving funds. Installers of RE equipment may be involved by partnering with the utility. Successful programmes are often characterised by strong partnerships between involved actors.

Utilities planning an on-bill financing programme can also consider partnering with specialists such as installers, service companies undertaking energy audits, banks and ESCOs. Especially the role of installers and contractors may be critical for successful programs.

All RET and EE measures are theoretically possible.

WHY:

When applying on-bill financing, the aim is generally to generate annual cost savings for the building owner within the loan term which must be shorter than the useful life of the equipment. Thus, only cost-effective measures are financed. On-bill financing programmes are often combined with grants to enable a wider range of measures to be cost-effective.

3.4.1.3. Leasing of renewable energy equipment

Leasing of RET offers another opportunity for building owners to use RET without having to make an upfront investment. It is possible both for larger scale equipment in large commercial buildings and in some cases also for small-scale, innovative RET for private home owners. The opportunity to lease equipment may also be part of the energy services package offered by an ESCO. However, leasing of RET equipment is analysed separately as it is technology specific and may also target individual residential customers.

Leasing enables a building owner to use a 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. The building owner pays a periodic lease payment to that party (Activum finance, 2011). Leasing therefore resembles renting (Brealey & Meyers, 2003) or hiring of a renewable energy technology.

Generally, the financial institution (or another actor who offers the lease, i.e. the lessor) remains owner of the asset during the lease period. However, several types of leasing are possible, which differ in ownership and other economic, legal and fiscal conditions (Clearsupport, 2008; Bleyl et al., 2008). There are two main types of leases: operational lease and financial lease.
Leasing can be a central component of the business model of an Energy Service Company which has limited own capital and therefore also only limited access to debt, but may lease equipment from a financial institution. The ESCO then installs the equipment at the premises of its customers as part of the services that it offers. However, building owners may also finance RET via leasing without the involvement of an ESCO.

Leasing can also be a central component of the business model of a company that introduces a specific new technology to the market. The company that provides the technology can offer it to property owners via a leasing arrangement, including a service and maintenance package. Figure below provides examples of leasing business model application, involving a bank and a property owner (a) or ESCO (b) or a technology provider (c).

<table>
<thead>
<tr>
<th>A bank acts as the lessor of RE equipment. The building owner leases a solar water heater directly from a bank, which owns the equipment. In exchange the building owner pays a periodic lease rate during the contract period which includes a lease instalment and interest share (Bleyl, et al. 2008; Gray &amp; Needles, 1999)</th>
</tr>
</thead>
<tbody>
<tr>
<td>An ESCO undertakes the negotiations with the financial institution, provides additional services to the building owner and remains the lessee of the equipment, which is still owned by the financial institution. The advantage of the involvement of an ESCO is that the ESCO can act as a facilitator.</td>
</tr>
<tr>
<td>A provider of a specific technology, e.g. a micro-CHP system, leases the system to private or commercial customers. This approach is mostly used by companies who want to bring a new (energy) technology to the market, and have to compete against established technologies, traditional institutional areas of influence and potentially long supply chains to individual customers (Foxona et al., 2005). The technology provider usually also provides operation and maintenance services for the equipment.</td>
</tr>
</tbody>
</table>

Figure 13: Examples of leasing business model application, involving a bank and a property owner (a) or ESCO (b) or a technology provider (c).
Table 3.22: St. Gallen approach for Leasing of renewable energy equipment model

**WHAT:**

For a building owner / user

- Leasing of equipment provides a building owner or occupier the opportunity to use this equipment without initial investments, thus helping to overcome the barrier of high up-front costs.
- By leasing via an energy service contractor, the building owners may profit from additional services such as specific financial, legal, fiscal and administrative consultancy, and operation and maintenance services. This may imply lower financing costs (due to better understanding of the risk by the lessor) and lower transaction costs and effort for lessee (Bleyl, 2008).
- Leasing terms are generally more flexible than for a loan. For example, banks are more flexible in setting lease periods.
- Leasing can be structured in a way that makes optimal use of subsidies and tax deductions.
- By leasing off the balance sheet, the building owner or ESCO can access additional financing to invest in other assets (Bley, 2008).

For an ESCO that leases equipment from a financial institution

- Leasing is more flexible than debt because it can be used to finance part of a project. With a loan (such as a mortgage) this is more difficult, as ownership rights of parties involved determine the possibilities of mortgage financing.

For a technology provider that leases out equipment

- The company can keep the responsibility for maintenance which may be important for technologies which are just entering the market or for technologies that are very maintenance intensive, e.g. CHP systems based on gas engines.
- Leasing provides an opportunity to distribute a technology that is too costly to be sold but that does generate cost savings over its life-time.
- Leasing provides an opportunity to distribute an energy technology in which customers may not yet have trust because it’s new and considered risky, e.g. fuel cells.

**WHO:**

Leasing could be applicable to all types of buildings.

**HOW:**

Usually an ESCO or a building owner takes a lease while a financial institution or bank provides it (Bleyl, 2008). Also, a company aiming to introduce a new technology to the market may offer leasing of this technologies to a building owner or user. Leasing may be available for energy equipment and installations like condensing boilers (AgentschapNL, 2010), small and micro-CHP systems or solar energy equipment in buildings.

However, overall, leasing is not frequently used for RET. One reason for this is that not all RET can be leased. Generally, any equipment which is an integral part of a building is to be owned by the building owner. If installed technologies become part of the building, an operational lease is impossible because for this type of lease the ownership has to remain with the lessor, i.e. the actor offering the lease. Another reason is that regulation usually requires that after the leasing period, an asset can be reused in reasonable state at a different time and place. This criteria is referred to as ‘fungibility’ (Bleyl, 2008). RET systems such as soil or water-based heat pumps do not meet this
criterion as the complete system cannot be removed without substantial damage. Similarly building insulation, which is often a very suitable EE measure, cannot be removed after the end of the lease term.

