RENONBILL

ON-BILL BUSINESS MODEL DEVELOPMENT GUIDELINES

2022 MARCH

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 847056.

Project Acronym	RenOnBIll
Project Name	Residential building energy rENovations with ON-BILL Financing
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Project Duration	2019 - 2022
Website	www.renonbill.eu

Deliverable No.	D 5.1
Dissemination Level	Public
Work Package	WP5
Lead beneficiary	Creara
Contributing beneficiaries	University of Genova, adelphi, Epta Prime
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Date	23/12/2021
File Name	D5.1 RenOnBill_OBS_business_model_development guidelines

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

EXECUTIVE SUMMARY

The goal of this document is to provide practical guidelines to any energy utility or other market actor interested in developing an on-bill offer for the energy renovation of residential buildings. The document aims to accompany the utility from the very beginning of the process, studying the national and local framework conditions and carrying out an examination of its strategical preferences that will help to assess the feasibility of launching on-bill offers. Successively, the reader is invited to reflect on the advantages and disadvantages of each subtype of on-bill scheme (hereinafter referred to as business models), based on specific criteria and factors that were validated thanks to stakeholders' consultations in four European countries: Italy, Germany, Lithuania, and Spain.

In addition, four business models for on-bill services have been fully analysed. The methodology followed in this task – the Value Flow Model (Lighthouse, Eindhoven University of Technology) – will help the readers to better understand the complex combination of agents, their motivations and the interactions involved in the offer of on-bill services. Also in this case, the analysis has been enriched with the results obtained from participative events with relevant stakeholders and especially through a survey addressed to utilities and financial institutions. A summary of the results obtained from the survey can be found in the methodology annex section entitled "Validation of analysis – stakeholder engagement ".

The **framework conditions** section *(chapter 3)* contains a list of key factors for the development of on-bill schemes. These factors are listed and classified into three categories: 1) market readiness, 2) legal and regulatory framework, and 3) operational issues for utilities. The impact of each factor, which can be positive or negative, thus enabling or disabling the development of on-bill schemes, is meant to be assessed through the evaluation of certain associated parameters. A table including all these factors, the associated parameters and how to quantitatively take them into account is provided in this section.

The **business model selection** section *(chapter 4)* presents a structured decision-making process aimed at choosing the most adequate on-bill business model considering also the framework conditions. The elements that the utility must take into account to assess the advantages and disadvantages of each model are based on utilities' and other stakeholders' views on the framework conditions explained above.

The **business model analysis** section *(chapter 5)* illustrates four fully developed on-bill business models to explain the main components according to the Value Framework methodologies: 1) key actors, 2) motivation, 3) compatibility and influence, 4) investment and financial set up, 5) risk allocation, 6) supplying and enabling networks, and 7) other stakeholders.

The **methodology** annex *(chapter 6)* gives insight to the theoretical basis behind the different sections of this document. Specifically, it explains the methodological approach for analysing the market readiness and the legal and regulatory context. Furthermore, the Value Flow Model methodology utilised in section 4 is also explained in more detail.

1 INTRODUCTION

The RenOnBill project's overall objective is to scale up investments towards residential building energy renovations by promoting the development and implementation of on-bill schemes based on the cooperation between energy utilities and financial institutions. The project, co-financed within the European Commission's Horizon 2020 programme, is born from the necessity to increase the energy renovation rate of buildings in the EU to meet the EU's long-term target for reducing GHG emissions, which requires the utilisation of huge financial resources and therefore the involvement of financial institutions.

On-bill schemes (OBS) refer to a method for financing energy renovations by using the utility bill as a repayment vehicle. They bring the upfront costs of energy efficiency upgrades down to zero by repaying the initial investment made by the utility with a periodical payment on the customer's utility bill. OBS represent a valid solution for the renovation of households and the realisation of economic savings in the medium to long term, be it in family houses, multi-family apartment blocks, or social housing. In addition, OBS customers can also benefit from an increase in the comfort, aesthetics, and value of their homes, leading to an improvement of their quality of life and the achievement of their sustainability motivations.

In addition, OBS also offer advantages for utilities and financial institutions. For utilities, OBS can imply long-term commercial relationships with their customers, increasing their client loyalty and retention through the offering of value-added services, and enables them to make energy efficiency renovations part of their services package, contributing to the diversification of their offer. It also allows utilities to access new market niches, to diversify and gain new clients, and to benefit from new revenue streams, whilst also improving their brand sustainability and social awareness image. For financial institutions, OBS can offer safe and relatively stable revenue streams and help them gain leadership in the market and differentiate from competitors, among others.

More than 30 years of successful implementation in the USA amounting over USD 2 billion in on-bill projects encourage the roll-out of these models in Europe. Notwithstanding, the market context is different in Europe, and the circumstances that enable or hamper the implementation of on-bill services must be thoroughly analysed. On top of that, each utility has its own (global) strategy, operational particularities, and proceedings, which makes it necessary to tailor the on-bill models.

The present document offers a methodology that utilities can follow for the launch of OBS services. It assumes that utilities, as any other company aiming to launch a new product or service, need to build a solid strategy that considers the legal and regulatory framework as well as the market conditions specific to OBS. If this is true for most enterprises, the complex environment that surrounds innovative services such as on-bill schemes exacerbates this need.

A comprehensive survey was carried out with relevant stakeholders such as utilities, financial institutions, energy service companies (ESCOs), government bodies, and other actors in the energy sector: we asked them for their opinion on the identified business models and to validate the assumptions and the analysis at the basis of the present document. Extracts from this survey can be found throughout the document and in the annex *(chapter 6)*.

2 FRAMEWORK CONDITIONS: ENABLING & DISABLING FACTORS

As anticipated in the introduction, the dynamicity of the energy renovation market as well as the legal and regulatory framework play a fundamental role in the choice of the most adequate business model. This is the learning from a series of interviews with relevant stakeholders, including energy utilities, financial institutions, energy renovation market players, policy makers as well as homeowners and tenants' representatives from four European countries (Italy, Germany, Lithuania, and Spain). When questioned about the replicability potential for on-bill schemes, it became evident from interviewees' replies that the success of on-bill schemes strongly depends on the respective national circumstances.

Along with that, the utility's motivations, market strategy, and other internal operational issues also need to be considered. All these elements together constitute the framework conditions that the utility must thoroughly examine before going any further in the definition of its strategy for launching on-bill offers. To support utilities in this task, this methodology suggests considering these elements as **enabling or disabling factors** depending on their positive or negative influence in the development of on-bill schemes. Furthermore, in order to simplify the approach, the impact of each enabling or disabling factor shall be assessed by qualitative or quantitative (when possible) parameters.

The values obtained with this assessment will be used to evaluate how encouraging the framework conditions are and, ultimately, the possibilities of success of on-bill services. The enabling and disabling factors can be categorised in three categories, as described below.

2.1 Market readiness

This category refers to the overall national market context, including characteristics of energy renovation demand, government support measure or the availability of financing:

- **Availability of support schemes compatible with OBS**. The presence of subsidies, tax incentives or any other instrument encouraging renovations is normally a positive factor, especially if it reduces the initial amount that needs to be covered by OBS, thus reducing payback times reasonably. However, they could also have a negative impact when the public support competes with on-bill schemes (for example when combining both is not permitted and the customer has to choose).
- **Accessibility to commercial loans**. A low interest rate environment and the general availability of standard financial products for building energy renovations can undermine the attractiveness of on-bill schemes.
- **Demand for energy renovations.** The demand for energy renovations in the residential sector will affect the outcome of OBS schemes. If the appetite for energy efficient interventions is modest, clients' OBS uptake will be moderate, and additional marketing efforts may be needed to spark customers' curiosity.
- **Availability of competent service providers.** When performing energy renovations in residential buildings, a key factor surrounding the renovation works is to accomplish the forecasted energy savings. This factor is crucial when talking about OBS, since the achieved energy savings will also be reflected in the on-bill component which is

charged to end-users. When utilities do not have internal departments that can take on deep energy renovations, it is imperative for them to be able to subcontract the technical side of the energy efficiency interventions to ESCOs, construction companies, architects, engineers, etc.

Category		Factor	Weight	Possible Values
Market Readiness	1	Availability of support schemes compatible with OBS	2	Compatible (1)
				Not compatible (0)
	2	Accessibility to commercial loans	2	High (1)
				Low (0)
	3	Demand for energy renovations	2	High (2)
				Medium (1)
				Low (0)
	4	Availability of competent service providers	2	Abundant availability (1)
				Limited availability (0)

Table 2-1 – Market Readiness Enabling and disabling factors

2.2 Legal and regulatory framework

The impact of the regulation on on-bill schemes is evaluated here. We take a look at creditors regulations at national level, the level of fragmentation of the decision-making process in multifamily buildings, the alignment of the incentives between homeowners and tenants and other relevant factors.

- **Flexibility of the regulation on creditors**: In general, national regulations on creditor activities may impose very strict conditions for non-credit institutions such as utilities. Therefore, a utility should investigate if, according to the applicable law, they are entitled to provide on-bill services. In particular, the transposition of Directives 2014/17/EU on credit agreements for consumers relating to residential immovable property and 2008/48/EC on credit agreements for consumers should allow utilities and other non-credit institutions to provide credit for investments of over EUR 75.000 for the renovation of residential buildings. Actual limitations may vary depending on the degree of integration of these EU regulations with the country's legal provisions on this matter.
- **Horizontal Property law and level of fragmentation** in the decision-making process for undertaking the energy renovation measures. Overall, the decision-making process and ease to reach consensus for the undertaking of energy renovation interventions in multifamily buildings tends to be long and complex compared to single-family houses due to the high level of fragmentation. The proceedings are often regulated by Horizontal Property laws that dictate the majorities of votes needed to adopt renovation measures.

- **Level of debt liability in a multi-family building.** National regulations (normally Horizonal Property laws) establish how liability is distributed among co-owners. Therefore, the level of debt liability is high if co-owners in a condominium are also responsible for another owner's default. The possible values are high liability or low liability.
- **Distribution of the renovation costs between owner and tenant**. This factor affects the level of influence of the owner-tenant dilemma[1]; if the owner can share the cost of the renovation with the tenant, that may serve as an enabling factor. The possible values are apportioning permitted or not.
- **Possibility of implementing a meter-attached scheme**. Meter-attached arrangements (hereinafter referred as "tariffed on-bill" or TOB) can solve the issue of the transferability of the debt when the property is sold or rented. This is especially relevant in countries where rented homes represent a large share of the building stock. Further detail on these arrangements can be found in the "Business Model Selection" section *(chapter 4)*.
- **Disconnection from the energy grid in case of non-payment**. The disconnection threat to users for missing payments is traditionally perceived as a form of collateral by utilities. However, in reality, most of them would not promote this measure because of the possible bad social responsibility image that they could give out. If disconnection is legally banned, it could be deemed as a disabling factor. The possible values are, therefore, disconnection possible or not

[1] The owner-tenant dilemma occurs when the landlord provides the tenant with the housing, appliances and installations but the tenant pays the energy bills. The landlord does not want to invest too much money in energy efficiency while the tenant wants to lower the energy costs (Ástmarsson et al., 2013).

Category		Factor	Weight	Values
Legal and regulatory Framework	1	Flexibility of the regulation on creditors	2	Flexible (1)
				Not flexible (0)
	2	Horizontal Property law and level of fragmentation in the decision-making process	3	Less fragmented (1)
				Fragmented (0)
	3	Possibility of implementing a meter-attached scheme	2	Possible (1)
				Not possible (0)
	4	Level of debt liability in a multi-family building	1	High liability (1)
				Low liability (0)
	5	Distribution of the renovation costs between owner and tenant	1	Apportion permitted (1)
				Not permitted (0)
	6	Disconnection in case of non-payment	1	Possible (1)
				Not possible (0)

Table 2-2 – Policy, Regulatory and Financial Enabling and Disabling factors

Stakeholder Survey outcomes

The outcome of the survey regarding the limitations of the **creditor's law** shows that, in general, legal uncertainty remains regarding this topic. Utilities are unsure about their legal entitlement to provide credit in the context of renovation (results provided in the "

Uncertainty about credit provision" section in the annex).

Nevertheless, as shown in the section "Reasons to include a financial institution in an on-bill scheme" *(suggestion: maybe highlight all hyperlinks in this box. Otherwise, the reader might miss that they exist),* utilities did not consider that involving a financial institution in the scheme is important in order to comply with national creditor laws. This may be because in the case of OBS and depending on the national context where the OBS is being set up, it could be argued that on-bill programmes do not lend a financial service, rather a payment is being made in instalments, similar to what construction companies and other service providers do.

Despite the horizontal property law and the level of fragmentation of the decision-making process in multi-family buildings being a possible barrier for OBS, survey results demonstrated that **multifamily buildings** are the preferred building typology to target for the commercialisation of OBS. In addition to multiapartment buildings making up a large part of the EU building stock, they offer a diverse range of renovation opportunities, and have an added incentive where other potential renovations can be "bundled" into the investment (such as lifts or improvement of garden residential areas). Hence, the potential returns for this building segment are attractive for investors. More details can be found in section "Most attractive residential sector for the delivery of on-bill schemes", shedding more light on the attractiveness of each residential sector for the implementation of OBS.

Survey participants from Spain and Italy considered detached **single-family houses** to also be an attractive building sector to target for OBS. One of the reasons behind this is the fact that many single-family houses in these countries tend to be inhabited by their owners rather than tenants, therefore avoiding the owner-tenant dilemma.

Although **tariffed on-bill arrangements** propose a way to solve transferability of the debt in the case of a change in owner or tenant, the survey questionees showed disagreement as to whether this arrangement is useful or possible. In Lithuania, all the participants considered this model to be useful and relevant. However, most participants in Italy considered that attaching transferability to OBS through a TOB arrangement could lead to default risk, whilst participants from Spain considered that this arrangement could be difficult to apply in a less dynamic home rental market. Additionally, participants pointed out that this arrangement could also make property unattractive for new residents, and its success will be very dependent on the housing segments (high-priced, social housing, etc.) and the housing pressure in the region. Lastly, participants in Germany pointed out that this arrangement may not be legally feasible. A complete view of the survey results for the TOB arrangement can be consulted in the "Tariffed on-bill (TOB) arrangement" annex section.

2.3 Strategic and operational issues for utilities

This category deals with internal operational aspects utilities can consider when contemplating the development of OBS. Many of these aspects are linked to the company's strategy, its customer portfolio, its segmentation strategy, its commercial and technical capabilities, and its internal procedures. At this stage, it is worth pointing out that rather than each of the following factors being enabling and disabling factors for OBS in general, they

will instead help the utility in deciding which of the proposed business models proposed in the "Business Model Selection" section is most suitable for their context.

- **Utility energy renovation expertise and capabilities:** this factor is related to the nature of the renovation measures and how compatible they are with respect to the utilities' core business. Utilities are often familiar with certain typology of renovations, such as boiler replacements, LED lighting or PV systems installation and often have in-house technicians or installers able to deploy these technologies. However, in-depth renovation measures (e.g., insulation o windows or building envelope) may require partnering with other companies (ESCOs, installers, etc.). In some cases, these partnerships can already exist, taking the form of collaboration agreements for certain categories of projects or can be obtained by having commercial relationships with a selected group of providers.
- **Utility's self-financing capabilities.** This factor can help a utility understand whether it is in their interest to integrate financial institutions into their OBS commercial offer or not. When a large utility has strong financial capabilities and can afford to invest large sums of capital without endangering its financial ratios, it may decide that integrating financial institutions into its business model is not needed; a Standard On-Bill Financing Model (OBF) may be most suitable in this situation. On the other hand, smaller utilities may find that partnering with financial institutions is the best solution for them, in which case a Standard On-Bill Repayment Model (OBR) will be more convenient.

  When considering this factor, utilities can also consider two other aspects regarding the programme size it desires to roll out:

  - The total size of the potential investment for building renovations among their client base (in millions of Euros). A utility wanting to launch energy renovations in a large number of multi-family condominiums will need a considerably higher investment than a utility targeting a few single-family houses.
  - The average size of a single building renovation project. Values for a single renovation can vary a lot between building typologies.
- **The total number of residential buildings among the utility client base.** When talking about residential building renovations, the number of residential clients that a utility has among its client base will help in measuring the potential programme size it wishes to roll out. Possible values are the following:

  - Total number of residential buildings among utilities' client base: high (>80%), medium (30% – 80%), and low (<30%).

  A high residential customer base will make a good case for OBS whilst a low one will not so much. Nevertheless, those utilities that have a lower share of residential customers can for instance seize the opportunity to offer more specific OBS services or decide to offer OBS to increase their market share of residential customers.
- **Customer income level.** The factor can affect other variables such as the level of attractiveness of OBS for banks. Single-family houses tend to belong to a socio-economic spectrum different from multifamily or social housing. Obtaining financing from banks for low-income end-users can be challenging due to their low credit rating and could therefore affect the success of OBS in certain neighbourhoods. It is worth

noting that this factor could be overcome if there are government support schemes which help energy-poor customers finance their deep energy renovations.

- **Credit rating of the utility.** Banks can be more prompt to provide financing to utilities depending on the results of their credit rating system (usually based on the assessment of the utility's balance sheet).
- **Possibility to add a line on the bill for on-bill services.** Converting the bill into a repayment vehicle may carry some efforts from different departments within the utility: administration, billing or IT. In addition, if financial institutions cooperate with utilities to offer OBS, effective communication must be available between both organisations regarding the payment or default of customers, meaning extra efforts must be put in to effectively set up a line for on-bill services.