Additional services provided are another difference between an operational and financial lease. In case of an operational lease a building owner is not responsible for e.g. financial accounting and administrative obligations. The bank (or other lessor) performs these as lease services to the building owner (Clearsupport, 2008). With a financial lease, the building owner is responsible for these arrangements. An operational lease thus offers more outsourcing of services and comfort to the building owner.

WHY:
Leasing involves a temporary financing contract between a party (the ‘lessor’, such as a bank) that provides an asset (such as a renewable energy technology) to another party (the ‘lessee’, such as a building owner) which wants to use the asset for a certain period. The lessee pays in exchange a periodic payment for the lease to the lessor. In this way, the lessees do not need to make an investment and do not take on any debt, although they still need to account for the liability from the expected lease payments. The choice for leasing or another financing option is case specific and depends on many aspects such as:

- The direct financing costs compared to the lease payments,
- Legal aspects, such as the ownership situation and its implications, and the conditions for contract cancellation,
- Securities required by the lease provider,
- Tax issues,
- Accounting issues, e.g. who activates the investment, etc.,
- Other aspects, e.g. transaction costs, comprehensive consultancy, etc. (Bleyl, 2008).

3.4.1.4. Business models based on Energy Saving Obligations

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

Innovative financing options can also emerge under energy saving obligations for utilities. The utility (potentially via an ESCO) offers investment incentives for energy efficiency investments, which are financed by overall higher energy prices. These incentives offer opportunities for building owners.

Energy Saving Obligation schemes, sometimes also referred to as White Certificates, are not a business model in itself, but a policy instrument that obliges energy companies to realise energy savings. It stimulates business models based on financial incentives offered by energy suppliers to building owners, renters or to energy service companies. Though primarily aimed at energy savings and energy efficiency, this regulation could potentially also be an important driver for investments in RET in the built environment.

Energy Saving Obligations may stimulate energy companies to develop business models to realize the mandated energy savings, e.g. by offering new energy efficiency services to customers (often in partnership with electricians and installers) as is the case in France, or by ‘outsourcing’ a large part of
the obligations to Energy Service Companies and thus creating a significant ESCO market, as is the case in Italy (Boot, 2009; ECN, 2011).

Mostly, energy companies are allowed to pass on the costs of the EE measures (and potentially RET) to all consumers via higher energy prices. Thus, the saving obligations can also be considered a financing mechanism for the development of energy savings or RET.

Energy companies, or the partners to whom the energy company outsources the obligation, need to create (financial) incentives for consumers to voluntarily implement energy savings at their premises. In Italy, France and the UK, subsidies for saving measures are the most common financial incentive (Bertoldi et al., 2009). In order to be able to finance the incentives offered, energy companies are generally allowed to charge higher energy prices to all customers. In many cases, financial incentives for energy consumers are combined with information measures.

There are a number of different design choices for energy saving obligations schemes. Examples are whether obligations involve trading and white certificates (official documents certifying that a certain reduction in energy consumption has been achieved), which actors are obliged parties, what kind of target (e.g. primary or final energy) is set and for which period, what eligible savings are, how flexible the scheme is with regards to eligible savings, and how monitoring & control of the obligations scheme is managed. There is no consensus, yet, on the best design in a specific situation.

**Table 3.23: St. Gallen approach for Energy Saving Obligations business model**

<table>
<thead>
<tr>
<th>WHAT: For governments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Saving Obligations are a means for government to catalyse energy savings without having to use government funds to finance and administer the programme. Instead, costs are paid for via higher electricity prices.</td>
</tr>
<tr>
<td>Energy Saving Obligations mandate energy suppliers to take action thus addressing the barrier ‘lacking intrinsic interest by energy companies’, which implies that due to their revenue structure, energy suppliers have no interest in efficiency measures.</td>
</tr>
<tr>
<td>Energy companies are generally in a strong position to implement the obligations as they already have direct contacts to households, which are their customers, and are often in a healthy financial position.</td>
</tr>
</tbody>
</table>
For building owners
- Energy Saving Obligations reduce the barrier of high up-front costs or cost effectiveness of EE measures or RET for the building owner, as obliged energy companies provide financial incentives.
- The building owner is usually supported by energy companies with information and advice, and organisation of the installation.

For ESCOs
- Energy Saving Obligations may create demand for energy efficiency services.

**WHO:**
Energy savings obligations can be applied to all types of buildings

**HOW:**
Directly involved actors are **energy companies, usually energy suppliers or distributors on whom the obligation is imposed**. In the British and French schemes the obliged parties are energy suppliers; in Denmark, Flanders and Italy the obliged parties are network companies. Frequently, the utilities enter into partnerships with service providers such as ESCOs or installers. In the UK, energy suppliers either offer energy services themselves, or hire external companies (JRC, 2011). In Italy and Denmark, obliged energy companies are not allowed to implement energy saving projects themselves (JRC, 2011). The measures are implemented at the clients of the energy companies, or the end user sectors. Government is involved in setting the regulatory framework.

Most existing schemes focus on energy efficiency measures. However, Energy Saving Obligations could be extended to cover RET. In the UK scheme, insulation is for example the dominant measure, followed by energy-efficient lighting. In France most savings are realized by installing efficient condensing boilers. A little more than 10% of the certificates were generated through the installation of heat pumps.