Category		Factor	Weight	Possible Values
Strategic and operational issues for utilities	1	Utility's energy renovation expertise	2	In-house available expertise (1)
				Partnerships already in place (½)
				Partnerships not established yet (0)
	2	Utility's self-financing capabilities	2	Strong (1)
				Medium (½)
				Weak (0)
	3	Percentage of residential customers among utilities' client base	2	High: > 80% (1)
				Medium: Between 30% - 80% (½)
				Low: <30% (0)
	4	Customer's income level	2	High (1)
				Medium (½)
				Low (0)
	5	Credit rating of the utility	1	Strong (1)
				Regular (½)
				Weak (0)
	6	Ease to add a line on the bill for on-bill services	1	Easy (1)
				Difficult (0)

Table 2-3 – Strategic and Operational Issues for Utilities - Enabling and Disabling factors

Stakeholder survey outcomes

Survey answers showed that utilities from different countries have varying levels of expertise and internal capabilities for the deployment of energy renovation measures. Most utilities in Spain, Italy and Germany have capabilities in-house, whilst Lithuanian utilities stated their preference to hire third parties, as shown in the "Availability of technical expertise to implement on-bill schemes" annex section. It is worth pointing out that as described in the "Preferred renovation measures to implement using on-bill schemes" section, the preferred interventions vary from country to country, and one of the factors correlating to the preferred renovation measures is utilities' internal capabilities to implement given renovation measures.

As mentioned previously, survey participants in Spain and Italy consider single-family houses as an attractive sector to target, which among other factors may be due to a large portion of these houses being inhabited by inhabitants from a high socio-economic background.

Results from the survey, found in the "Ease to implement changes in the utility to set up on-bill schemes" annex section, reveal that adding a line for the repayment of renovation measures on the bill is generally a rather acceptable task for utilities, together with allocating marketing efforts to promote the offer, developing staff capabilities, and setting up a dedicated team for the development of OBS.

2.4 Analysis

The previously described categories represent the framework conditions that a utility must thoroughly examine when considering the commercialisation of an on-bill offer and the definition of its business strategy. The impact of each enabling and disabling factor can be assessed qualitatively and quantitatively to evaluate how encouraging the framework conditions are and, ultimately, understand the possibility of success of an OBS project. To quantitatively assess the potential roll-out of OBS, three tables have been created for each category (Table 2-1, Table 2-2, Table 2-3).

Market readiness

For the first category, utilities can decide whether the framework conditions are favourable or unfavourable, giving each factor a possible score of 0 or 1, as shown in Table 2-1 (with the exception of the "demand for energy renovations" factor, to which utilities can apply a score of 0 (low), 1 (medium), or 2 (high)).

For example, for the "availability of compatible support schemes for energy renovations" factor, a utility will consider the market context surrounding the set-up of the OBS. If there are indeed compatible support schemes, a score of "1" is given to this cell. Otherwise, a score of "0" is given.

Legal and regulatory framework

Similar to the first category, utilities can decide whether the framework conditions are favourable or unfavourable regarding the policy, regulatory, and financial conditions that apply to its context by giving each factor in Table 2-2 a possible score of 0 or 1. It is worth noting that for factors in this category for which an unfavourable score is obtained, the

potential barrier can be overcome by choosing the appropriate business model out of the ones suggested in the "Business Model Analysis" section.

Utility's strategic and operational issues

The same methodology can be followed for the strategic and operational issues (Table 2-3). In this case, the possible values to choose from for the enabling and disabling factors are 0 (non-favourable score), ½ (moderately favourable score), and 1 (favourable score). For instance, when a utility considers its internal renovation capabilities, it can consider having a decent in-house expertise (1), to have partnerships already in place with ESCOs and other subcontractors (½), or to not have any established partnerships (0).

Defining the enabling and disabling conditions

A weight has been assigned to each factor depending on its importance for the success in the commercialisation of an OBS. The respective weights have been validated through a series of workshops carried out with utilities collaborating with the RenOnBill project.

After applying the parameters associated to each factor, pondered with the respective weight value, a final result is obtained defining the attractiveness of the framework conditions.

For the market readiness category:

- Between 7 and 10: **Enabling** conditions for on-bill projects
- Between 4 and 6: **Acceptably positive** conditions for on-bill
- Between 0 and 3: **Barriers** may hinder the development of on-bill schemes

This first analysis will give the utility an idea of the framework conditions surrounding the market context and will be pivotal to the success of an OBS, since it may be hard for a utility to overcome market barriers which are out of its control.

For the legal and regulatory framework category:

- Between 7 and 10: **Enabling** conditions for on-bill projects
- Between 4 and 6: **Acceptably positive** conditions for on-bill
- Between 0 and 3: **Barriers** may hinder the development of on-bill schemes

For the utility's strategic and operational issues category:

- Between 7 and 10: **Enabling** conditions for on-bill projects
- Between 4 and 6: **Acceptably positive** conditions for on-bill
- Between 0 and 3: **Barriers** may hinder the development of on-bill schemes

For these last two categories, if a poor score is obtained, utilities can focus on the factors for which they obtained the lowest score and find a way to overcome them. It is likely that these barriers can be hurdled by selecting the appropriate business model out of the ones presented in the "Business Model Analysis" section. If all the limiting factors fall under the "utility's strategic and operational issues" category, utilities can opt to adjust and polish their internal operations and business strategies, if possible.

Example:

Table 2-4, Table 2-5, and Table 2-6 below illustrate an example of how a utility can assess the enabling and disabling conditions surrounding a possible commercial launch of OBS. In this example, the market readiness and the utility's strategic and operational issues suggest favourable enabling conditions for on-bill projects. However, the scoring obtained for the legal and regulatory category is poor, given that there is no flexibility of the regulations on creditors, there is a fragmented decision-making process, and there is no possibility of disconnection as collateral for default payments.

Market Readiness

Category		Factor	Weight	Possible Values	Value given by utility	Score
Market Readiness	1	Availability of support schemes compatible with OBS	2	Compatible (1) Not compatible (0)	1	2
	2	Accessibility to commercial loans	2	High (1) Low (0)	1	2
	3	Demand for energy renovations	2	High (2) Medium (1) Low (0)	1	2
	4	Availability of competent service providers	2	High (1) Limited (0)	1	2
					Total score	**8**

Table 2-4 – Market readiness of a hypothetical OBS

Policy, regulatory and financial framework

Category		Factor	Weight	Values	Value given by utility	Score
Policy, Regulatory and Financial	1	Flexibility of the regulation on creditors	2	Flexible (1) Not flexible (0)	0	0
	2	Horizontal Property law and level of fragmentation in the decision-making process	3	Less fragmented (1) Fragmented (0)	0	0
	3	Possibility of implementing a meter-attached scheme	2	Possible (1) Not possible (0)	1	2
	4	Level of debt liability in a multi-family building	1	High liability (1) Low liability (0)	1	1
	5	Distribution of the renovation costs between owner and tenants	1	Apportion permitted (1) Not permitted (0)	1	1
	6	Disconnection in case of non-payment	1	Possible (1) Not possible (0)	0	0
					Total score	**4**

Table 2-5 – Policy, regulatory and financial framework conditions of a hypothetical OBS

Strategic and Operational issues for utilities

Category		Factor	Weight	Possible Values	Value given by utility	Score
Strategic and Operational Issues for Utilities	1	Utility's energy renovation expertise	2	In-house available expertise (1) Partnerships already in place (½) Partnerships not established yet (0)	1	2
	2	Utility's self-financing capabilities	2	Strong (1) Medium (½) Weak (0)	0	0
	3	Percentage of residential customers among utilities' client base	2	High: > 80% (1) Medium: Between 30% - 80% (½) Low: <30% (0)	0.5	1
	4	Customer's income level	2	High (1) Medium (½) Low (0)	1	2
	5	Credit rating of the utility	1	Strong (1) Regular (½) Weak (0)	1	1
	6	Ease to add a line on the bill for on-bill services	1	Easy (1) Difficult (0)	1	1
					Total score	**7**

Table 2-6 – Strategic and operational issues for a utility considering a potential OBS offer

In this example, the absence of the possibility of disconnection in case of default is difficult to overcome due to legal barriers. However, the utility could overcome the challenge of the flexibility on the creditor's law by incorporating a bank into the scheme (see "Standard On-Bill Repayment Model (OBR)") and could consider establishing partnerships with property administrators to overcome the challenge of a fragmented market at the end-user's decision-making level. By overcoming these barriers, the score for the legal and regulatory category would improve, moving the conditions for OBS from "possible but with certain obstacles" to "enabling conditions for on-bill projects".

3 BUSINESS MODEL SELECTION

To select the most suitable business model, a utility must go through a decision-making process in which some of the factors from the framework conditions explained in Section 2 serve as criteria. The following steps have been designed to guide a utility in the implementation of OBS, introducing a logic among these factors that need to be evaluated. Ultimately, utilities will have to weigh the pros and cons of each option and decide which model is most suitable for their interests.

Table 3-1 below displays a short description of each business model and the corresponding acronym used in this document. For further detail on them, it is recommended to consult the *Report on the replicability of on-bill schemes in the EU* (Sonvilla, 2020)[2].

Acronym	Short Description
OBF	Standard on-bill financing model
OBR	Standard on-bill repayment with two variants: • Deposit on a utility's escrow account • Works paid directly by the financial institutions involved
OBSEP	On-bill scheme targeting energy poor customers
OBRSPV	On-bill repayment scheme operated through a special purpose vehicle (SPV)
OBRM	On-bill repayment scheme operated by a master-servicer
OBRMS	On-bill repayment scheme operated by a master-servicer under the control of a state agency
OBSI	On-bill scheme, either OBF or OBR, for supporting Valued Added Energy Services (VAES)
DSOF	On-bill scheme, either OBF or OBR, with a distribution service operator (DSO) acting as a facilitator
DSOA	On-bill scheme, either OBF or OBR, with DSO acting as an initiator

Table 3-1 - Summary of on-bill schemes

To streamline this process, we will focus on a subset of models, while others will not be considered for the reasons explained in the "Business model selection (Section 3)" part of the methodological appendix.

Step 1: OBF models or OBR models (OBR, OBRSPV, OBRM)

In general, OBF models have simpler value chains compared to OBR; therefore, they can provide a higher margin for the utility. Additionally, it can be said that OBF models involve less contractual complexities than OBR schemes. Figure 3-1 below illustrates the pros and cons of OBF and OBR-based models.

[2] The report is available at this link.

	OBF		OBR-based	
	Pros	**Cons**	**Pros**	**Cons**
Own financial resources vs. third-party financing	• Simpler value chains allow for higher profitability for the utility • The utilities' assets and liabilities remain the same (more leeway)	• Potential liquidity constraints (especially in large programmes) • Difficult to scale	• Utility liquidity is not altered • Easier scalability • Generates synergies between utilities and FIs	• More complex value chain may reduce profitability for the utility • Utility may have to incur in debt towards the FI • Small programme sizes may not result attractive for FIs
Flexibility of the Creditor's Law		• Requires flexible national creditor regulations	• More suitable in case of strict national creditor regulations	
Tariffed On-Bill vs. On-Bill loan	• Tariffed on-bill arrangements are tied to the meter, easily transferable and do not represent a debt for the final user	• On-bill loan based on OBF represents a debt to the utility for the final user	• Tariffed on-bill arrangements are tied to the meter, easily transferable and do not represent a bank debt for the final user	• On-bill loan based on OBR represents a bank debt for the final user

Figure 3-1 - OBF models vs OBR-based models

Firstly, a utility should evaluate the **investment size** of the programme it desires to roll out, and whether they are willing to fund it with their own financial resources (or whether they can leverage the investment with public funds, if available, or from other sources of capital such as non-profit organisations). If they are willing and able to do so, a Standard On-Bill Financing Model (OBF) is a suitable choice. Otherwise, Standard On-Bill Repayment Model (OBR) in cooperation with financial institutions may be more fitting.

Nonetheless, other factors should be considered when selecting the ideal business model: financing with the utility's own resources can put a burden on the **utility's liquidity**, especially when implementing large programmes. For the same reasons, OBF models are difficult to scale.

In any case, utilities may also consider the opportunity of investing in other core-business projects when choosing between OBF and OBR models. In fact, they may prefer to keep their financial leeway for core-business projects, and therefore avoid standard OBR arrangements that can reduce it. Under this scenario, OBF as well as other OBR arrangements that do not require a bank loan (e.g., OBRSPV), are preferable.

An advantage of OBR is the potential synergies created between financial institutions (which hold the expertise needed to decide on credit risk and other financial aspects) and the utilities (which hold contact with their clients and in some cases possess the technical knowledge to implement energy renovation measures). Banks and other financial institutions can access secondary financial markets and have the possibility to create financial products to sell the credits generated by the OBR and thus raise more capital, improving scalability.

Additionally, if **national creditor regulations** imply limitations or practical barriers for utilities to provide credit for building renovations, OBR schemes will be easier to implement (for further detail on this matter, consult Section 2).

Results obtained from a RenOnBill survey conducted to relevant stakeholders in the energy sector showed that the reasons for utilities to seek partnerships with financial institutions for the implementation of OBS are diverse. By order of preference, the reasons are the following:

- Transfer the default risk to a financial entity or a risk-sharing mechanism such as a public guarantee;
- The utility's own funds are not enough to scale the programme;
- The utility would prefer to use its own funds for other strategic investments or operations;
- The utility is not legally allowed to provide credit for building renovations (national creditor law).

More details can be found in the Annex "Reasons to include a financial institution in an on-bill scheme".

Another factor to consider is that depending on the desired contractual agreements to be put in place, OBS models can be either:

- **Tariffed on-bill:** The obligation to pay for the renovation is tied to the property's meter and therefore, transferrable to the next occupier.
- **On-bill loan**: The obligation to pay for the renovation is tied to the end user, and therefore not transferrable. If a property is sold, remaining instalments are paid to the utility in one solution, or, alternatively, the buyer will take over the debt (with a corresponding reduction in the house's sale price). Usually, the creditor must give an approval to the new owner/debtor before proceeding with the sale.

The **tariffed on-bill arrangement** works best in areas where the rental market is dynamic (and there are little unused dwellings). Most on-bill schemes in North America are attached to the meter. In Europe, possible regulatory issues may arise since the new tenants' freedom to choose its energy supplier would be affected.

Alternatively, in OBR models based on **on-bill loan** developed in collaboration with commercial banks, the client contracts a debt/liability with the bank. This can represent a relevant entry barrier for several potential clients, who may already have other loans in place with banks (and therefore insufficient leeway) or may prefer not to affect their personal indebtment level and reserve it for other needs.

However, when the financial institutions involved in an OBR scheme are not commercial banks (for example, private funds), the final user will contract a liability with the utility, which can be seen as a lighter level of personal commitment. The same situation applies for OBF schemes, in which the liability is again held by the client towards the utility. Additionally, if a tariffed on-bill arrangement is applied to the scheme, another advantage is represented by the transferability of the on-bill contract, which would be linked to the meter (or the property) rather than the client. These two factors may represent an advantage not only for final users, but also for utilities that can attract more potential clients.

Step 2.1: Simple value chain vs. complex value chain OBR models

Providing that the utility has decided to cooperate with financial institutions (OBR-based models), the next step will be to determine whether a complex value chain OBR model is desirable and/or appropriate. Similarly, as in the previous step, the utility will need to reflect on certain factors and weigh the pros and cons of each option.

Figure 3-2 below illustrates the different stages in the decision-making process.

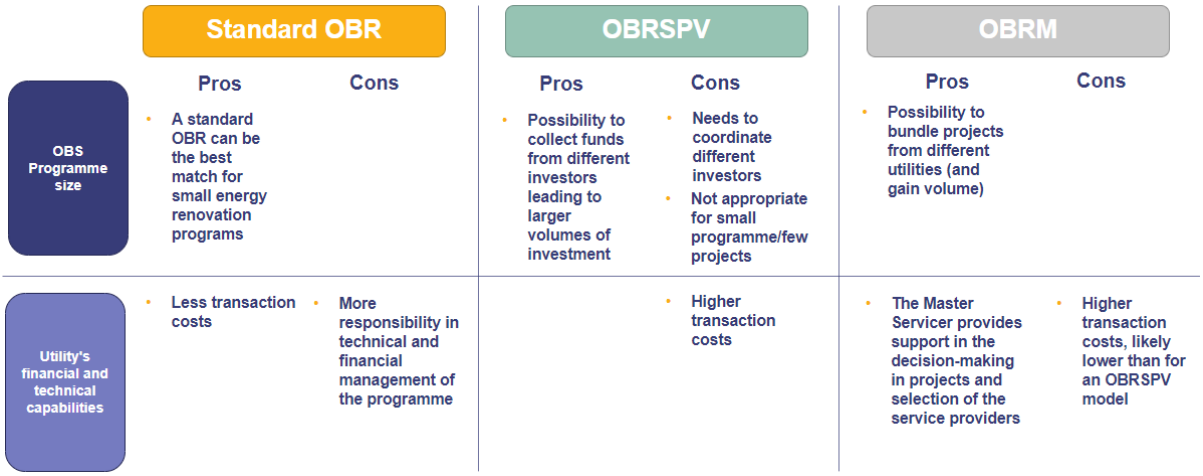


Figure 3-2 - OBR decision making process

As a starting point, the total amount of capital needed for the implementation of the on-bill renovation programme is an important factor to consider. If the financial resources needed to carry out the building renovation programme are not large, a standard OBR model with a simple value chain can be the best match.

As the total capital needed to execute the programme grows, a more complex value chain is likely to become more desirable. In fact, the OBRSPV model has the advantage of **allowing to gather funds from a pool of investors**, thus accessing more capital and leading to a higher overall investment size and more renovation projects.

Additionally, an OBRM model can represent a suitable model for utilities that **need technical support and financial structuring.** The Master Servicer can adopt many roles, scrutinising project viability, selecting the technical solution providers or the ESCOs involved, and supervising the works. A Master Servicer may also work with different utilities, under different on-bill schemes, thus leading to economies of scale.

Naturally, each additional actor involved in the business model will apply a fee to compensate for their services, **so transaction costs will usually be higher** in more intricate OBR models (OBRM and OBRSPV). When taking a decision, one should weigh these additional costs with the benefits introduced by these additional actors.

Stakeholder survey outcomes

Utilities from different EU countries were asked which of the identified business models they found most attractive. The results are shown in Figure 3-3, and commented in more detail in the Annex section on "Energy sector's preferred business models".

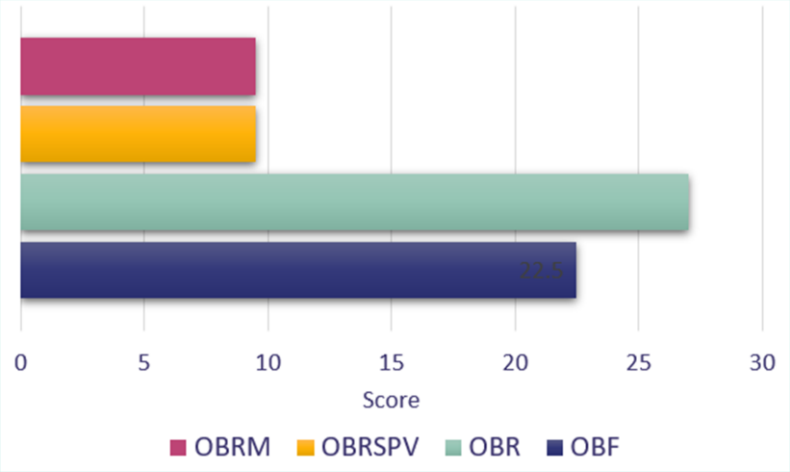


Figure 3-3 – Preference for the implementation of different on-bill schemes

It can be appreciated that utilities have a split preference for the OBF and OBR model, demonstrating that depending on a utility's self-financing capabilities or willingness to finance an OBS programme with its own funds, it will decide to either enter collaborations with financial institutions (OBR scheme), or roll out an OBS using its own funds (OBF).

In addition, utilities were asked which sources of funding they preferred to tap into the OBS market. The results are shown in Figure 3-4 and in more detail in section "Utilities' preferred source of funding".

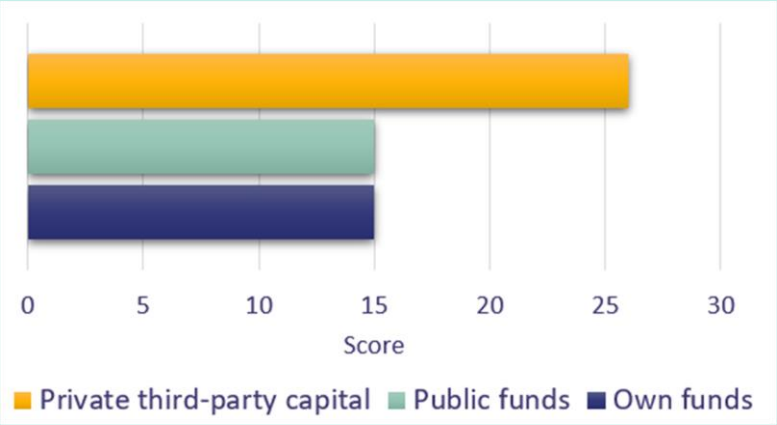


Figure 3-4 – preferred sources of funding to implement OBS

The survey results show that utilities would generally prefer to roll out OBS using third-party capital, reinforcing the results provided in Figure 3-3 where utilities preferred the OBR model. Nevertheless, a considerable number of utilities preferred to finance OBS with their own capital and will therefore prefer to implement an OBF model. Utilities also consider that tapping into public funds to support the renovation measures is an interesting option, since on-bill schemes are usually compatible with public subsidies and can help reduce the initial capital investment.

Step 2.2: OBF models

If the utility chooses an OBF-based model, the next step will consist in defining its strategy for the implementation of this model, considering its own technical and financial capabilities.

If a utility lacks certain skills and/or prefers to concentrate on its core activities, partnering with a financial advisory firm or a technical support partner, similar to a master servicer, may help reducing initial obstacles and delivering a better service. Delegating these tasks to third parties instead of making permanent investments in hiring and training personnel implies more flexibility when the volume of workload varies. Figure 3-5 below shows the benefits and challenges of choosing between a standard OBF model or OBF models which integrate additional actors.

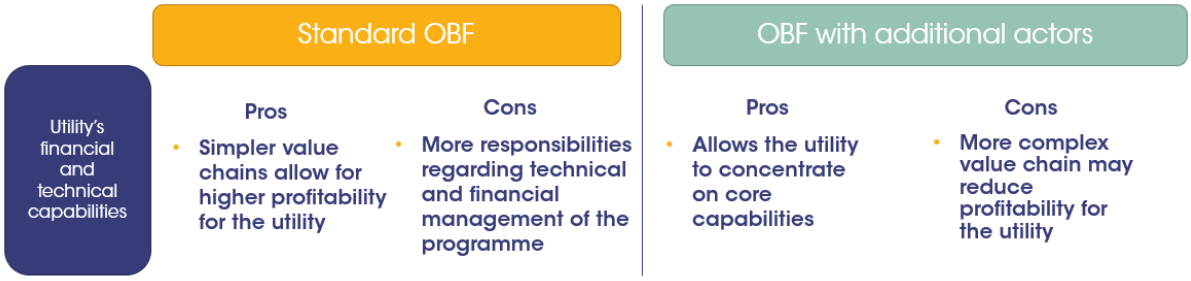


Figure 3-5 – OBF decision making

Step 3: Market segment or service oriented OBS models

Independently of the choice regarding OBF vs. OBR or the complexity of the value chain, a utility may opt towards any of the different models presented in Table 3-1.

For instance, a utility may opt for an on-bill scheme model targeting residential customers with a low-income profile (OBSEP), or it may opt to offer energy renovations including innovative added-value services such as electric vehicle charging, smart metering, or demand response (OBSI). Some aspects to consider when deciding among these variations are the following:

- OBSEP: the decision to opt for this model depends on the target market (low-income customers).
- OBSI-OBF and OBSI-OBR: the decision on choosing these models depends on the type of innovative value-added services offered and not on the other factors evaluated in this section.

4 BUSINESS MODEL ANALYSIS

4.1 Definition of the ecosystem

Defining OBS with the Value Flow Model

If step 1 helped utilities to assess the probability of success of OBS offers, and step 2 guided them to decide on the most suitable business model, step 3 aims at digging deeper on the selected business model. The task of developing a new business product requires to draw a realistic landscape of actors and interactions among them and with the environment.

The methodology used to describe the value offered by the five business models suggested in this document is called the Value Flow Model[3], which gives insight into what meaningful innovations are, what value is, and how it can be created. It is a model that can be used to describe 'new' business models requiring new business ecosystems and describes how to create meaningful value propositions. It also describes how these new ecosystems can be designed for solutions that require combinations of products and services from different organisations (Lighthouse, Eindhoven University of Technology), as is the case with OBS. The Value Flow Model not only indicates the offerings and interactions of one organisation with its customers, but also the flow of value between multiple members of the total ecosystem.

By following this methodology, the interactions and cooperation between the stakeholders who take part in the OBS ecosystem can be identified. This allows to comprehend the added value held by each of the actors involved.

A set of five OBS business models are described in detail in this section following the proposed methodology. The Value Flow Model has been considered to describe and analyse the proposed OBS business models because it helps describe new business models by bringing together all relevant actors involved in the OBS ecosystem, considering each one of them individually, their interconnected relationships, and the value proposition they bring. Since OBS can be complex, this model has been chosen as valid for this purpose.

Key components

Before delving into the description of each separate business model, it is necessary to describe the elements highlighted by the Value Flow Model to define the ecosystem which composes OBS. Hence, the actors involved, their motivations, compatibility, and influence, are described in Figure 4-2 (which describes the actors present in the core value proposition), Figure 4-3 - (complementary offerings), Figure 4-4 (enabling networks), and Figure 4-5 (other actors). Figure 4-1 is given to understand the nomenclature used in figures 5-2 to 5-5. It is worth noting that depending on the OBS business model, small variations can occur relating to where each actor is situated within the ecosystem (core value proposition, complementary

[3] The Value Framework is a method that supports the creation of shared value for people, organisations and society at large (Lighthouse, Eindhoven University of Technology), https://www.tue-lighthouse.nl/Images/Propositions/20161003%20Value%20models.pdf

offering, enabling networks, and other actors), but in general the elements described in the following section are common for all business models.

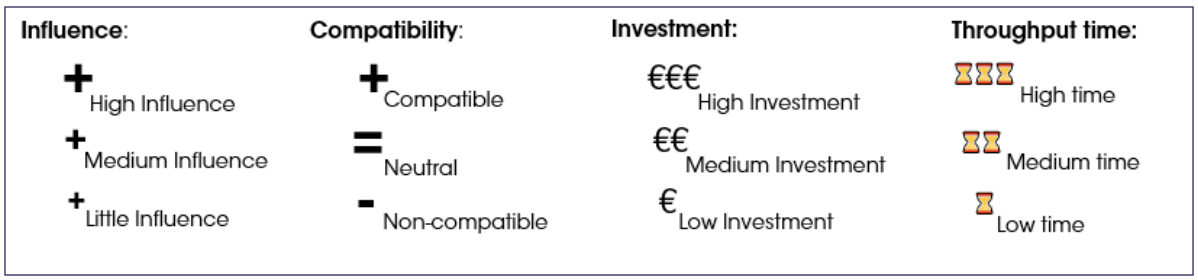


Figure 4-1 - Key describing the Value Flow Model nomenclature

		Description	Motivation	Compatibility/ Influence
Customer/ End-user		Residential building tenants and owners who are willing to renovate their households through OBS mechanisms	Improve home comfort, value and sustainability	+
Utilities		Utilities deal with the commercial initiative and the supervision of the technical execution of the project	Diversify and get new clients and image of sustainability	+
Provider of services		ESCOs, contractors, architects, engineers, installers, consultants, construction companies, etc. These are ultimately responsible for the implementation of the building renovation	Increase contract volumes, replicability.	+
Financial Institutions		Commercial banks, private equity firms, private or public investment funds, etc. They provide the investment capital and may participate in the definition of the offer.	Access new market/clients	+

Figure 4-2 - Description, motivation, compatibility and influence, investment and throughput time of the key actors involved in the core value proposition of the OBS ecosystem

		Description	Motivation	Compatibility/ Influence
Commercial Banks		Offer capital in the form of mortgages and loans to end-users	Seek to give out mortgages and loans	+
House Insurance Agents		Offer home insurance policies to end-users	Seek to re-evaluate insurance policies after the implementation of energy efficiency interventions	+
Complementary Building Renovation Providers		Include construction and home renovation companies, interior and outdoor home design companies, companies offering lift installation in apartment blocks, etc.	Increase contract volumes	+
Real Estate Agents		Support end-users with the sale, purchase, or rental of residences	Increase sales and contract volumes	+

Figure 4-3 - Description, motivation, compatibility and influence, investment and throughput time of the actors involved in the complementary offerings of the OBS ecosystem

	Description	Motivation	Compatibility/ Influence
Utility Bank	Finances the utility and may overlook providing financial expertise	Creation of credit and accessing new markets and clients	+
Marketing and Communication Agencies	Promotes OBS for the utility, providing it with customer acquisition campaigns and increasing its customer base	Increasing contracts, and improved sustainability image of brand	+
Material and Technology Providers	Produce the materials and technologies that are needed to realise the energy efficiency renovation of a building	Increase volume of sales and turnover	+
Energy Efficiency Equipment Manufacturers	Assemble and manufacture the material and technologies received from suppliers for use in renovations	Increased contracts and volume of sales of energy efficiency equipment	+
Distribution System Operator	Manages the distribution of energy to the end-user and receives its grid fees from the customer via the utility bill	Grid optimization (energy efficiency reduces demand). Implementation of energy efficiency directive in the EU	+
Financial Services Providers	Agents that provide services to the utilities offering the OBS	More contracts and collaborations with utilities. Gain knowledge of new markets	+

Figure 4-4 - Description, motivation, compatibility, and influence of the actors involved in the enabling networks of the OBS ecosystem

	Description	Motivation	Compatibility/ Influence
Government	Sets the objectives of the regulatory frameworks and may advocate energy efficiency renovations	Achievement of decarbonization and energy efficiency targets. Increased popularity levels from society at large	+
Energy Market Regulator	Determines the rules and fees under which utilities and customers participate in the energy market	Monitorization of new markets	+
Society	All the other stakeholders in the area or country where the offer is directed to	Benefitting from environmental benefits (reduced CO_2 emissions, air pollution, etc.). Increased standards of living	+
Neighbours	Witness the customers' energy renovation and can create a positive effect on demand for equal services	May want to also benefit from energy efficiency renovations, motivated by opinions of other customers	+
Competitors	Utilities providing other offers. May also be providers of energy efficiency services under different financing mechanisms	Increase in their own customer basis and turnover	+

Figure 4-5 - Description, motivation, compatibility, and influence of other actors involved in the OBS ecosystem

A more detailed description of each of the key actors involved in the OBS ecosystem, along with their motivation, compatibility, and influence is given below:

- **Utilities.** Utilities deal with the commercial initiative and the supervision of the technical execution of the project.
- **Service providers.** Several actors can fall under this category: ESCOs, contractors, architects and engineers, installers, consultants etc. The service provider is ultimately responsible for the implementation of the building renovation (i.e.: deployment of energy saving measures).

- **Customers.** Customers/ clients are residential building tenants and owners who are willing to renovate a building with an OBS mechanism.
- **Financial Institutions.** When financial institutions are involved in an OBS project, they provide the investment capital and may participate in the definition of the offer. Financial institutions can be commercial banks, private equity firms, private or public investment funds, etc.

A more detailed description of the full list of actors involved in the OBS ecosystem is given in the "Description of all the actors involved in an OBS ecosystem" section in the annex.

Motivation, Compatibility, and Influence

Each of the actors mentioned above have their own motivation to join an OBS programme, described henceforth. In addition, each of the actors may or may not be compatible with the programme and will have different degrees of influence on the OBS programme's success.

- **Utilities.** Through OBS, utilities have the opportunity to access new market niches, diversify and get new customers, increase their clients' loyalty in the long term by offering value-added services, and improve their brand sustainability. Utilities have positive compatibility and medium level of influence (utilities channel the capital and take the responsibility for collecting the payment, so they are quite influential).

Stakeholder survey outcomes

Utilities were asked to discuss which motivations triggered their interest the most for launching OBS. The results can be found on Figure 4-6. A more detailed view of the results can be found in the Annex section on "Motivations and benefits expected from offering energy renovation services".

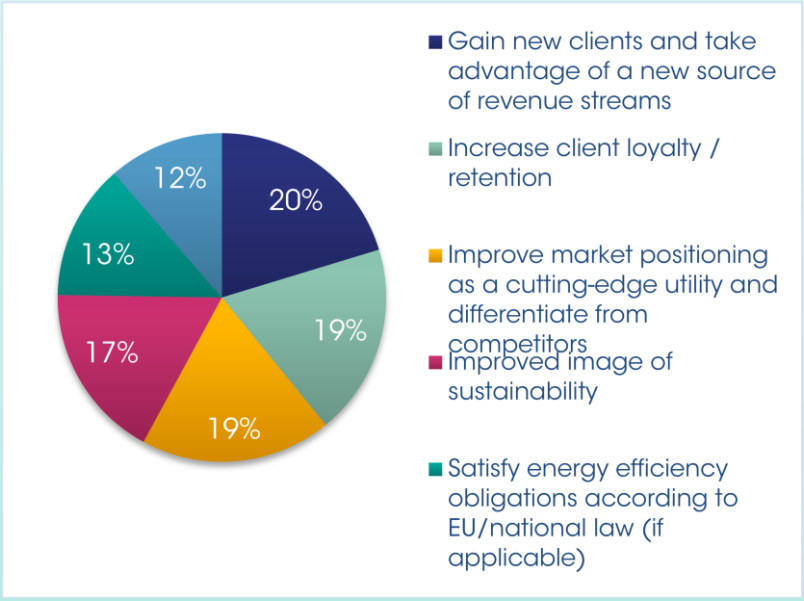


Figure 4-6 – Utilities' motivations and expected benefits from offering OBS services

The benefits expected from launching OBS are evenly distributed due to the fact that these schemes provide an added value to a diverse set of interests and motivations for utilities who wish to implement these schemes, depending on their marketing and corporate strategy and target customer segment, among others.