**WHY:**

**Cost structure:**
For government costs are only related to the approval of requests and general support services.

**Revenues structure:**
For government: costs are paid for via higher electricity prices.

For ESCOs: Energy companies implement new EE measures, covering costs associated to the installation of the new measures. Companies are are allowed to pass on the costs of the EE measures (and potentially RET) to all consumers via higher energy prices.
### 3.4.2. “New financing schemes” Geographical context and application at country level

<table>
<thead>
<tr>
<th>Business model</th>
<th>Geographical context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Assessed Clean Energy (PACE) financing</td>
<td>The model is relatively new, and current programmes in the U.S. apply to owners of existing free-standing residential houses and commercial buildings. While the PACE concept has gained relatively widespread attention, its actual use is still limited. In Europe there is the EURO PACE GNE Finance leading Horizon 2020 project.</td>
</tr>
<tr>
<td>On-bill financing</td>
<td>This business model is mainly widespread in US. In the UK, a scheme similar to an on-bill loan programme is being suggested as central component of the proposed ‘Green Deal’: under the proposed scheme called ‘Pay-as-you-save’, building users would borrow money from private lenders and would pay the loan back through their energy bills. If they moved out and stopped being responsible for the energy bills of the property, the financial obligation would move to the next bill-payer (UK DECC, 2010).</td>
</tr>
<tr>
<td>Leasing of renewable energy equipment</td>
<td>Country specific regulation on leasing, e.g. regulation on tax implications and depreciation, may have a substantial impact on the decision if leasing is an attractive option for a building owner or ESCO (Clearsupport, 2008). Overall, leasing is not frequently used to finance RET. In Austria, leasing is for example typically applied for large scale renewable energy projects, e.g. wind farms but is not common for RE in buildings. In the Netherlands, only some energy service providers are known to rent or lease solar water heater to their clients (Milieucentraal, 2011). Energy companies usually rather rent or sell RET instead of offering leasing arrangements. Financial institutions are generally found to be not very open to leasing energy technologies, probably because energy is not part of their core business, because they are not familiar with the implications of leasing of RET, or because they may not want to take the risks associated with ownership of the technology. The creditworthiness of the client and a financially sound business case are the main requirements by a bank for leasing. Public organisations would therefore be more easily accepted as clients than commercial actors.</td>
</tr>
<tr>
<td>Business models based on Energy Saving Obligations</td>
<td>In the EU, Energy Saving Obligations are expected to become widely used if the proposed EU Energy Efficiency Directive is implemented. As of 2011 four EU Member States and one region in the EU have an energy saving obligation scheme in place: the United Kingdom, Denmark, France, Italy and the Flemish region in Belgium. Some countries seem to be planning or considering Energy Saving Obligations schemes, e.g. Poland, Ireland, Bulgaria, Romania, Germany, and Portugal. Research in Sweden advised against the implementation of an obligation scheme following an ex ante evaluation (ECN, 2011). In the UK, the savings must for example be...</td>
</tr>
</tbody>
</table>
realized in residential buildings. 40% of savings needs to be realized in low income households to reduce energy poverty (Ofgem, 2010). The French regulation also mostly targets the residential sector (90% of realized savings in the first obligation period) and includes fuel poverty as a consideration (JRC, 2011). In Denmark the residential sector is not the primary target for savings but rather other end-use sectors such as industry.

Moreover, in the UK, energy suppliers are estimate to have invested 3.2 billion pounds between 2008 and 2011 in saving measures at households. Many saving measures are delivered by the suppliers at no cost to the homeowner (Ofgem, 2010). Suppliers in the UK use several ways to persuade homeowners to take saving measures. The most important is subsidizing the installation of measures by installers. Other suppliers are marketing programs to private homeowners, enter into partnerships with local public organisations (social housing corporations) or with other government saving programmes (Ofgem, 2010).

In France, consumers do not directly pay the costs of saving measures. Energy suppliers provide financial incentives to customers such as subsidies and soft loans (JRC, 2011). Investment can be earned back via energy bills, but since energy tariffs are regulated the regulator needs to take these investments into account (Bertoldi et al., 2009). Most energy suppliers have set up their own programs.

In the British and French schemes the obliged parties are energy suppliers; in Denmark, Flanders and Italy the obliged parties are network companies. Frequently, the utilities enter into partnerships with service providers such as ESCOs or installers. In the UK, energy suppliers either offer energy services themselves, or hire external companies (JRC, 2011). In Italy and Denmark, obliged energy companies are not allowed to implement energy saving projects themselves (JRC, 2011). The measures are implemented at the clients of the energy companies, or the end user sectors. Government is involved in setting the regulatory framework.

Most existing schemes focus on energy efficiency measures. However, Energy Saving Obligations could be extended to cover RET. In the UK scheme, insulation is for example the dominant measure, followed by energy-efficient lighting. In France most savings are realized by installing efficient condensing boilers. A little more than 10% of the certificates were generated through the installation of heat pumps.
3.4.3. “New financing schemes” Further potential for innovation

**Loan capital, soft loans or green loans**

Relevant factors of these financial instruments are the interest charged on loans and the time allowed for repayment. Loan capital is the part of an organization’s capital employed that is not equity capital, that earns a fixed rate of interest instead of dividends, and that must be repaid within a fixed period. A Green loan represents a sum of money lent for environmentally-friendly investments (including energy savings), at an interest seeking both financial returns and environmental benefits. Soft loans offer flexible terms for repayment, usually at lower than market interest rates, and are provided customarily by government agencies. The difference with the commercial interest rate is mostly covered by the government.

**Other possibilities**

There are several innovative financing schemes that have not been covered in this study, such as ‘soft leases’ (leases with a lower interest rate, similar to soft loans), financial guarantees (e.g. a guarantee scheme for green mortgages) or revolving funds (e.g. for EPC projects). Moreover, there is scope for increasing the understanding of how financial institutions can be better involved in offering financial products for financing energy improvements in buildings.
### 4. Selection of most promising Business Models

The table below reports the main remarks for each of the business models sub-category described in detail in the previous Chapter.