- **Service providers.** By participating in these schemes, they can benefit of larger and longer contracts and access a new source of clients and work in collaboration with utilities to better design the energy renovation according to final user's needs. Service providers have positive compatibility and low level of influence (there are many service providers who can fit in this role).
- **Customers (final users).** End users' motivations may include realising economic savings in the medium-long term, increasing the comfort and aesthetics at home, improving their quality of life, meeting their sustainability motivations, and increasing the value of their dwelling. End-users show positive compatibility and high level of influence (the whole success of the model depends on their interest).
- **Financial Institutions.** They can gain access to new customers and markets, benefiting from the insights that utilities may have on their customers' ability to pay (bill payment history) and on the technical aspects of the energy renovation measures**.** Reputational motivations can also play a role (banks can benefit from supporting sustainable projects). Financial institutions have positive compatibility and medium level of influence (they may play an important role in providing the up-front capital) when they are involved in an OBS.

Stakeholder survey outcomes

Financial institutions were asked to discuss what motivations triggered their interest for launching OBS. A more detailed view of the results can be found in the annex section on "Motivations and benefits expected from offering OBS energy renovation services".

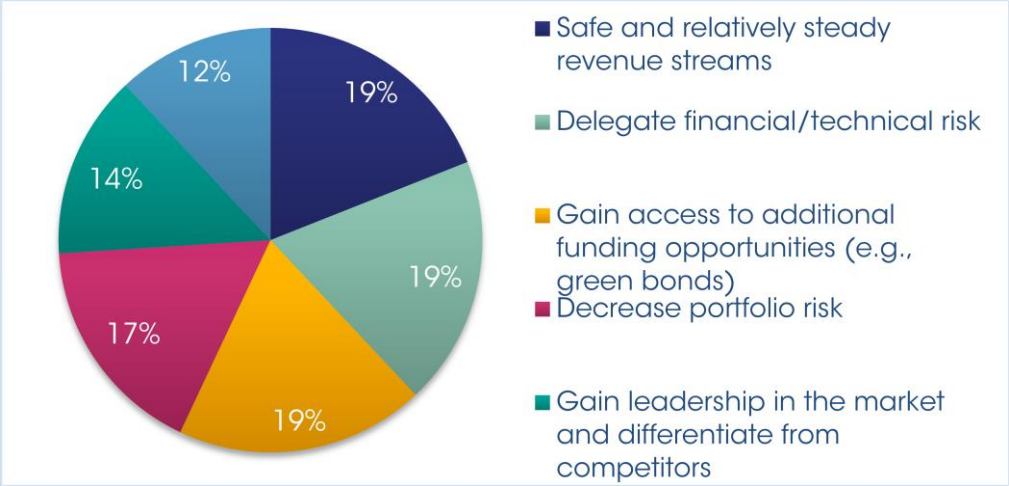


Figure 4-7 – Financial institutions' motivations and expected benefits from offering OBS energy renovation services

As can be appreciated in Figure 4-7, OBS can provide an added value to financial institutions through a diverse set of benefits, once again verifying the flexibility and usefulness of implementing energy renovation measures using on-bill mechanisms.

A more detailed description of the motivations, compatibility, and influence of each actor involved in an OBS ecosystem is given in the "Motivation, compatibility, and influence" section of the appendix.

General Value Flow model of an On-Bill Scheme

Figure 4-8 and Figure 4-9 introduce the general Value Flow model of an on-bill scheme, highlighting the value flows between the actors highlighted in the previous sections, their compatibility and influence, and their investment and throughput time.

Core value proposition

The customer, the utility and the service providers are the key actors involved in the core value proposition of all OBS business models.

The **utility** deals with the financial investment in advance, the commercial side of the project and the supervision of the technical work. A key aspect of this model is the flexibility for the utility in defining the format of the programme and having higher profit margins. In contrast, certain utilities may have limited access to larger sections of clients depending on their financial muscle and liquidity.

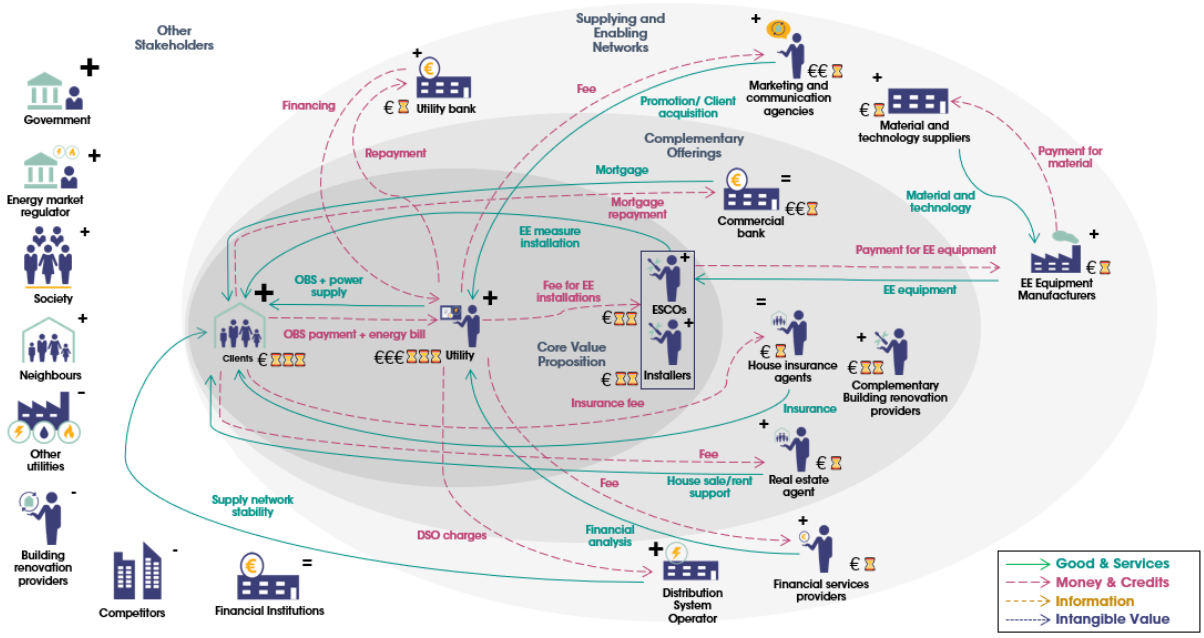


Figure 4-8 - Detailed graphic description of the value streams (goods & services, money & credits) and the compatibility and influence of each actor in a standard OBS ecosystem. A larger image can be found in the *Value Flow Charts* section in the annexes

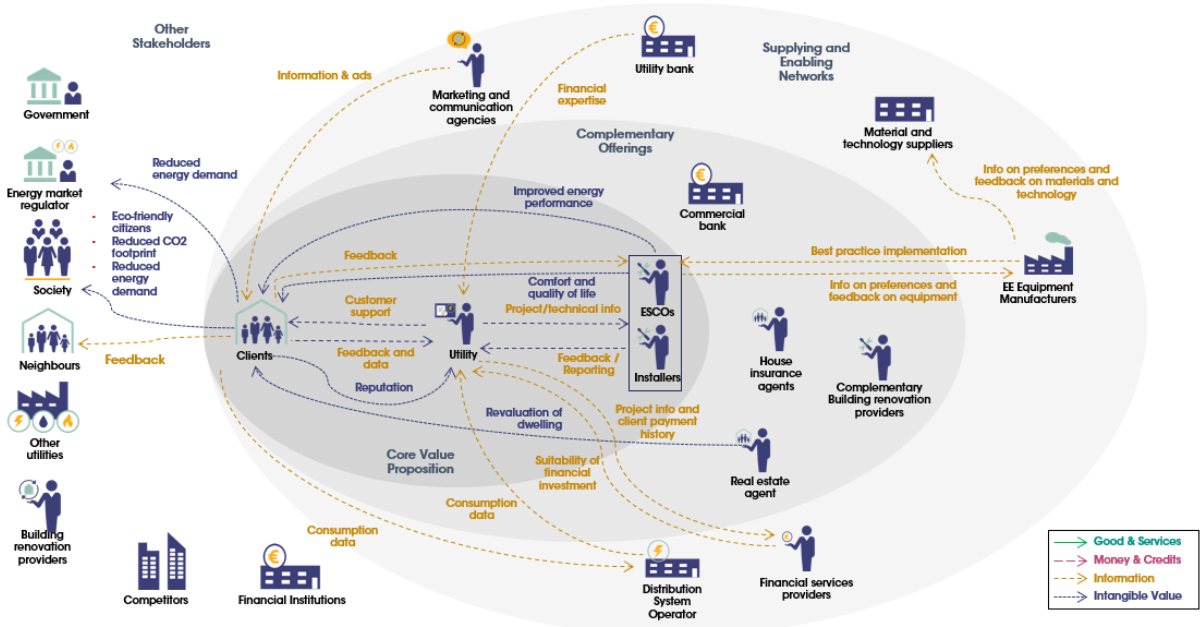


Figure 4-9 - Detailed description of the value streams (information and intangible values) in a standard OBS ecosystem. A larger image can be found in the *Value Flow Charts* section in the annexes

The **service provider** is ultimately responsible for the implementation of the renovation (i.e., the deployment of energy efficiency measures). The choice of provider may depend on the utility's previous contractual relationships, or the type of renovation project pursued. Very often, more than one type of provider is needed: for example, different provider profiles will be needed for the replacement of a building façade or its windows compared to the installation of a new boiler.

The **customers** will normally be a subset of the utility's customer base, which may vary depending on the utility's target market segment preferences. These segments may vary depending on the size and market strategy of the utility implementing the on-bill model.

Complementary offerings

Real estate agents, commercial banks, house insurance agents and complementary building renovation providers are all involved in the ecosystem of the value proposition due to their contribution to complementary offerings. Complementary offerings can make the total bundle of offerings more attractive for the customers, and they may also address additional target groups. The actors involved in the complementary offerings also have direct contact with the customers or users, but they are not core to the system, since the value proposition can still work without them.

For example, real estate agents support end-users with the sale, purchase, or rental of residences, and therefore the revaluation of residences through energy efficiency refurbishment measures will add value to the end-user, rendering this actor complementary to the value model. The same can be said for commercial banks which offer mortgages and loans to end users, and house insurance agents (the price of all these services can be affected by energy renovations).

Supplying and Enabling networks

These actors are the ones who facilitate and enable the implementation of OBS, either by supplying the material and services needed by the utility and service providers to realise the energy renovations, by managing legal and financial agreements of the services provided to the customers, supporting the scheme through marketing and communication campaigns, or enabling the stability of the supply network.

Although utilities may directly contact and inform their clients of OBS through emails, telephone calls, or internal marketing programmes, they could also decide to subcontract marketing and communication agencies for the job. They can provide the utility with customer acquisition (through television or online adverts, for example) by promoting the benefits of energy efficiency measures and the financial benefits of choosing OBS over other business models, enabling a further market reach for the implementation of OBS models. Financial service providers can supply the utility with financial analyses and determine suitability of projects and investments.

Distribution system operators (DSO) enable the stability of the supply network and provide consumption data readings.

Other stakeholders

A stable legal framework is needed to encourage financial institutions and utilities to take the risks of the energy renovation investments. Public support is desirable to increase general awareness on the benefits of energy renovation, e.g., by the establishment of communication campaigns. Through the exploitation of local, national, and European support schemes, end users and utilities may be able to cover part of the up-front costs of the renovation measures.

Examples of other stakeholders involved in the value proposition include the society at large, local, national, and European governments, other utilities, neighbours, financial institutions not directly involved in the scheme, energy market regulators, competitors, and building renovation providers.

4.2 Standard On-Bill Financing Model (OBF)

Brief Description of the Business Model

A standard OBF scheme consists of a commercial offer presented by a utility which provides the upfront cost for an energy efficiency investment, which is repaid by the final user "on the bill", namely by an additional amount added to the final users' energy bill (e.g., electricity, natural gas, district heating, etc.).

This amount of money repaid each month by the end user can be equal to or lower than the amount corresponding to the energy saved. In this case, we say that the "Golden Rule" is applied: therefore, an immediate money saving may be guaranteed for the customer. Otherwise, the end user will simply pay a discretionary amount of money to repay the upfront cost, without any relation to the possible energy savings.

In OBF schemes the capital necessary for the implementation of energy efficiency measures is originated from the utility own sources. In some cases, also public funds can be used.

Consequently, in OBF schemes the investment volumes will be limited to the amount willing to be disbursed by the utility. Therefore, this model is better suited for larger utilities which have the financial muscle to take on large investments.

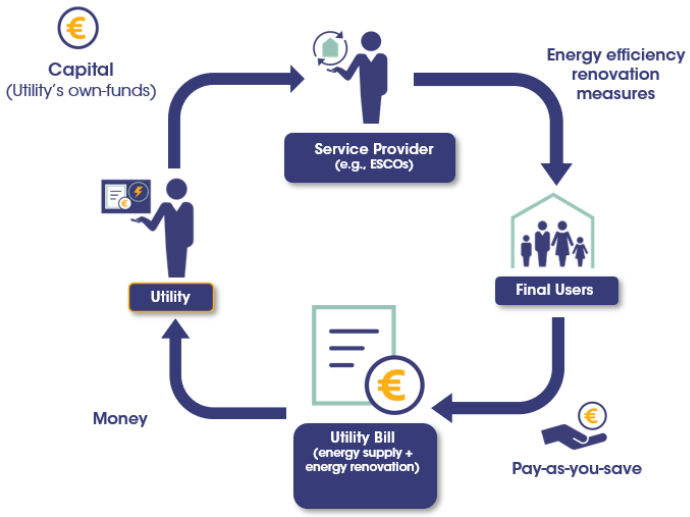


Figure 4-10 – Schematic representation of an OBF business model

Key advantages and disadvantages

Advantages

- Shorter value chains;
- More control for the utility: larger flexibility in defining the format of the programme;
- Suitable for small or large interventions;
- The utility's capital structure and financial ratios remain unchanged (providing that no additional debt is added).

Disadvantages

- Less scalability: large programmes may lead to liquidity constraints;
- Possible banking and financial regulation constraints.

Risk allocation and mitigation

Allocation of risks

- **Technical risks:** The utility oversees the technical supervision and will therefore also bear with the technical risks of the project. However, a certain level of distribution of the technical risks can be foreseen between the utility and the service provider (stipulated by contract);
- **Financial risks:** The financial risk is held by the utility;
- **Reputational risks:** It is borne uniquely by the utility.

Risk mitigation

- Utility companies have access to the payment history of their clients, which can be analysed to mitigate the risk of defaults from the client's side. Different methods can be used to assess the creditworthiness of clients, including credit scores, debt-to-income ratios, and utility payment history. Regardless of the underwriting methods used, nearly all OBF schemes in existence (in the US) experience very low default rates (generally between zero and three percent)[4];
- Technical risks can be managed through contractual agreements between the utility and the ESCOs/service provider;
- State-backed guarantees, if available, can support the scheme.

Financial and contractual set-up

The OBF model is characterised by a simple value chain and is suitable for both small and large building renovations (the size and capability to invest own resources will define the size of the projects). The utility company offers the energy renovation service without any upfront capital disbursement from the end-users, using the energy bill as a repayment vehicle. The utility provides the capital for the energy efficiency renovation measures directly to the service providers who are in charge of performing the renovations. As discussed above, contractual agreements can be signed between the utility and service providers or ESCOs to mitigate technical risks and make sure that the renovation measures meet the necessary standards.

Contractually, the arrangement can be set up either as **tariffed on-bill (meter attached)** or as an **on-bill loan (tied to the user)**.

A meter attached arrangement has the main advantage of ensuring the transferability of the contract to a new tenant of building owner. If a tenant or owner changes, he or she must

[4] (EESI, 2017) - https://www.eesi.org/files/OBF/EESI-How-to-Guide-On-Bill-Financing-Program.pdf

take care of paying the remaining instalments, unless differently agreed with the previous owner or tenant that may also liquidate the outstanding debt. However, the financial risk may increase if the new tenant does not pay the invoices. This arrangement works best in areas where the property rental market is dynamic, where there are little unoccupied dwellings. However, possible regulatory problems may arise with this arrangement since the new tenant may not be free to choose its energy supplier.

In the case of an **on-bill loan,** the OBF scheme is not attached to the meter, and the costs of renovation are tied to the property owners, including the corresponding debt obligation. If a property is sold, the remaining instalments are paid to the utility in one solution, or, alternatively, the buyer will take over the debt (with a corresponding reduction in the house's sale price). In this case, the creditor must give a "green light" to the new owner or debtor before proceeding with the sale.

Value Flow model

Figure 4-11 shows the visual representation of the main value streams within the core value proposition for an OBF scheme Value Flow model. There are no significant differences with the standard OBS model discussed in the previous section. A more detailed representation which includes the value streams between all actors present in the Value Flow model can be found in the "Detailed OBF Value Flow model" Annex section.

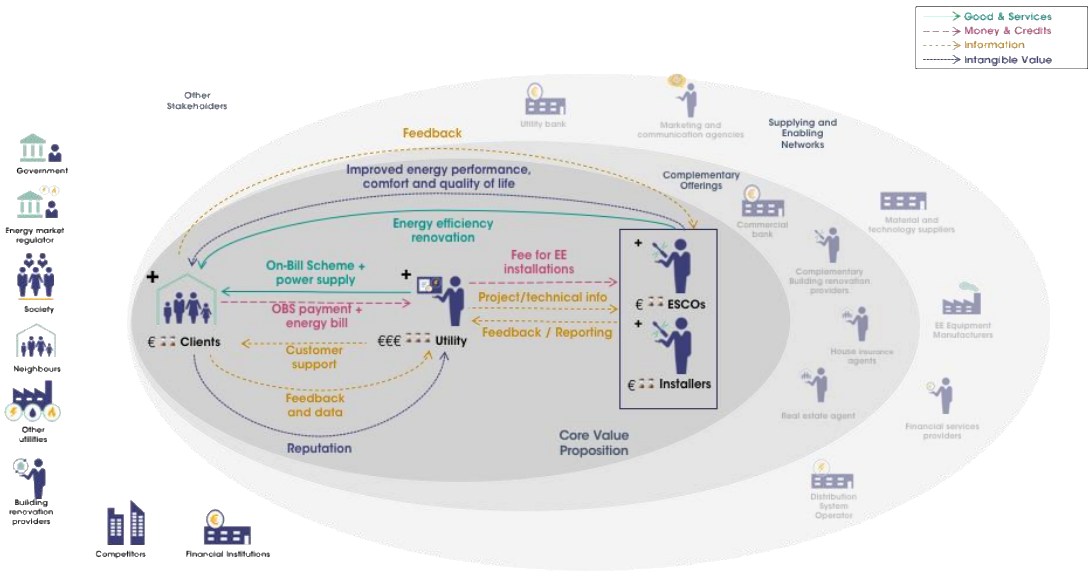


Figure 4-11 - Visual representation of the value streams within the core value proposition for an OBF scheme Value Flow model. A larger image can be found in the *Value Flow Charts* section in the annexes

4.3 Standard On-Bill Repayment Model (OBR)

Main characteristics of the business model

The key characteristic of an On-Bill Repayment (OBR) model is that a financial institution, through a dedicated agreement, provides the capital necessary for the implementation of the building renovation programme. The repayment mechanism set up towards the end user works the same as in a standard OBS model, where the utility bill is used as a repayment vehicle. The utility will then oversee transferring the corresponding repayment to the financial institution.

Key advantages and disadvantages

Advantages

- Synergies can be created between the financial institution and the utility. Utilities have knowledge of the energy market and have access to the bill payment history of their clients, minimising the technical and the solvency risk, whilst financial institutions can lend their financial expertise to utilities;
- The utility does not have to provide all the capital required for the renovation measures, which is instead provided by financial institutions;
- More scalability for the programme.

Disadvantages

- More complex value chain and contractual complexities;
- Interest fees are applied by financial institutions, leading to extra costs for the final users.

Risk allocation and mitigation

Allocation of risks

- **Technical risks**: As with OBF, the technical risks are borne by the utility and the service providers;
- **Financial risks**: Ultimately, the financial risk is held by the financial institutions which invest in the OBS;
- **Reputational risk**: It is borne by the utility, and depending on its visibility, by the financial institution.

Risk mitigation

In addition to the risk mitigation measures identified in the OBF model section, the following mitigation measures can be considered for OBR schemes:

- Financial institutions will mitigate their financial risks with the cost of capital (interest rate applied to the utility) and by requiring financial risk assessment procedures on customers;

- Financial institutions may require additional contractual arrangements to secure their capital (such as escrow accounts, or additional contractual agreements involving the end-users).

Financial and contractual set-up

An OBR model requires a set minimum level of investment; the presence of a financial agent and the need to compensate utilities for bearing risks may compromise its profitability in case of small programmes.

The financial set-up can imply the use of an escrow account. In general terms an escrow account is a "financial instrument whereby an asset or escrow money is held by a third party on behalf of two other parties that are in the process of completing a transaction"[5]. Escrow accounts can be used in the context of OBR schemes to segregate money from the balance sheet (and bank accounts) of an entity. The escrow account can be used for the money that flows to finance the works, and for the money stream to repay the loan, or both.

The escrow account ensures that the money collected by the utility to pay back the loan (or to finance the renovation works) does not stay on the utility's books and accounts. Without escrow principles, a bankruptcy of the utility would cause that all its assets (including the financial institutions loan, which is actually not property of the utility) would be devoted to the repayment of its own debt and the investor's position would be that of an unprivileged creditor, whose rights move "*pari passu*" (in line with) all the others.

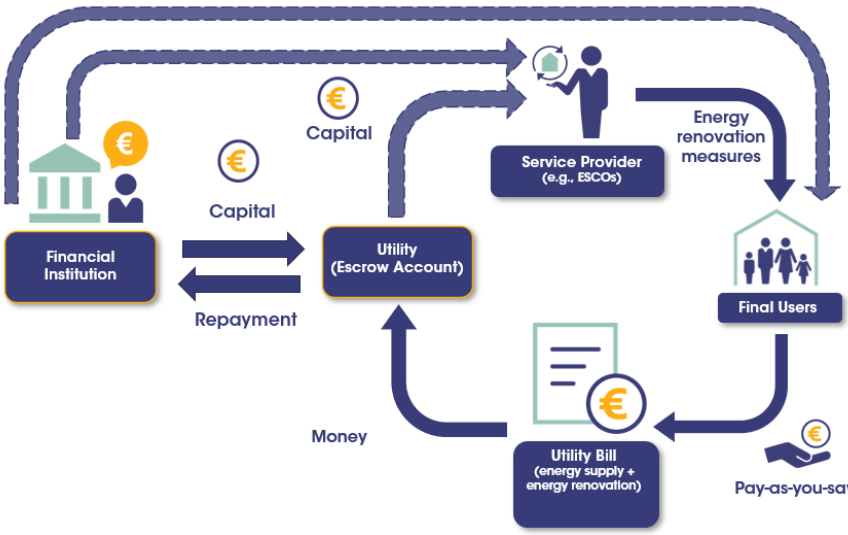


Figure 4-12 – Schematic of OBR business model based on the escrow account

From this point of view, as shown in Figure 4-12, three possible variants on how a financial institution can finance a standard OBR scheme can be distinguished:

[5] Investopedia, 2021, https://www.investopedia.com/terms/e/escrow.asp

1) The financial institution transfers the capital directly to the utility using an escrow account;
2) The financial institution transfers the capital directly to the service providers (using an escrow account);
3) The financial institution transfers the capital directly to the final users, who then pay for the energy efficiency renovation measures themselves.

In all three cases, the utility will collect the repayment from end customers through the energy bill and convey the repayment according to stipulated financing conditions previously agreed upon.

As with OBF schemes, the contractual arrangement can be set up either as **tariffed on-bill (meter attached)** or as an **on-bill loan (tied to the user)**.

There is no unique solution as to how the utility, financial institutions and final users should set up their contractual agreements. Since the OBS is a commercial offer, the parties involved in it (utility and financial institutions) can structure it based on their agreements and strategies. Depending on the utility's interests, they will decide which is the optimal framework for them and their financial partners. A multilateral agreement between the end user, utility and the financing entity may be required to be written down to define the exact terms of the OBS.

In general, the debtor should be the final user or the condominium and not the utility or the service providers who perform the works. In that way, a burden (long-term debt) will not be added to the balance sheet of the utility or the companies. Therefore, any possible issue with banking regulations would also be avoided. It is worth considering, however, that having the bank sign an individual agreement with each customer may carry transaction costs that outweigh the benefits.

Eventually, financial institutions could improve financial conditions by possibly re-selling debt to investors in secondary markets.

Value Flow model

There are no significant differences with the standard OBS Value Flow model, except financial institutions now form part of the core value proposition. Although in most cases the financer is a commercial bank, other categories are possible (specialised investment funds, private funds, public funds).

Figure 4-13 shows the visual representation of the main value streams within the core value proposition for an OBR scheme Value Flow model. A more detailed representation including all actors present in the Value Flow model can be found in the "Detailed OBR Value Flow model" Annex section.

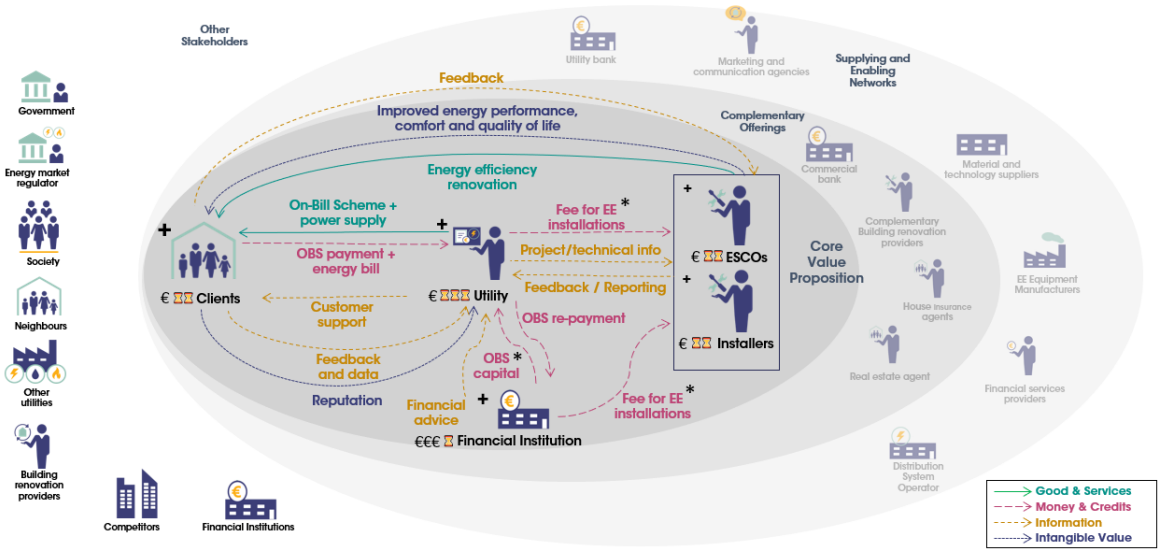


Figure 4-13 - Visual representation of the value streams within the core value proposition for an OBR scheme Value Flow model. A larger image can be found in the *Value Flow Charts* section in the annexes

Stakeholder survey outcomes

To validate the theoretical analysis presented in this section, stakeholders from the financial sector were asked what the main constraints were to work with energy companies to offer OBS. The results are as follows:

- **Granularity and transaction costs** related to the number of actors involved in the implementation of OBS (utility, service providers, architects, engineers, etc.), and a **fragmented market** at an end-user level (with a diverse number of customer segments and building typologies which can be targeted for energy renovations) were identified as possible barriers. Other factors were deemed significant and should also be considered:
  - The owner-tenant dilemma
  - Barriers related to the horizontal property law
  - The person/entity responsible for the payment in the case of default of one of the dwellings within a multifamily building.
- The **sharing of technical and financial risks** has also been deemed a relevant factor, and it becomes evident that utilities and financial institutions must align their interests when setting up an OBS. Some financial institutions partaking in the survey considered that the utility should align with the protocols and risk levels established by the financing company.

4.4 On-Bill Repayment Model via a Special Purpose Vehicle (OBRSPV)

Brief Description of the Business Model

An OBRSPV is a more articulated variant of the OBR model presented in section 4.3, which integrates a Special Purpose Vehicle[6] (SPV) into the scheme, also known outside of Europe as a Special Purpose Entity (SPE). An SPV is a legal entity with a predefined and limited purpose that can be used to pool capital from several financial investors and, crucially, to isolate financial risk for the actors involved in it.

The SPV may be set up by different combinations of partners that have decided to enter in a joint venture for the provision of on-bill energy renovation services. In general, although not mandatory, only one utility will usually be involved in the OBS. The utility may be joined by an ESCO that will be involved in the realisation of the interventions, as well as by a mix of different private and public investors or stakeholders: banks, funds, and public authorities. Each of these actors may have different levels of responsibility depending on the cooperation agreements put in place between the SPV shareholders at the beginning of the programme.

The utility and the other technical partners involved (an ESCO, for instance), based on such agreements, can oversee the appraising of individual energy renovation projects leading to the bundling of relevant sets of projects for the SPV.

When an investment decision is taken, capital is provided by the SPV to the ESCO or the installers to implement the energy renovation measures in the chosen residential buildings. As with other OBS, final users repay the services and goods received through an on-bill mechanism and the utility will subsequently convey these payments to the SPV. Finally, the SPV will redistribute its profit to the shareholders, as depicted in Figure 4-14.

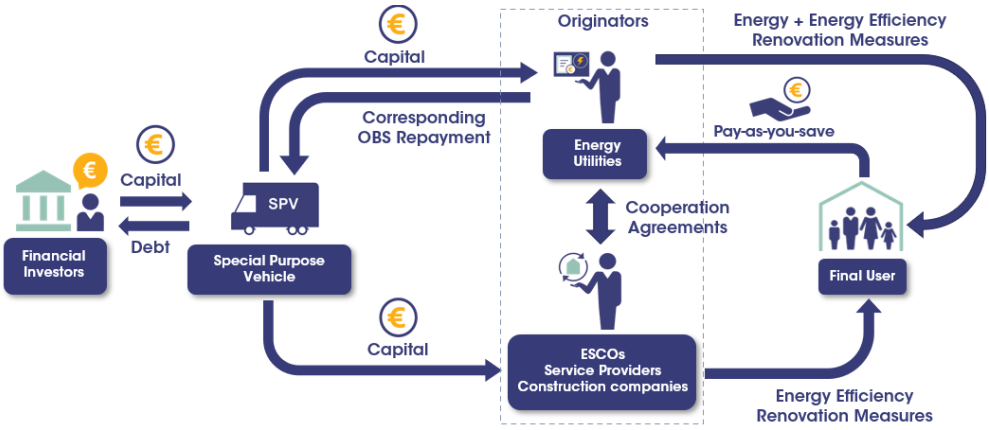


Figure 4-14 - Schematic of OBRSPV business model

[6] A special purpose vehicle, also called a special purpose entity (SPE), is a subsidiary created by a parent company to isolate financial risk. Its legal status as a separate company makes its obligations secure even if the parent company goes bankrupt. https://www.investopedia.com/terms/s/spv.asp

Key advantages and disadvantages

Advantages

- Includes all the advantages of OBR schemes;
- A collection of financial investors, ESCOs, utilities, etc. can be attracted to OBS, forming an industrial joint venture;
- Creation of an "ad-hoc" financial vehicle which supports specific on-bill schemes and energy renovation targets (conditions of the SPV may change in relation to the project originator, geographic distribution, typology of the investments, etc.);
- Suitable for the implementation of a large number of interventions due to the gathering of a greater amount of capital;
- Risks and profits are shared among the SPV shareholders;
- An OBRSPV model is feasible for both highly evolved and a less evolved OBS markets.

Disadvantages

- More complex value chain compared to OBR;
- More contractual complexities (especially between the utility, ESCOs and developers);
- Governance and operational issues related to the set-up of a new entity.

Risk allocation and mitigation

Allocation of risks

- **Technical risks**: the utility and the ESCO or service provider (if involved) oversee the technical supervision and implementation measures, and therefore bear the technical risks of the project. Different levels of distribution of the technical risks can be expected between the three parties regulated through collaboration agreements and contracts;
- **Financial risks**: The financial risk is ultimately held by the financial institutions and investors which invest capital to the SPV. If the utility holds a part of the SPV, it will also assume a corresponding risk;
- **Reputational risks**: it is mainly borne by the utility, ESCOs, and service providers that hold the relationship with the end users, and depending on their visibility, by the financial institutions.

Risk mitigation

In addition to the risk mitigation possibilities identified in the previous sections:

- Technical risks can be managed through cooperation agreements between utilities, ESCOs and/or service providers;
- The presence of the SPV mitigated losses for the utility in case of the OBS failing – risk is limited to the capital invested in the SPV;

- The SPV can also mitigate financial risks of its partners by securing the capital and revenues in the SPV in the event of one of the actors having financial issues.

Financial and contractual set-up

The SPV is created as a **trust to pool capital from financial investors** and to isolate the on-bill programme capital and revenues from the normal operations of the SPV shareholders. For instance, the SPV could be funded by a utility and a set of investors, and optionally an ESCO.

The presence of the SPV enables large amounts of capital to be gathered and invested, enabling a large market range with a reduced risk for financial institutions, thanks to contractual agreements and predefined project selection criteria.

This **model requires a minimum level of investment** due to the presence of many actors: financial investors, utility and ESCOs. The need to compensate the actors for bearing risks may compromise the profitability in case of small investment volumes. It is estimated that an SPV model may make sense when the overall programme size is at least EUR 30 to 50 million.

In setting up the SPV, the utility and other investors will have to consider **national regulations** concerning financial and creditor activities that may be entailed in the operation of the on-bill models, and structure the SPV accordingly. Depending on national requirements, legal due diligence and licensing costs may apply. In order to comply with financial regulations, a financial institution may hold the majority share of the SPV.

As with other OBR models, the SPV may **access the secondary markets** to refinance itself once the initial phase of the energy renovations has been executed. For example, credits can be embedded in existing financial products managed by the participant financial institutions, or ad-hoc products could be set up and proposed to the market.

For this business model, the **contractual agreements** will be on one hand between the financial institutions and the other investors involved in the SPV (including the utility and the ESCO, if applicable), and on the other will be between the SPV and the service providers realising the energy renovation (which could include the ESCO involved in the SPV, if applicable).