<table>
<thead>
<tr>
<th>BM category</th>
<th>BM</th>
<th>Main remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business models based on One Stop Shop (OSS) concept</td>
<td>OSS based on Step-by-Step approach</td>
<td>The Step-by-Step model refers to a timeline of implementation of the retrofitting measures that are spread over a long period, based on an overall plan depicted at the beginning of the renovation work. Main target buildings are residential buildings (single-family and multi-family), with private or public owners.</td>
</tr>
<tr>
<td>OSS provided as a complementary business (e.g. by utilities)</td>
<td>Utility (or other stakeholders such as real estate agency or insurance company) take advantage of their existing market position to sell a complete renovation package, which they compose by using subcontractors. Main target buildings are single family houses, with private owners.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by multidisciplinary team cooperation</td>
<td>Multidisciplinary team cooperation is a novel model of business where the project is carried out by a multi-disciplinary team in a cooperative manner. Main target buildings are large buildings, e.g. offices, commercial buildings or multi-family houses, privately owned. Also social-houses are a target.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by joint venture of retailers with industry and contractors</td>
<td>Retailers or building product suppliers enter into contracts with contractors and industry to provide a full renovation package service. Main target buildings are Private single family houses.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by Private-Public-Partnership</td>
<td>In this collaborative model, private and public partners collaborate coordinating their skills and knowledge for long-term contracts (usually 20-30 years). Single-family to multi-family houses, public owner. Also large buildings such as health facilities, commercial buildings could be targeted.</td>
<td></td>
</tr>
<tr>
<td>OSS provided by contractors’cluster cooperation</td>
<td>A team of contractors that may be made entirely by SMEs or by a major contractor and its affiliated partners.</td>
<td></td>
</tr>
<tr>
<td>BM category</td>
<td>BM</td>
<td>Main remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>----</td>
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</tr>
<tr>
<td>OSS based on ICT tools</td>
<td>Energy Supply Contracting (ESC)</td>
<td>Energy Service Company supplies useful energy, such as electricity, hot water or steam to a building owner or building user allowing the ESCO to earn based on the improved performance of the house. Main target buildings are new and existing public, industrial, commercial and large residential sector buildings.</td>
</tr>
<tr>
<td>Business models based on Product Service Systems (PSS) - Energy Service Companies (ESCO)</td>
<td>Energy Performance Contracting (EPC)</td>
<td>Energy Service Company guarantees energy cost savings in comparison to a historical (or calculated) energy cost baseline. For its services and the savings guarantee, the ESCO receives performance-based remuneration in relation to the savings it achieves. Main target buildings are public institutions buildings including special purpose buildings like universities, hospitals, swimming facilities and leisure facilities.</td>
</tr>
<tr>
<td>Integrated Energy Contracting (IEC)</td>
<td>Integrated Energy Contracting (IEC) is a hybrid model aiming to combine useful energy supply, preferably from renewable sources, with energy conservations measures in the entire building. Main target buildings are public, residential, commercial and industrial buildings. Customers target are both public and private organizations.</td>
<td></td>
</tr>
<tr>
<td>Business models based on Feed-in remuneration scheme</td>
<td>Feed-in remuneration scheme</td>
<td>Feed-in schemes can be used by households and small and medium enterprises who want to generate their own energy using renewable sources.</td>
</tr>
<tr>
<td>BM category</td>
<td>BM</td>
<td>Main remarks</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>new and innovative revenue models</td>
<td>Which market segments are eligible for feed-in support, and therefore can be part of a business model depends on the policy specifics in the country.</td>
<td></td>
</tr>
<tr>
<td>Developing properties certified with a green building label</td>
<td>‘Green’ building certification systems assess a building’s performance according to environmental and wider sustainability criteria and provide proof that the building confirms to a certain sustainability standard.</td>
<td>Green certification based business models can be done in all market segments and targeting all buildings typology.</td>
</tr>
<tr>
<td>Building owner profiting from rent increases after the implementation of energy efficiency measures</td>
<td>This business model is based on regulation that allows rent increases after the implementation of energy-efficiency measures. Its attractiveness for the building owner directly depends on the details of the legislation.</td>
<td>Applicable for renter-occupied residential buildings, with preference for social housing (multi-family public buildings).</td>
</tr>
<tr>
<td>Property Assessed Clean Energy (PACE) financing</td>
<td>Under PACE scheme local governments issue bonds for RET projects. The building owner repays the loan through an additional special assessment payment on its property tax bill for a specified term.</td>
<td>All buildings can be targeted, with special focus on residential and commercial buildings.</td>
</tr>
<tr>
<td>On-bill financing</td>
<td>Utilities provide financing (i.e. a loan) for RET and EE measures. The building owners (or building users) repay the loans via a surcharge on their utility bills.</td>
<td>The mechanism worked well for small businesses which required simple, turnkey approaches to improve their energy efficiency and for private owners of residential buildings.</td>
</tr>
<tr>
<td>Leasing of renewable energy equipment</td>
<td>Leasing enables a building owner to use a 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. The building owner pays a periodic lease payment to that party.</td>
<td></td>
</tr>
</tbody>
</table>
Leasing could be applicable to all types of buildings.

Energy Saving Obligation schemes, sometimes also referred to as White Certificates, are a policy instrument that obliges energy companies to realise energy savings at customer level. It stimulates business models based on financial incentives offered by energy suppliers to building owners, renters or to energy service companies.

Energy savings obligations can be applied to all types of buildings.

Based on the above table, providing the main conclusions on each subcategory identified, the selection of the most promising business models has been performed. As already reported in Chapter 2.2, the business models were selected according to their capacity to foster the achievement of European geographical coverage target towards the increase of 2-3% buildings’ renovation.

At this scope, the geographical coverage and replicability for a single or more typology of buildings were evaluated for the first screening of innovative BM.

In the following table the most promising business models are reported, in correspondence of the European area in which they are currently applied and they present the higher grade of replicability, considering both climate and building stock characterizations.