The contractual relation between the utility, ESCOs and service providers involved in the implementation of the energy renovations financed by the SPV must be defined depending on the specific requirements of each project, and the distribution of responsibilities, penalties and compensations must be defined by predefined contracts.

With regards with the end-user, as with OBR, the arrangement can be set up either as tariffed on-bill or as an on-bill loan.

Value Flow model

In comparison to the standard OBS model, the key difference is that the OBRSPV model integrates the SPV into its core value proposition. As mentioned previously, the SPV may be set up by a different combination of partners that have decided to enter in a joint venture for the provision of OBS (a utility, an ESCO, and a set of financial institutions, for example).

Figure 4-14 shows the visual representation of the main value streams within the core value proposition for an OBRSPV scheme Value Flow model. A more detailed representation including all actors present in the Value Flow model can be found in the "Detailed OBRSPV Value Flow model" methodology section in the annex.

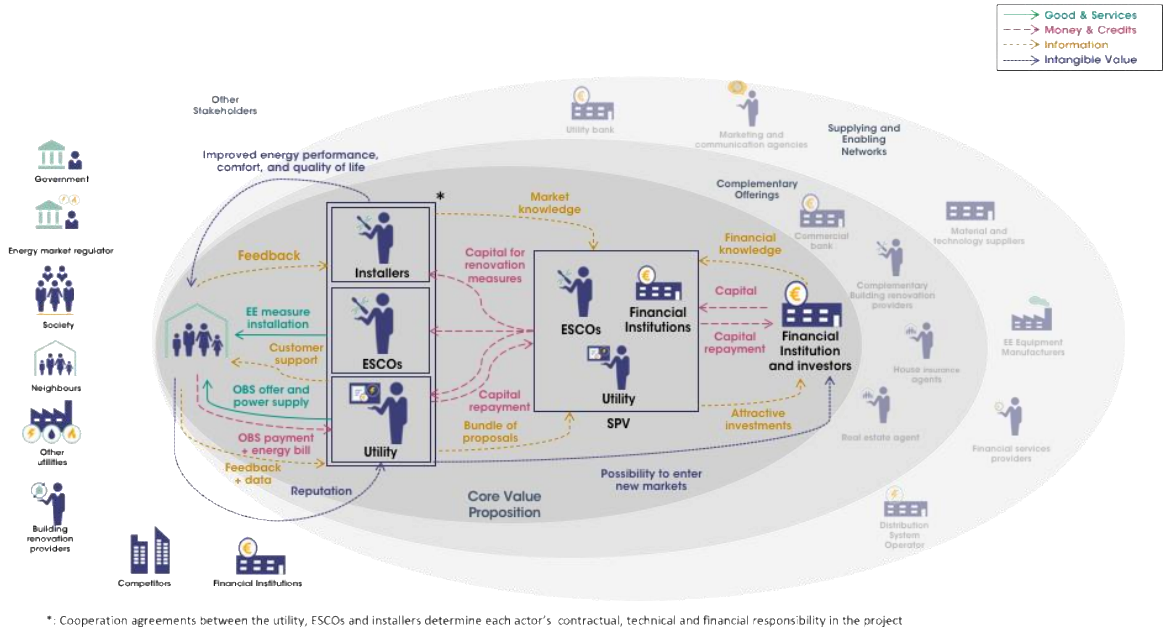


Figure 4-15 - Visual representation of the value streams within the core value proposition for an OBRSPV scheme Value Flow model. A larger image can be found in the *Value Flow Charts* section in the annexes

Stakeholder survey outcomes

During RenOnBill stakeholder engagement webinars and a subsequent questionnaire, relevant stakeholders from the financial sector were asked their opinion whether the creation of an SPV is appropriate. Some financial institutions thought that the integration of an SPV would be appropriate given certain conditions. More information on this topic can be found in the "Opinion regarding whether the creation of an SPV is appropriate" section in the annexes.

4.5 On-Bill Repayment Model Operated through a "Master Servicer" (OBRM)

Brief Description of the Business Model

The OBRM model is also a more articulated model based on the standard OBR scheme. It is based on the presence of a **"Master Servicer" (MS)**, which acts as a **service provider** and as an intermediate infrastructure between utilities and financial institutions. The MS manages the capital from the financial institutions which want to invest in on-bill services, has the role of scrutinising the investments proposed by the utilities, and deciding which investments are worthwhile. Capital is then provided by the financial institutions to the MS, which in turn pays the service providers for the implementation of the energy efficiency measures. The MS can be a private entity, a public authority, or a mixture of both depending on the size and specifications of the scheme. For example, the MS can be a large ESCO operating at national level cooperating with different utilities at local level.

A key characteristic of this model is that the MS offers its services on one side to all utilities interested in proposing OBS and, on the other side, to all financial institutions and investors interested in financing these schemes. This facilitates the attraction of a relevant amount of capital and the deployment of a substantial quantity of energy efficiency interventions. Once the interventions are completed, as with other models, the clients use the utility bill as a repayment vehicle and the utility conveys the repayments to the MS, which in turn transfers the due amounts to the different financial institutions.

The OBRM model differentiates itself from OBRSPV model in the fact that the MS is a service provider, whereas the SPV is a subsidiary created by a parent company to isolate financial risk and used to collect a pool of capital from investors.

A **variation of this model (referred to as OBRMS)** is found in those cases when the entire scheme is supervised by a dedicated **public authority that acts as the MS**. The involvement of a public entity can represent a warranty for final users, especially in contexts where there are a few operators with a large market power.

Key advantages and disadvantages

Advantages

- Includes advantages of OBR schemes;
- MS offers its services to all utilities and financial institutions interested in OBS;
- Suitable for the implementation of many interventions (large capital attraction);
- Inclusion of MS gives a larger flexibility to the scheme;
- Reduces transaction costs in project assessments by economies of scale based on specialisation and track record;
- The entire scheme can be supervised by a dedicated public authority which can act as the MS, which represents a warranty for final users (especially in contexts where there are a few operators with a large market power).

Disadvantages

- Longer value chain and contractual complexity;
- Integration of various utilities adds complexity managing end-customer payments. Protocols may be added from the MS to utilities to organise payments;
- This model is more suitable for mature OBS markets with a high number of transactions/projects;
- This on-bill model may be more relevant in some countries than others.

Risk allocation and mitigation

Allocation of risks

- **Technical risks:** Utilities overlook the technical supervision and implementation measures, and therefore bear the technical risks for the project. However, certain level of distribution of the technical risks can be foreseen between the utility and the service providers. The Master Servicer will also bear some of the technical risks since it supervises the analysis of project viability;
- **Financial risks:** Ultimately, the financial risk is held by the financial institutions which invest in the OBS;
- **Reputational risks:** Utility companies bare the biggest reputational risk from the point of view of the end-user, and depending on its visibility, by the financial institution. The Master Servicer is also exposed to reputational risks since it oversees decision-making and has the final word in the validation of utilities investment proposals.

Risk mitigation

- Technical risks can be managed between the utilities and the service provider (or private contractors) by way of a three-way contractual agreement involving the Master Servicer.

Financial and contractual set-up

The defining difference regarding the financial and contractual set-up is the presence of the MS which acts as a service provider between utilities and financial institutions. The MS analyses the viability of renovation projects, attracts and manages investor capital, and pays installers, etc. for the realisation of the renovation measures. Once projects have been validated, contractual agreements must be signed between the MS and the utilities involved in the scheme. Additionally, contractual agreements must be signed between the MS, financial institutions and other investors involved in the scheme.

It is worth pointing out that **the MS needs to have both engineering and financial expertise at a very high level**, as it will have a very delicate role, performing a technical-economic feasibility and risk analysis of the project. This means that the **MS needs to be a trusted entity** for the other actors in the scheme. The level of trustworthiness required is the one an entity can only achieve after several years of successful projects. It is also worth pointing out that the MS must also be very familiar with the regulations and political aspects of energy

renovations, in order to be able to offer a one-stop-shop for end-users, whilst making sure that the projects it manages are compliant with current laws and regulations.

Therefore, this business model is **more feasible for mature OBS markets**, in which the actors involved may seek reducing costs by outsourcing the project analysis to a very specialised and trusted entity (the MS). The MS would in fact benefit from economies of scale by working on several projects and with several utilities, thus reducing the costs of the whole package. Figure 4-16 shows a schematic of an OBRM model.

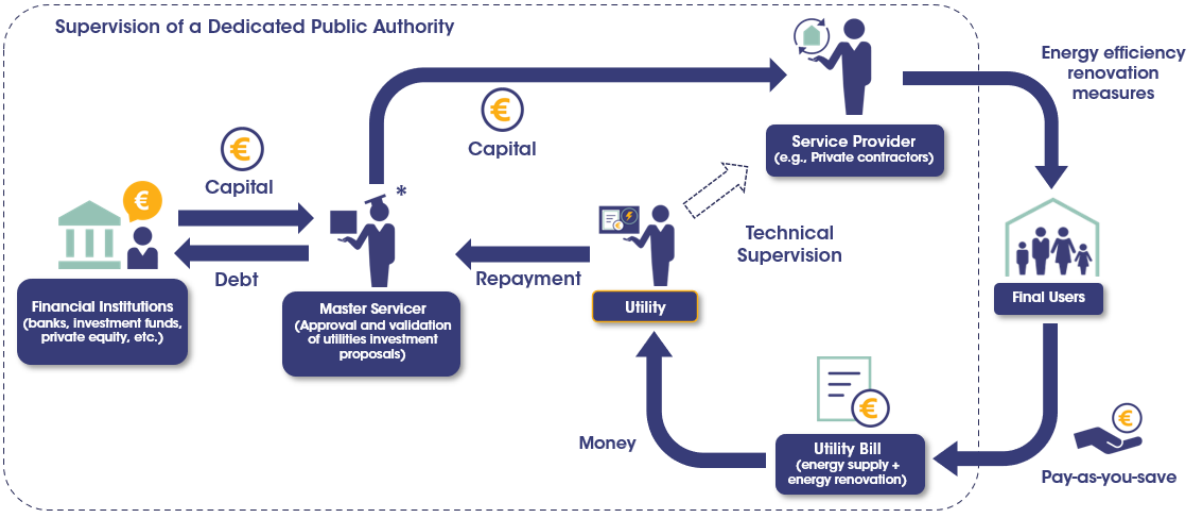


Figure 4-16 – Schematic of OBR business model with Master Servicer

It is likely that in certain countries the MS will be a financial agent subject to authorisation from financial authorities (central banks or others), whilst it could also fit the role of the "renovation agent" which has been proposed in Spain in the recent law (RD853/21) introducing the residential buildings renovation programme.

If a homeowner community or a landlord decides to perform energy efficiency interventions in their building, the proposed "renovation agent" can on their behalf oversee all the process, from the preparation of the technical documentation, carrying out all the paperwork for the request of public subventions, and implementing and supervising the technical part of the works.

Towards the end-user, as with any standard OBR model, the OBRM model can be set up either as tariffed on-bill or as an on-bill loan.

Value Flow model

In addition to the actors already presented in the previous models, the Master Servicer gets integrated into the core value proposition.

The **Master Servicer (MS)** acts as an intermediate between utilities and financial institutions, and oversees managing the capital from the financial institutions that want to invest in OBS. It has the role of scrutinising the investments proposed by the utilities and taking the final decisions. Once these decisions have been taken, the capital is received from the financial institutions and the MS pays the installers, construction companies, etc., for the implementation of energy efficiency measures.

Once the MS considers investment decisions attractive, financial investors invest capital to enable the implementation of the energy efficiency measures. Multiple financial institutions are likely to be present in this model which can include investment banks, specialised investment funds, private funds, public funds, etc.. As with other OBR schemes, these actors may also develop specific products to sell their debt on the secondary market to obtain more capital for investment in OBS.

Figure 4-17 shows the visual representation of the main value flows within the core value proposition for an OBRM scheme Value Flow model. A more detailed representation including the value streams between all actors present in the model can be found in the "Detailed OBRM Value Flow model" section in the annex.

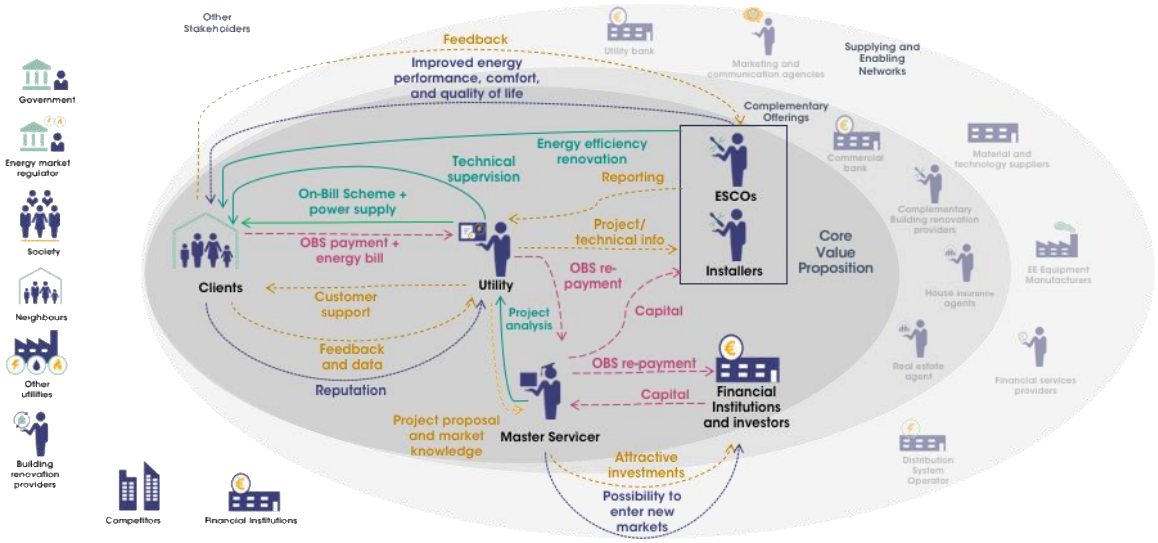


Figure 4-17 – Visual representation of the value streams within the core value proposition for an OBRM scheme Value Flow model. A larger image can be found in the *Value Flow Charts* section in the annexes

Comparison between OBRSPV and OBRM models

Both OBRSPV and OBRM models are a variation of the standard OBR model, and therefore share some **similar properties**:

- Multiple financial institutions can be involved in the two schemes;
- Both models introduce a way of sharing the project risks and costs between the involved actors;
- Both may have governance and operational issues related to their complexity;
- Both are suitable for the implementation of several building renovation interventions;

Nevertheless, the two models do have **differences**, as presented in Table 4-1.

OBRM	OBRSPV
A Master Servicer (MS) is included in the scheme, who acts as a **service provider** for utilities and financial institutions.	A special purpose vehicle is included in the scheme, created as a **vehicle to pool capital** from financial investors and to isolate financial risk.
A unique entity acts as a MS (can either be a private entity or a public authority). The **MS is a third party**, external to the main actors, to which they can outsource parts of the process (at different levels of responsibility depending on the specifications of each project).	The **SPV is set up by the main actors** of a specific OBS (financial institutions, a utility, ESCOs), and they are directly involved in it, vertically integrating almost the whole process.
Multiple utilities are likely to participate in the scheme.	In general, although not mandatory, **only one utility** will usually be involved in the OBS.
An OBRM model is more feasible in a **highly evolved OBS market** with a high number of transactions/projects.	The OBRSPV model is feasible for both a highly evolved OBS market and a less evolved one.
By working on several projects with several utilities, the MS can benefit from **economies of scale**, thus reducing the costs of the whole package.	**Transaction costs** are likely to be higher for OBRSPV.

Table 4-1 – Comparison of OBRM and OBRSPV models

4.6 On-bill schemes involving DSOs

Option 1: Facilitator role (DSOF)

Distribution System Operators (DSOs) are the regulated companies in charge of managing the distribution network, namely the network which distributes electricity or natural gas from the transportation network to final users. Since their network is unique, these companies are considered natural monopolies and are therefore strictly regulated.

According to national energy market regulations, DSOs are remunerated for ensuring the correct operational conditions of the network. Such remuneration is mainly funded by the collection of network tariffs paid by end-users on their energy bills.

The creation, by national energy market regulators and/or national governments, of a similar "**on-bill tariff**" could help in setting up more effective on-bill schemes allowing for improved transferability of existing arrangements between end-users and energy suppliers. Such on-bill tariffs should be **linked to the end user's point of delivery (POD)**, i.e., the physical point where the meter measuring the energy supply to the dwelling or building is located.