<table>
<thead>
<tr>
<th>Area</th>
<th>Climate</th>
<th>Countries</th>
<th>Most promising business models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>Cold continental, with cold to mild summer</td>
<td>Denmark, Finland, Sweden, Norway</td>
<td>Betterhome</td>
</tr>
<tr>
<td>Southern</td>
<td>Mediterranean</td>
<td>Cyprus, Greece, Italy, Malta, Portugal, Spain</td>
<td>Enerphit EPC plus EUROPACE</td>
</tr>
<tr>
<td>Western</td>
<td>Temperate, with warm summer</td>
<td>Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, UK</td>
<td>Energiesprong Remourban</td>
</tr>
<tr>
<td>Eastern</td>
<td>Cold continental, with warm summer</td>
<td>Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia</td>
<td>Enerphit EPC plus</td>
</tr>
</tbody>
</table>
Leveraging on the actual and potential application of each of the innovative business model selected from the in-depth analysis reported in the previous Chapter 4, most promising business models were selected as reported in the table above.

**Northern area:**

The most promising Business models selected for the Western area is Betterhome.

The One-Stop-Shop business model aims at providing full service energy efficient renovation of mainly private single-family houses (in some cases also multi-family houses can be addressed) and it is particularly widespread in Nordic countries where there is plenty of these buildings’ types. Indeed, in those countries the majority of the houses are more than 30 years old and need to be renovated, which provides opportunity for implementation of energy efficiency measures. Indeed, in the Nordic countries typical single-family houses with large primary energy saving potential are those from the 1960’s and 1970’s, since they were built in large numbers and built just before the tightening of the insulation standards in the late 1970’s, and because electric heating is prevalent (except for Denmark). Although a part of the single-family houses built before 1945 has been renovated, energy renovation of those houses would still account for large specific energy savings. There is a significant business potential for such a model as the volume of renovation market for single-family houses can reach hundreds of million Euros per year in each Nordic country. These features, togheter with the positive results and potential of replicability of the proposed approach, permitted to select Betterhome as the most promising business model for the Northern area of EU.

**Southern area:**

The most promising Business models selected for the Western area are Enerphit and EUROPACE.

The Enerphit approach permits to implement EE measures in successive steps, according to an initial planning using PassivHaus Components. Such an approach can be promising for the southern area according to different reasons: on one hand Mediterranean climate conditions allows the renovation project to tackle EE measures over a longer period of time, with minor consequences on user’s comfort; on the other hand the project can be managed with a low budget, extending the timeline of the project and planning a cautious approach. Moreover, the Enerphit project can be applied at a wide range of different buildings typologies (mainly Residential -single and multifamily- and commercial buildings) with no specific restrictions and appear to be particularly favourable in the southern area of EU, as the number of already completed renovation project in the area implementing the Enerphit model can attest.

PACE financing is a relatively new concept: the first pilot programme was undertaken in 2008 in the city of Berkeley. It is attractive as it provides access to capital for property owners to invest in RET and EE measures, thus overcoming the barrier of high-up front costs. In addition, it incentivises long-term investments because the repayments of the special tax assessment may be done over 15 to 20 years and the lien on the property stays with the property when it is sold. The main prerequisite to enable PACE financing or a similar programme is a change in legislation that enables the creation of special tax assessment districts or similar arrangements, and the acceptance of all stakeholders. The EUROPACE running project, having installed a pilot in Spain, is one of the most promising solution for

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54 One-stop-shop service for sustainable renovation of single-family house – Norden – Nordic Innovation Report 2012 - Krushna Mahapatra, Mid Sweden University
this geographic area, presenting a good level of replicability if public authorities will decide to support such model.

**Western area:**

The most promising Business models selected for the Westen area are Energiesprong and Remourban.

The Energiesprong approach providing zero energy homes at zero upfront costs in The Netherlands – proposes a new financing and construction model. Its success is based on the idea to to move from a product-centred approach to an industrialised, service-oriented approach that uses innovative technologies, business models and/or finance models (such as selling products and services within an integrated framework), ultimately reducing the cost of energy renovations. Yet this industrialisation process that brings down the costs of the refurbishment is enabled by proper segmentation of the building stock. Much of the success of the programme is due to the identification of a very specific segment of target buildings (residential multi-family buildings) allowing a replicable approach to each of the projects. This suggest a huge potential for the business model in the geographic area of Western EU, as the project started its activity in the Netherlands expanding then to United Kingdom and France, but other countries with similar climate conditions could be targeted.

The other business model selected as most promising for the Westen area is Remourban that intends to promote Private-Public Partnership business model combining a set of EE and RET measures, together with an active involvement of private owners and citizens. The Nottingham pilot project is a perfect example of the potential that the business model can represent, for a large scale renovation of urban areas guided by a centralized public authority, coordinating and promoting renovation measures. The model appears to be particularly suitable for the Westen area also thanks to a geo-political similar context and similar market conditions.

**Eastern area:**

The most promising Business models selected for the Westen area are EPC plus and Enerphit.

EPC plus aims at eliminating barriers for implementation of EE measures and RET through standardisation of technical interventions and simplified financing. The implementation of the measures always follows a dedicated standardised process, making it scalable and replicable at large scale. The pilot project targeted Czech Republic as one of the major market for the business model application with 2 project completed and more than 30 pilot projects offered to participate in a project. These number suggested the selection of the business model as most promising for the Eastern area of EU.

Enerphit already showed its applicability in countries of the eastern area of EU, particularly in Bulgaria. The possibility of the model to be applied to different categories of buildings and to be flexible, both in the solutions to implement and in the timeline of implementation, suggest its selection as most promising in the area.
5. References

Reference documents for the above-described analysis have been gathered by means of Desktop Analysis, consisting in the documents collection and data analysis and processing from literature (see Chapter 5.1) as well as of EU projects dealing with business models related to Energy Efficiency in buildings (see Chapter 5.2).

5.1. Desktop Analysis

The main documents collected and analysed in the Desktop Analysis are reported in the following list.


UIPI & CEPI. (2010). Landlord/tenant dilemma. Joint statement by CEPI, the European Council of Real Estate Professions and UIPI, the International Union of Property Owners.

UIPI. (2010). Revision of the Energy Efficiency Action Plan - strategy: contribution from private property and building owners’ organisations to meet the challenge. UIPI - GEFI - UEHHA.


5.2. EU projects

5.2.1. NeZeR project: Promoting Nearly Zero-Energy Building Renovation

Duration and Status
The NeZeR project started in March 2014 and completed in February 2017. The project had a budget of 1.6 million euro and it was financed by Intelligent Energy Europe with national co-funding from the project partners and national authorities, cities or foundations.

Main partners involved
The project has been promoting the Nearly Zero Energy Building Renovation market, with its thirteen partners from Sweden, Finland, Netherlands, Spain and Romania.

Objective
The goal of the NeZeR project (2014-2017) was to promote implementation and smart integration of Nearly Zero Energy Building Renovation (NZEBR) measures and the deployment of Renewable Energy Sources (RES) in the European renovation market.

Main Achievements
The NeZeR project has cooperated with all stakeholders in the building supply chain to increase the awareness about potential advantages from Nearly Zero Energy Building Renovation. This was achieved through the following activities:

- Technical solutions for Nearly Zero Energy Building Renovation and utilization of Renewable Energy Sources were analysed and combined to packaged solutions. Successfully executed Nearly Zero Energy Building Renovation cases were analysed and presented.
- The feasibility of Nearly Zero Energy Building Renovation over traditional renovation was emphasized by feasibility studies and environmental and economic assessments.
- Nearly Zero Energy Building Renovation city action plans have been developed as well as concrete guidelines for developing similar action plans in other European cities.
- National clusters have been established in the participating countries consisting of the most relevant stakeholders.
- Knowledge in the whole building chain with respect to Nearly Zero Energy Building Renovation concepts has been improved through a series of competition and training workshops.

Synergies with Stunning
Synergies with STUNNING project can be found in the willing to create a comprehensive and co-creative procedure to promote country-specific implementation of Nearly Zero-Energy Building Renovation, both in terms of renovation packages as well as in terms of best practices, results and lessons learned for promoting energy efficiency buildings refurbishment.
5.2.2. **COHERENO project: Collaboration for Housing nearly zero-energy renovation**

**Duration and Status**

The COHERENO project started in April 2013 and completed in April 2016. The project had a budget of 1.6 million euro and EU financed it for 75%.

**Main partners involved**

The project consortium was made of nine partners from Belgium, Austria, Norway, Netherlands, Germany.

**Objective**

The objective of COHERENO is to strengthen collaboration of enterprises in innovative business schemes for realizing Nearly Zero-Energy Building (NZEB) renovations in single-family owner occupied houses. The project focuses on eliminating barriers for collaboration, providing enterprises with guidance on how to collaborate and on developing services for the different customer segments. In this way ad-hoc demonstration projects will be replaced by NZEB renovations in a volume market.

**Main Achievements**

The major outputs of the project have been:

- The organization of 10 Business Collaboration Events (two in each of the five partner countries) to inform and encourage stakeholders to collaborate.
- 19 collaborative structures involving more than 50 organisations in the partner countries have been set up and can enter the single-family owner-occupied housing market.
- 'nZEB radars' to be used as tracking tools to identify nZEB single-family house renovations and to map frontrunners in the supply-chain.
- Report on the "Mapping of frontrunners in nZEB renovation of single-family houses" and on "Barriers and opportunities for business collaboration in the nZEB single-family house renovation market".
- Report on "Customer segments and value propositions in the nZEB single-family housing renovation market".
- Hands-on recommendations on Quality Assurance practice.

**Synergies with Stunning**

- ZEB radars are useful tools to track energy efficient renovations that may also help in the identification of BC.
- Listing of frontrunners in nZEB renovation is important for professional actors to match as well as for home-owners searching for experienced collaborative companies.
- Lesson learned from the project was also related to the time taken to establish a tight business collaboration, to build trust between partners and to find the appropriate model for the group.
5.2.3. **SuccessFamilies: Successful Sustainable Renovation Business for Single-Family Houses**

**Duration and Status**

The project was running from May 2009 to April 2012.

**Main partners involved**

The project consortium was made of five partners from Finland, Sweden, Norway, Denmark.

**Objective**

The main objective of the project was to change the business environment in order to speed up the implementation of sustainable renovation of single-family houses. The resulting new service concepts combined both the technical solutions, financing services as well as other promoting issues to overcome the behavioural, organizational, legal and social barriers that exist in sustainable renovation.

**Main Achievements**

The solution to the lack of business concepts for renovation services for single-family houses is first of all that renovation service packages should be developed to include standard technical solutions for energy efficiency improvements regarding different building systems and ages. Secondly, all other necessary services should be included, providing overall renovation solutions for the people living in single-family houses.

Providing off-the-shelf renovation service packages will significantly improve the quality of life for many single-family house owners. This kind of concepts would not only improve the energy efficiency and IEQ (Indoor Environment Quality), but they would also provide an economically viable and easy-to-get choice for the house owner. Making the energy-efficient renovation services easy-to-get will speed up the implementation of energy efficiency improvement measures.

The new services must be supported with new features, like better visualisation, guaranteed price and funding services to overcome the behavioural, organizational, legal and social barriers that exist in sustainable renovation.

**Synergies with Stunning**

The project team analysed emerging business models to offer full-service renovation packages in the Nordic countries. A comparative assessment of the models shows that different types of actors (renovation company, insulation company, energy utility, building product warehouse) can provide such a service. Financing is included in some models. There are differences in how customers are contacted, while the similarities are more on how the service is provided. A main challenge is how to secure independent advising. Even though there is strong business potential for one-stop-shop energy renovation concept, still it has been somewhat difficult to start or run such a business. Various options to overcome the barriers to promote energy efficient renovation of detached houses are discussed in the final reports.
5.2.4. ERACOBUILD project: Strategic Networking of RDI Programmes in Construction and Operation of Buildings

Duration and Status
The ERACOBUILD project started in November 2008 and completed in April 2012. The project had a budget of almost 3 million euro.