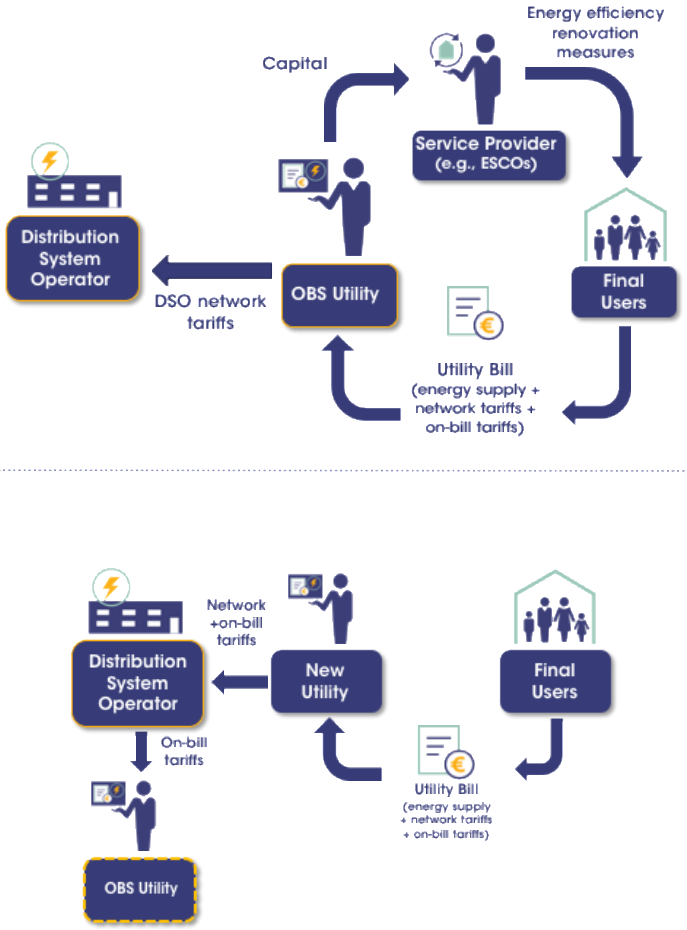


Figure 4-18 – Schematics of an OBS business model involving a DSO

How these tariffs could contribute to the implementation of on-bill schemes is illustrated in Figure 4-18. In the upper chart, representing the initial set-up of the on-bill scheme, an OBS

utility is the initiator of the scheme. The on-bill repayments are incorporated in the utility's invoice as on-bill tariffs.

Later on, in case an end-user decides to change their utility, the on-bill tariffs could add flexibility to the scheme by allowing swift transfer of on-bill repayment fees to the original OBS utility through the DSO, as shown in the lower part of the figure.

In this situation, the repayments for on-bill services are still paid by the end-user via the ad-hoc on-bill tariff, that the DSO will receive and transfer to the utility which originally developed the services, also in the case the end-user changes energy provider over the duration of the on-bill contract.

Naturally, the facilitator role which in this scheme is assigned to the DSO could also be assumed by another entity, depending on national regulation and policy. For instance, such role could be covered by the national market regulator or by another public entity designated by the government or the regulator.

The on-bill tariffs, if they are linked to the POD, could also allow swift transfer of OBS arrangements in case that the dwelling is sold to a new owner or, in case of a rented dwelling, when the tenant changes. The newcomer, unless differently arranged with the previous owner, while enjoying the benefits of the renewable energy renovation, may continue paying the on-bill tariffs associated to its meter.

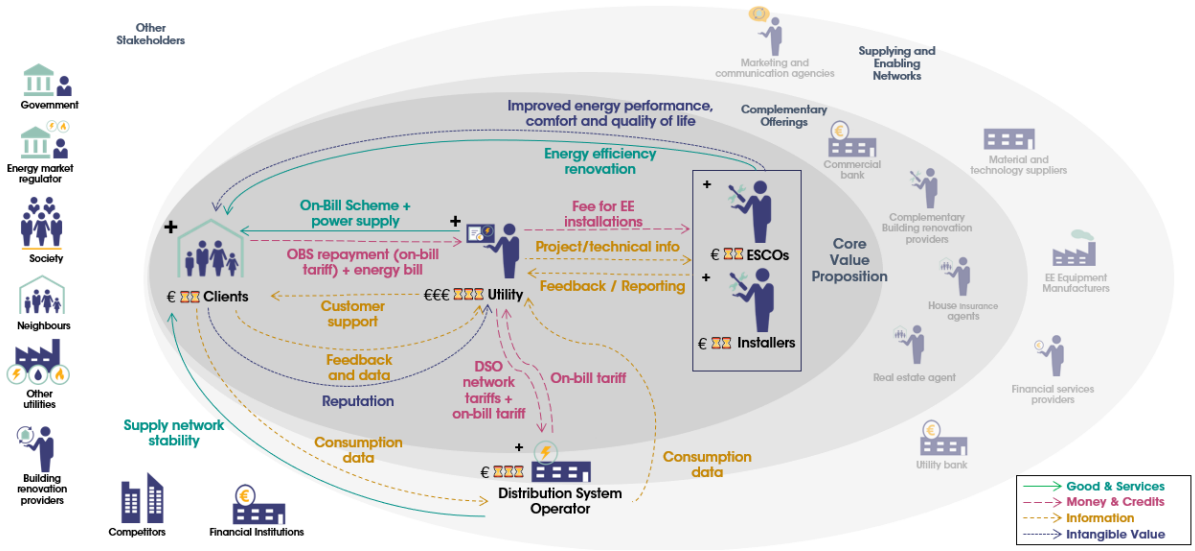


Figure 4-19 – Visual representation of the value streams within the core value proposition for a DSOF scheme. A larger image can be found in the *Value Flow Charts* section in the annexes

Advantages

- Solves the problem of attaching the OBS service to the meter (tariffed-on bill) by using an ad-hoc vehicle (on-bill tariffs) similar to those already used for other payments (e.g., network tariffs, taxes, smart meter fees);
- Allows for transferability between final users;
- Allows for transferability between energy suppliers;

- Allows for more flexibility in designing programmes.

Challenges

- Requires regulatory changes at national level;
- More complex value chain and contractual complexity;
- Possible issues deriving from the fact that DSOs are natural monopolies.

Option 2: Active role of DSOs (DSOA)

In those countries or regions where the regulatory framework allows for it, DSOs may take an active role in the offering of on-bill services, especially in cases when they are subject to energy efficiency targets that contemplate the execution of interventions for the end-users, such as the Energy Efficiency Obligations contemplated in Article 7 of the Energy Efficiency Directive and its recast proposal[7].

In such cases, DSOs may work with any of the four business models discussed in the previous sections, and once again take advantage of the "on-bill tariffs" that can be used to transfer the repayment amounts from the energy supplier to the DSO that originated the investment. In those cases where it is allowed, the DSO may invoice directly to the final user. Such arrangement is outlined in Figure 4-20.

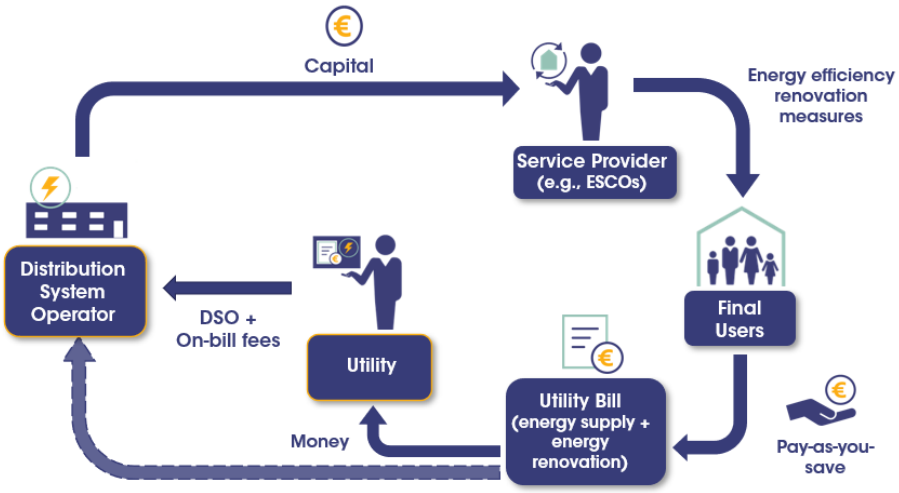


Figure 4-20 – Schematics of an OBS business model with a DSO taking an active role

[7] See https://ec.europa.eu/info/news/commission-proposes-new-energy-efficiency-directive-2021-jul-14_en

5 ANNEXES

5.1 Methodology

Business model selection (Section 3)

The five business models described in the present document have been chosen as follows. Initially, ten business models were analysed and discussed among RenOnBill project partners, who were asked to evaluate and grade them according to their replicability potential in their respective countries. Replicability means, in this context, the ease of implementing the business model in any European country. According to the results obtained from the responses given, the selected business models are: OBF (on-bill financing), OBR (on bill-repayment), OBRSPV (on-bill repayment including a Special Purpose Vehicle), OBRM (on-bill repayment with master servicer), and OBSI (on-bill supporting valued added energy services).

Afterwards, the criterion of representativeness was also considered to make the final decision on the selection of business models. Choosing the most representative business model means to avoid selecting those that can integrate extra features such as value-added energy services or targeting energy-poor customers, since they can be integrated into both OBF and OBR models. For this reason, OBSI, OBSEP and OBRMS were excluded. That led to including on-bill models including a distribution system operator (DSO), a model that differs considerably from the rest, but which is also compatible to the on-bill mechanism. Allowing DSOs to participate in OBS allows to solve the meter attachment and transferability of the OBS arrangement when a new tenant or owner enters the scene by renting or acquiring the renovated dwelling. Nevertheless, OBS integrating DSOs may be treated differently due to their strong dependence on regulatory actions.

Acronym	Short Description
OBF	Standard on-bill financing model
OBR	Standard on-bill repayment with two variants: • Deposit on a utility's escrow account • Works paid directly by the financial institutions Involved
OBSEP	On-bill scheme model targeting energy poor customers
OBRSPV	On-bill repayment scheme operated through a SPV
OBRM	On-bill repayment scheme operated by a master-servicer
OBRMS	On-bill repayment scheme operated by a master-servicer under the control of a state agency
OBSI	On-bill scheme, i.e. both OBF and/or OBR, for supporting Valued Added Energy Services (VAES)
DSOF	On-bill scheme, either OBF or OBR, with DSO acting as a facilitator
DSOA	On-bill scheme, either OBF or OBR, with DSO actively engaged in supporting energy efficiency measures.

Table 5-1 – Summary of on-bill schemes

For analysis purposes, we can consider that there are two main categories of business models:

- On-bill financing (including OBF-based models: OBF, OBSEP and OBSI-OBF subtype)
- On-bill repayment (including OBR-based models: OBR, OBSI-OBR, OBRSPV, OBRM, OBRMS).

Table 5-1 displays a short description of each business model. For further detail on each one it is recommended to consult the RenOnBill publication *Report on the replicability of on-bill schemes in the EU*[8].

Several feedback sessions with utilities and other stakeholders shed light on the main criteria to choose among the different types of business models:

- **The opportunity of using third party financing versus own resources.** In other words, opting for OBR-based models instead of OBF-based models. Here there are different dimensions or sub-criteria:
  - **Overall OBS project size:** OBF-based models demand strong self-financing capability, and the scalability may be difficult. On the other hand, OBR models have a longer value chain, larger investment volumes, project size, and complexity in comparison with OBF.
  - **Flexibility on the regulation on creditors**: OBF-based models where the utility provides credit for energy renovation need flexible credit regulations.

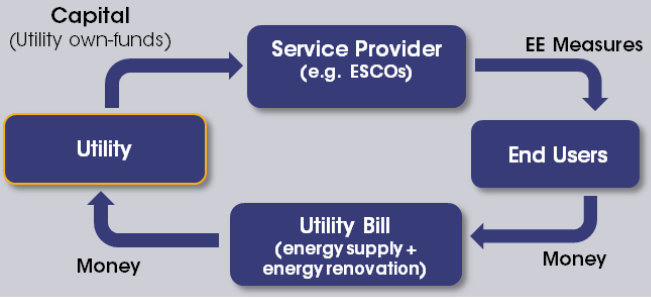
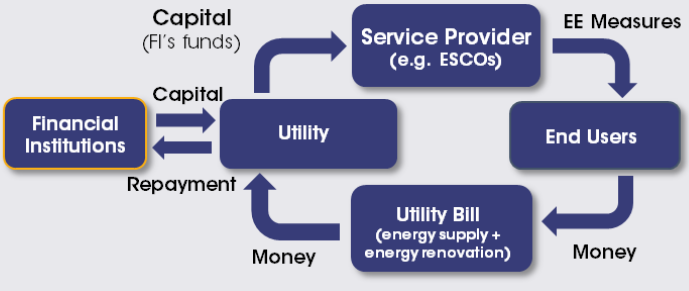
Utility's own funds?		
YES	OBF based	
NO	OBR based	

Table 5-2 – Example of basic criteria to choose between OBR and OBF business models

[8] The report is available at this link.

- **The length of the value chain and the consequent profitability for the actors involved.** More complex value chains (including financiers, intermediaries or master servicers) may lower the profitability of the programme for the utility (unless the benefits of including those intermediaries offset for these costs).
  - **Utility's technical building renovation capabilities**: having available in-house experts, allowing to assess the technical robustness of renovation projects can reduce the complexity of the value chain. However, in some cases, utilities may find that working with third parties (for example a master servicer) is more efficient than using their own staff, allowing to easily adjust the investment to the level of effort needed in each stage of the project (implementation, operation of the facility, etc.).
  - **Utility's financial capabilities**: similar to the above, having in-house financial experts which can analyse the financing of OBS may reduce the need for additional actors such as financial advisory service providers. However, the utility may prefer to hire independent contractors to perform these tasks for the same reason of increased flexibility explained above.
- **Tariffed on-bill or on-bill loan:** the obligation to pay can be attached to the property's meter or to the client (not attached to the meter). Tariffed on-bill models allow to transfer the debt to the next occupier. However, this could infringe on the end user's right to freely choose the energy provider.

To select the most suitable business model, the utility must go through a decision-making process, as described in the main body of this document. Ultimately, utilities will have to weigh the pros and cons of each option and decide.

Business model analysis (Section 4)

To capture all the value and interactions present in an OBS ecosystem, the guidelines proposed in this document are built using the Value Frameworks[9] method (the Value Flow Model), which "helps to visualise specific interactions in the network to provide a perspective for understanding value-creating roles and relationships and offers a dynamic view of how both financial and non-financial assets are converted into value" (Lighthouse, Eindhoven University of Technology). According to this methodology, the following aspects of the Business Model are analysed:

- **Actors' motivation, compatibility, and influence**: The actors of the model have different interests/intentions and goals. In addition, these drivers can be positively or negatively compatible with the value proposition. The level of compatibility can be + (positive compatibility), - (negative compatibility), or = (neutral). Besides, the actors' co-level of influence in the decision-making process is assessed; the more influential they are, the more attention utilities must pay to them.

[9] The Value Framework is a method that supports the creation of shared value for people, organisations and society at large (Lighthouse, Eindhoven University of Technology), https://www.tue-lighthouse.nl/Images/Propositions/20161003%20Value%20models.pdf

- **Risk allocation and mitigation**: explanation of the split of technical and financial risks. In addition, identification of collaterals (if any) and other risk mitigators.
- **Contractual and financial set up**: financial and contractual arrangements required for the realisation of value proposition (e.g.: the use of escrow accounts, three-way contracts).
- **Layout of the Value Flow Model:** including the core value proposition and complementary offerings.
- **Supplying and enabling networks**: actors and transactions that deliver components for the integration in the value proposition or play a role in enabling the value proposition (e.g.: public and regulatory bodies).
- **Other stakeholders**: stakeholders that are affected by the value proposition (i.e.: externalities) but they are not involved in it (e.g.: society at large).

Description of all the actors involved in an OBS ecosystem

Key Actors

- **Utilities.** Utilities deal with the commercial initiative and the supervision of the technical execution of the project.
- **Service providers.** Several actors can fall under this category: ESCOs, contractors, architects and engineers, installers, consultants etc. The service provider is ultimately responsible for the implementation of the building renovation (i.e.: deployment of energy saving measures).
- **Customers.** Clients are residential building tenants and owners who are willing to renovate a building with an OBS mechanism.
- **Financial Institutions.** When financial institutions are involved in an OBS project, they provide the investment capital and may participate in the definition of the offer. Financial institutions can be commercial banks, private equity firms, private or public investment funds, etc.

Actors among the complementary offerings of the OBS

- **Commercial banks.** Commercial banks may offer capital in the form of mortgages and loans to end-users and can hence play a role in the ecosystem of the value proposition.
- **House insurance agents.** Offer home insurance policies to end-users.
- **Complementary building renovation providers.** These include construction and home renovation companies, interior and outdoor home design companies, companies offering lift installation in apartment blocks, etc.
- **Real estate agents.** These support end-users with the sale, purchase, or rental of residences.

Actors among the enabling networks of the OBS

- **Utility bank.** This agent provides banking and financing services to the utility and may also overlook providing financial expertise. It may finance the utility for usual operations other than offering OBS.
- **Marketing and communication agencies.** They can provide the utility with customer acquisition by promoting the benefits of energy efficiency implementation measures and the financial benefits of choosing OBS over other business models.
- **Material and technology suppliers.** These produce the materials and technologies that are needed to realise the energy renovation of a building.
- **Energy efficiency equipment manufacturers.** These assemble and manufacture the material and technologies received from suppliers for their use in energy renovations of buildings.
- **Distribution System Operator**. This agent manages the grid up to the customer and receives its grid fees from the customer via the utility bill.
- **Financial services providers.** Agents that provide services to the utilities offering the scheme.