Main partners involved
ERA-Net Eracobuild is a network of national R&D programmes focusing on construction and sustainable built environments and aims to develop synergies between national programmes by sharing strategies and establishing joint programmes and projects. Eracobuild has so far defined two thematic frameworks for transnational cooperation: “Sustainable Renovation” and “Value Driven Processes”.

Objective
ERACOBUILD aims at strengthening and enlarging the strategic networking of RDI programmes in the field of “construction and operation of buildings” initiated in the previous ERABUILD coordination action. ERACOBUILD gathers 34 programme owners or managers coming from 17 EU Members States, 4 Associated Countries and 1 European Region. The new countries will benefit from the experience and results of the 15 programmes owners/managers (10 countries) which already launched 6 joint calls in ERABUILD and agreed on two future trans-national programmes on “Sustainable renovation of buildings” and “Value driven construction process” to be implemented in ERACOBUILD.

Main Achievements

Synergies with Stunning
Main synergies with STUNNING project may be found in the following results of the project:

- The development of a strategic platform to national funding bodies to share strategies. It is the core for improving cooperation and setting the basis for long-lasting cooperation in the field of construction and operation of buildings.
- The preparation of the joint activities (including a future ERA-NET+) and thus supports the creation of a strong trans-national RDI community in the field.
- The implementation of joint activities, respectively in the two trans-national programmes and the new topics.
5.2.5. NewBEE project: Novel Business model generator for Energy Efficiency in construction and retrofitting

Duration and Status
The NewBEE project started in October 2012 and completed in September 2015. The project had a budget of 4.5 million euro.

Main partners involved
The project consortium was made of seventeen partners from Finland, Slovenia, Malta, Italy, Germany, Spain.

Objective
The objective of the project was to develop the NewBEE system enabling SMEs to generate performance based Business models for energy-efficient construction works with special incidence in buildings retrofitting.

Main Achievements
The main innovation of NewBB comes from the seamless integration from the first time, of all actors in the value chain of energy efficiency in construction industry (paying special attention to the retrofitting works where most of the savings in energy efficiency can be achieved) by the use of a new working methodology fitted to the new paradigm efficiently supported by an ICT set of tools. Another important innovative issue is the creation of a system which benefit from the previous knowledge in order to enabling SMEs to find an easy way of generating new business opportunities and also provide them the means to develop them.

Synergies with Stunning
Synergies may be found in the fact that within NewBee project a dedicated system has been develop to:

- Support to identify the best retrofitting technology adapted to each retrofitting project.
- Support to identify a business opportunity.
- Upon a business opportunity detection/development, easy configuration / adaptation / implementation of new business models based on regional specificities (climate, legislation, etc.) and on building/district typology
- Calculate risk/value distribution across the value chain and promotion of win-win public and private financing models e.g. through White Certificates
- Advise to develop new business opportunities
- Store and re-use the apprehended knowledge.
5.2.6. RE-BIZZ project: Business models for Renewable Energy in the Built Environment

Duration and Status


Main partners involved

The project coordinator was ECN, part of TNO group.

Objective

The project RE-BIZZ aimed to provide insight into policy makers and market actors in the way new and innovative business models (and/or policy measures) can stimulate the deployment of renewable energy technologies (RET) and energy efficiency (EE) measures in the built environment.

Main Achievements

The project analysed ten business models in three categories (amongst others different types of Energy Service Companies (ESCOs), Developing properties certified with a ‘green’ building label, Building owners profiting from rent increases after EE measures, Property Assessed Clean Energy (PACE) financing, On-bill financing, and Leasing of RET equipment) including their organisational and financial structure, the existing market and policy context, and an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT). The study concluded with recommendations for policy makers and other market actors.

Synergies with Stunning

Synergies with STUNNING project can be found in the scope of both projects consisting in the analysis and evaluation of innovative promising business models, defined as ‘strategies to invest in RET (and EE measures), which creates value and leads to an increased penetration of RET in the built environment.’ In both cases, successful business models represent approaches in which the financing and implementation of RET or EE in buildings is organised in such a way that certain barriers for the deployment of RET are overcome.
5.2.7. **ENERFUND project: An ENergy Retrofit FUNDing tool**

**Duration and Status**

The project “An ENergy Retrofit FUNDing rating tool” (ENERFUND) is a Coordination and support action started in February 2016 that will finish in January 2019. The project had a budget of 1.5 million euro.

**Main partners involved**

The project consortium is made of 16 partners from all Europe and is led by the Technical University of Cyprus.

**Objective**

The ambitious objective of enhancing funding investments for deep renovation of buildings, working on three components: public awareness and trust, funding schemes and incentives and trustworthy retrofitting opportunities. A comprehensive state of the art evaluation of existing barriers and needs in these fields will enable the development of the ENERFUND tool, which will address these shortcomings and expectations. The tool will then be promoted within the scope of the project and its impacts on deep-renovations will be monitored and measured.

**Main Achievements**

The project main innovation is the developed tool that will permit to rate and score deep renovation opportunities. The tool will be based on a methodology to be developed and on a set of parameters such as EPC data, number of certified installers, governmental schemes running, etc. By providing a rating for deep renovation opportunities – whether for private establishments or for public buildings – funding institutes can provide targeted loans, retrofit companies can identify sound opportunities, municipalities can promote targeted incentives and the public’s trust for retrofitting will be enhanced.

**Synergies with Stunning**

Synergies with STUNNING project can be found in the following results of the project:

- analyse the status quo and needs of deep renovation stakeholders and the public
- build upon the outcomes of previous projects to create a tool for deep renovation financing
- promote the tool to all interested stakeholders
- measure and document the impact of the tool on deep renovation strategies and financing
- provide a powerful tool that will assist EU stakeholders meet their obligations on increasing renovation rates.
5.2.8. 4Rineu project: Reliable models for deep renovation

Duration and Status
The project initiated in October 2016 is going to last till 2020.

Main partners involved
The project coordinator is EURAC research and the consortium is made of 16 partners from all Europe.

Objective
The Project goals are: to minimize failures in design and implementation, to manage different stages of the deep renovation process, from the preliminary audit up to the end-of-life, to provide information on energy, comfort, users' impact and investment performance.

Main Achievements
The 4RinEU deep renovation strategy to encourage large scale renovation of existing buildings is based on 3 Pillars:

- Robust technologies to reduce energy demand, to improve energy efficiency, to improve building operations, to reduce construction waste
- Usable methodologies: to understand renovation issues and potentials, to ensure an effective and participated design, to reduce construction time and failures
- Reliable business models: to enable well-founded investments

10 RESULTS will be combined in 6 tailored renovation packages, designed for 6 different geographical areas in Europe. This approach aims to foster a broader application of the deep renovation strategy.

Synergies with Stunning
Synergies with STUNNING project can be found in the evaluation of reliable business models for widespread existing buildings renovations.
5.2.9. **EMBUILD project**: Empower public authorities to establish a long-term strategy for mobilizing investment in the energy efficient renovation of the building stock

**Duration and Status**

The project started in March 2016 and will finish in August 2018.

**Main partners involved**

The project coordinator is GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit - German Corporation for International Cooperation) and the consortium is made of 10 partners from all Europe.

**Objective**

The project EmBuild is designed to empower public authorities at local, regional and national level, to formulate renovation strategies for the building sector that foster deep renovation and facilitate the acceleration of the renovation.

**Main Achievements**

EmBuild works directly with public authorities in towns and regions in Romania, Bulgaria, Slovenia, Croatia, Serbia and Germany. The aim is to generate new tools, better processes and higher capacity in local governments to design ambitious but realistic renovation strategies.

EmBuild communicates the experience of the focus municipalities throughout Europe and helps regional energy agencies to support more and more municipalities.

EmBuild promotes a bottom-up approach: The national renovation strategy should be the sum of local commitment. So the project involves national actors to contribute to national processes.

**Synergies with Stunning**

Synergies with STUNNING project can be found in the bottom-up approach, it is to say that both the projects targeted the building owner, supporting him during decision making.
5.2.10. REFURB 2.0: REgional process innovations FOR Building renovation packages opening markets to zero energy renovations

Duration and Status
The project REFURB 2.0 is a Coordination and support action started in April 2014 and finished in March 2018. The project had a budget of 2 million euro.

Main partners involved
The consortium was made of 15 partners from the Netherlands, Belgium, Germany, Denmark, Slovenia and Estonia.

Objective
The Project goal was to bridge the gap between supply and demand side within the One-stop-Shop BM by:
- developing a holistic approach to the renovation process in which technology combinations trigger step-by-step deep energy renovation of existing, private residential buildings towards NZEB-standards.
- accommodating the technology solutions to the decision-making psychology and ‘language’ of residential house-owners; this will provide the drivers for empowerment and mobilisation of house-owners for deep renovation.
- developing a quality and performance protocol to build trust on the demand side.

Main achievements
Dedicated renovation packages for different market segments and regions in Europe, starting from the private residential sector. A small scale pilot was carried out in order to validate and demonstrate the REFURB 2.0 solution. This was followed by a roll-out plan to stimulate EU wide uptake. In addition, a transferability plan was established for other sectors, whereas the social housing sector will be the first follower.

Synergies with Stunning
Synergies with STUNNING project can be found in the following objectives of the project:
- developing a holistic approach to the renovation process in which technology combinations trigger step-by-step deep energy renovation of existing, private residential buildings towards NZEB-standards.
- accommodating the technology solutions to the decision making psychology and ‘language’ of residential house-owners; this will provide the drivers for empowerment and mobilisation of house-owners for deep renovation.
6. Conclusions

This report has been prepared in the framework of WP5 “Promotion of new business models and validation through business cases” of STUNNING project “SusTainable bUsiNess models for the deep renovation of buIldiNGs” (GA: 768287). The document, in particular was developed within the course of Task 5.1 “Setting the scenarios”.

The focus of this report is the description of the methodology defined for performing the identification and evaluation of innovative business models for existing buildings’ deep renovation for dedicated key stakeholders towards their validation through business cases.

The aim of the report is two-fold. On one hand, that of creating a dedicated Business Models’ (BM) DataBase (DB) to stimulate the collection of additional data and eventually to find potentially uncovered business cases and target markets, to define BMs clusters, and eventual data filling needs.

On the other hand, to select a limited number of basic criteria to be extracted, giving the possibility to identify replicable and adaptable models of business, representative of the typical needs into the refurbishment activities.

On the basis of such analysis, a limited number of basic families of business models were extracted, giving the possibility to the identification of replicable and adaptable models of business, comprehensive of the typical needs into the refurbishment activities.

The 4 main families of Business models identified are:

1. Business models based on One-Stop-Shop (OSS) concept
2. Business models based on Product Service Systems (PSS) - Energy Service Companies (ESCOs)
3. Business models based on new and innovative revenue models
4. Business models based on new financing schemes

For each of them the main subcategories were identified, with a special focus on innovative applications of each of them, for the selection of innovative business models.

Based on the collected information, the selection of the most promising business models has been performed. The business models were selected according to their capacity to foster the achievement of European geographical coverage target towards the increase of 2-3 % buildings’ renovation. At this scope, the geographical coverage and replicability for a single or more typology of buildings were evaluated for the first screening of innovative BM.

After this first screening, a final decision will be taken (approximately in September 2018) based on the following parameters:

- **Barriers relevance evaluation**: The type and the relevance of each barrier related to a specific business model for sure influence its replicability
- **Market mechanisms**: Geographical context in which the Business Model is applied for sure influence the replicability of the business model itself.

The final selection and application at dedicated Business Cases will be included in D5.2.