Other actors involved in the OBS ecosystem

- **Government.** Sets the objectives of the regulatory frameworks and may provide support measures for energy renovations of buildings.
- **Energy market regulators.** Determines the rules and the fees under which utilities and customers participate in the energy market.
- **Society at large.** Consists of all the other stakeholders in the area or country where the offer is directed to.
- **Neighbours.** Witness the energy renovation of the customer and can create a positive effect on demand for the same services.
- **Competitors.** This category may include:
  - **Other utilities** that can provide energy (electricity or gas) to the same customer or offer different energy renovation programmes
  - **Competing building renovation providers** that may offer building renovation services to the client under different business models

Motivation, compatibility, and influence

Key Actors

- **Utilities.** Through OBS, utilities have the opportunity to access new market niches, diversify and get new customers, increase their client's loyalty in the long term by offering value-added services, and improve their brand sustainability. Utilities have positive compatibility and medium level of influence (utilities channel the capital and take the responsibility for collecting the payment, so they are quite influential).
- **Service providers.** By participating in these schemes, they can benefit of larger and longer contracts, access a new source of clients and work in collaboration with utilities

to better design the energy renovation according to final user's needs. Service providers have positive compatibility and low level of influence (there are many service providers who can fit in this role).

- **Customers (final users).** End users' motivations may include realising economic savings in the medium-long term, increasing the comfort and aesthetics at home, improving their quality of life, meeting their sustainability motivations, and increasing the value of their dwelling. End-users show positive compatibility and high level of influence (the whole success of the model depends on their interest).
- **Financial Institutions.** They can gain access to new customers and markets, benefiting from the insights that utilities may have on their customers' ability to pay (bill payment history) and on the technical aspects of the energy renovation measures**.** Reputational motivations can also play a role (banks can benefit from supporting sustainable projects). Financial institutions have positive compatibility and medium level of influence (they may play an important role in providing the up-front capital) when they are involved in an OBS.

Actors among the complementary offerings of the OBS

- **Commercial banks.** These actors seek customers to give out mortgages and loans. They have a positive compatibility since mortgages enable clients to buy new residences, point at which many people may consider implementing energy efficiency measures - especially between younger or middle-aged customers which understand the benefits of energy efficient dwellings and give importance to sustainability issues. They have a low level of influence since there are many banks which clients can choose from.
- **House insurance agents.** Revaluation of dwellings can mean that house insurance policies need to be redefined. End-users will likely expect a higher insurance on their dwelling; hence insurance fees can also be revaluated. These agents have positive compatibility and low influence level.
- **Complementary building renovation agents.** Performing energy renovations on a building can be an opportunity for multifamily building communities to invest in other renovations such as elevators, renovations of the aesthetics of buildings, construction of a pool or garden, etc.. Therefore, these agents can benefit from an increase in contract volumes, having a positive compatibility with OBS. They have a low level of influence since there are many complementary building renovation agents who can take on this role.
- **Real estate agents.** The implementation of energy efficiency measures leads to the value increase of residential buildings and therefore these actors will benefit from OBS programmes. They will have positive compatibility and low level of influence since their role is not pivotal for the functioning of the business model.

Actors among the enabling networks of the OBS

- **Utility's bank.** They are motivated by the creation of credit and accessing new markets and clients. In this perspective they are not directly involved in OBS, and rather have relationships with the utility to finance other endeavours. However, they have positive compatibility since they can improve utilities' financial ratios or may become

interested in investing in OBS and becoming a financial institution involved in OBR schemes. They will therefore have medium influence.

- **Marketing and communication agencies.** They can benefit from increased contracts, incrementing their turnover and could also improve their brand sustainability image by supporting sustainable market services as OBS.
- **Material and technology suppliers.** These would benefit from increased volume of sales hence enjoying an increase in turnover. These suppliers have a positive compatibility and a low level of influence since there are many suppliers who can fit this role.
- **Energy efficiency equipment manufacturers.** These would benefit from increased contracts and volume of sales of energy efficiency equipment for OBS, increasing their turnover. Energy efficiency equipment manufacturers have a positive compatibility and a low level of influence since there are many manufacturers who can fulfil this role.
- **Distribution System Operator (DSO)**. This actor would benefit from the implementation of OBS and energy efficiency measures since it would reduce the load and pressure on the grid, perhaps enabling them to reach out to a larger volume of customers. Furthermore, in some countries, DSOs may also be obligated parties for energy efficiency obligations. They have a positive compatibility and medium level of influence, since these companies are natural monopolies due to the network being unique.
- **Financial service providers.** By assessing the suitability of financial investments and projects they can benefit of more contracts and collaborations with the utilities to better design the financing of OBS. Participation can also enable these actors to enter and gain knowledge of new markets. Financial service providers have positive compatibility and low level of influence (there are many financial service providers which can fit this role, and utilities may have an internal department which can oversee this role which could spare the need for this actor).

Other actors involved in the OBS ecosystem

- **Government.** Government and local authorities benefit from OBSs because they enable the achievement of decarbonisation objectives set at local, national and EU levels. The support to such schemes can provide them increased popularity levels due to their involvement in the transition to a carbon-neutral economy. They have a positive compatibility and a high influence, since they may provide support measures for energy renovations of buildings and could facilitate the implementation of OBS.
- **Energy market regulators** can benefit from the implementation of energy efficiency measures due to a reduced grid demand and increased system efficiency. They have a positive compatibility and a medium level of influence, since they oversee the determination of the rules and fees under which utilities and customers participate in the energy market, which can logically impact the implementation of OBS.
- **Society at large.** Society at large would benefit greatly from the implementation of OBSs and energy efficiency in buildings due to a reduced energy demand, CO_2 emissions and air pollution in cities, enjoying an increase in the standard of living as

well as home comfort. Society can also enjoy from the generation of employment and welfare. Hence, they have a positive compatibility and a low level of influence.

- **Neighbours.** Through the feedback of clients, these actors may be influenced by the positive impacts of successful energy efficiency renovations and have the potential of becoming future clients. The benefits of implementing OBS can be spread by word of mouth encouraging new adopters, enabling a larger customer base for the utilities without having to invest in marketing and communication strategies. Neighbours have a positive compatibility and low influence (whether neighbours adopt energy efficiency measures or not is not crucial to the success of the scheme despite it being beneficial for other actors such as the utilities).
- **Competitors** could find themselves affected by the loss of contract volumes. Latecomers to OBS may find that their role is already filled by other companies once they decide they would be interested in entering this market.
  - **Other utilities** could be negatively impacted by the successful implementation of on-bill schemes due to the loss of turnover and clients. They have a negative compatibility and a medium level of influence (they can steer the interest of clients and therefore affect their eagerness to adopt energy saving measures, threatening the success of the model).
  - **Competing building renovation providers** may see their customer base and turnover reduced due to clients adopting OBS in favour of their own business models. They have a negative compatibility and a low level of influence (there is a large availability of building renovation providers who can fit in this role).

5.2 Validation of analysis – stakeholder engagement and survey

Once the most representative business models have been identified by the RenOnBill project partners, four webinars were organised in four different countries (Spain, Italy, Lithuania, and Germany) to present selected business models to relevant stakeholders, namely financial institutions, utilities, and other actors in the energy sector.

To validate the theoretical work performed throughout the project, a questionnaire was prepared and distributed to the webinar attendees asking for their opinion on the presented business models, the gaps and problems they identified in them, and asking them to answer a set of leading questions which were formulated to attempt to fill the theoretical gaps which were still present in different defining factors of OBS. It is worth noting that some questions were targeted towards all the questionees, whilst some were addressed uniquely to either financial institutions or the energy sector. By performing the webinar in four different EU countries with different energy markets, national regulatory laws and subsidies for energy efficiency renovations, geographic and climatic conditions, etc., the goal was to find commonalities between countries or country specific preferences, as well as understanding the opinion and stances of professionals working in different fields, namely the energy and financial sector. The total number of webinar attendees is as follows:

Spain	Italy	Germany	Lithuania	Total
14	16	29	19	78

Table 5-3 - Total number of webinar attendees

The results obtained from the questionnaire led to conclusive results in some of the theoretical gaps present in the research, which have been integrated into the main body of this document, and another set of inconclusive answers.

For some of the questions, a weighted parameter has been applied to each factor: the votes for very relevant/interesting have been given a score = 2, moderately relevant/interesting votes have been given a score = 1, and not relevant/interesting have been given a score of -0.5. The total score for that factor was then obtained calculating the product of the weighted score and the number of scores. When the total score for a factor came out as negative, a value of 0 has been given to it.

All the questions and results are presented henceforth:

Questions targeted towards the energy and financial sectors:

Most attractive residential sector for the delivery of on-bill schemes

Financial institutions and energy utilities both agreed that the most promising residential sector for the implementation of OBS are multi-family apartments, followed by single-family housing, and lastly, individual apartments. Apartment buildings could include social housing and could potentially be an interesting target sector for OBS business models.

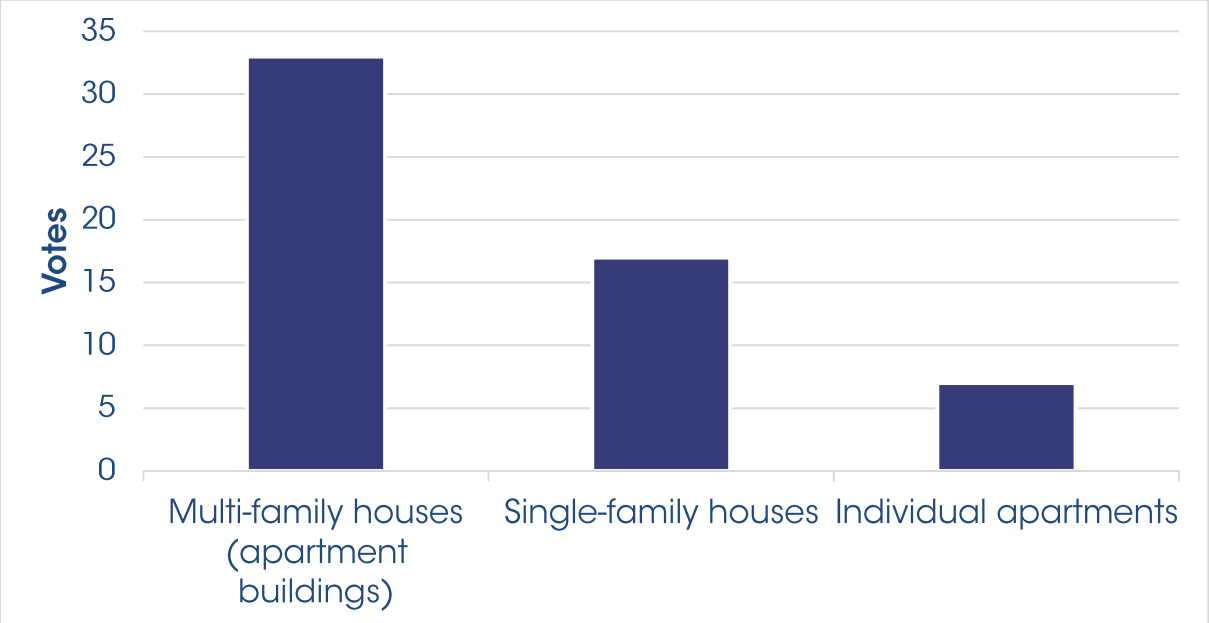


Figure 5-1 - Most attractive residential sector for the delivery of on-bill schemes

Despite multi-family apartment buildings usually having a more complex decision-making process for undertaking the energy renovation measures due to fragmentation, this customer segment is also attractive because:

- Multifamily apartment buildings will require a higher initial investment due to the diverse renovation opportunities which arise from these projects. Hence, the returns from these investments will also be attractive for utilities and financial institutions.
- Multi-apartment buildings consist of a large portion of the EU building stock which needs to be renovated to meet the GHG and energy reduction goals set by the EU. Therefore, solutions must be found to perform deep energy renovations in these buildings.

It is interesting to point out that in Spain and Italy the interest in multifamily and single-family dwellings was fairly pair. Influencing factors could be the nature of the building stock in each country (Spain and Italy have a considerable number of single-family houses), market factors (single-family houses are usually inhabited by owners rather than tenants in both these countries) and socio-economic characteristics of the inhabitants of each type of dwelling (the level of income may also play a role here - higher income families are usually associated with living in single-family dwellings). Some stakeholders working in the German market also pointed out that although multifamily building blocks are an attractive market segment, consensus must be reached between the owners of the apartments within the building, therefore single-family buildings may be easier to target due to there being an individual owner.

Tariffed on-bill (TOB) arrangement

There is no consensus as to whether the TOB arrangement would be useful. Participants in Lithuania seem most convinced about this measure, followed by Spain and Germany, whilst participants in Italy were not convinced, as shown in Table 5-4.

Would attached to the meter arrangements be useful?	Spain	Germany	Italy	Lithuania
Yes	3	4	1	7
No, transferability could lead to default risk	2	1	4	-
No. Other reason:	2	3	-	-

Table 5-4 - Participant's opinion regarding the usefulness of attached to the meter arrangements for OBS

Reasons given by questionnaire participants for not using TOB arrangements are:

- "Difficulty to apply in the Spanish residential market" – probably referring to a less dynamic home rental market in Spain
- It may make property unattractive for new residents. It will be very dependent on the housing segment (high-priced, social housing, etc.) and the housing pressure in the region.
- May not be legally feasible in Germany

Liability in case of clients' default on repayment

When asked who should be liable in case of clients' default on repayment, most survey participants deemed that the sharing of risks between the utility and the financial was the most suitable solution.

Who should be liable in case of client's default on repayment (OBR model)?	Spain	Germany	Italy	Lithuania
Financial institution	4	2	1	5
Utility	3	0	1	0
Both should share risk	5	2	4	3

Table 5-5 - Questionnaire results on who should be liable in case of clients' default on repayment

When asked to expand on their answers, there also seemed to be a consensus that depending on the responsibilities of each actor, there should be a corresponding risk exposure factor. For example, in Spain it was pointed out that whoever performs the risk evaluation (which will almost always, if not always, be the financial institution) should be the one to bear the financial risk. Another factor pointed out is that the one who signs with the end-user should be the one liable for a default on repayment.

In conclusion, questionnaire participants believe that both stakeholders should share some default risk. If risk is not shared, then the financial institutions should be the ones to be liable for the default since these will usually be the ones performing the risk evaluation.

Questions targeted exclusively towards the energy sector:

Motivations and benefits expected from offering energy renovation services

The benefits expected from launching OBS is fairly evenly distributed. This gives validity to the fact that these schemes give an added value to a diverse set of interests and motivations for utilities who wish to implement these schemes, depending on their marketing and corporate strategy and target customer segment, among others.

The three main drivers for energy utilities to engage in OBS are:

- Gain new clients and take advantage of a new source of revenue streams
- Increase client loyalty / retention
- Improve market positioning as a cutting-edge utility and differentiate from competitors

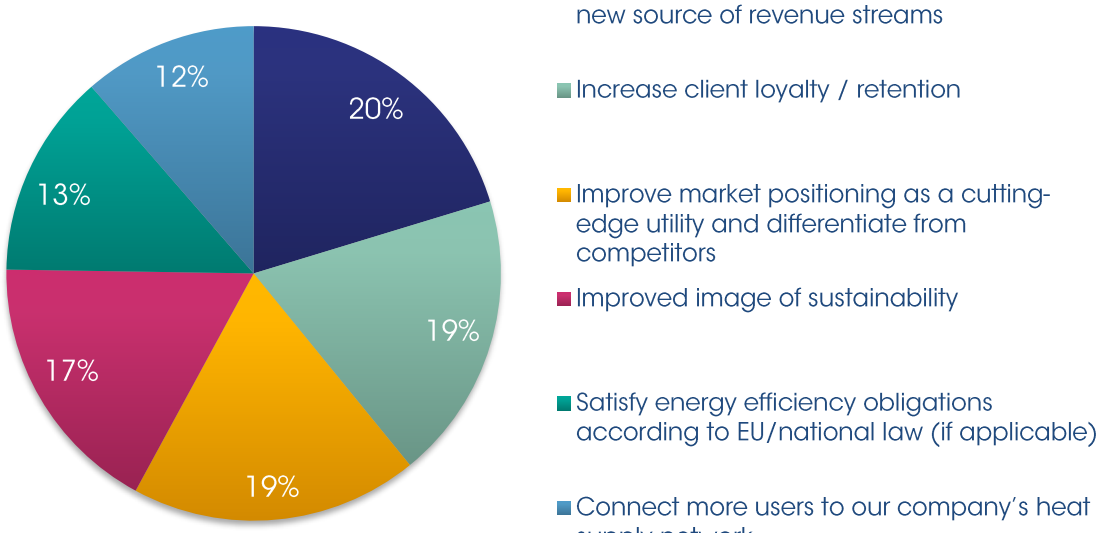


Figure 5-2 - Motivations and benefits expected from offering energy renovation services

The above percentages represent the motivations for questionnaire participants in the energy sector to offer OBS. It is worth pointing out that "connecting more users to the company's heat supply network" was a very relevant factor in both Germany and Lithuania given the higher use of this heat distribution technology in Northern European countries, which highlights the variability of interests depending on the national and geographical contexts.

The percentages presented in Figure 5-2 were calculated using the votes presented in Table 5-6[10].

Motivations to offer energy renovation services		Spain	Germany	Italy	Lithuania
Increase client loyalty/retention	Very relevant	6	3	2	4
	Moderately relevant	0	5	3	2
	Not relevant	0	0	0	4
Improve image of sustainability	Very relevant	4	1	0	4
	Moderately relevant	0	7	5	6
	Not relevant	2	0	0	1
Get new clients and take	Very relevant	3	5	4	4
	Moderately relevant	2	3	1	4

[10] (Score per vote: very relevant (2), moderately relevant (1), not relevant (- 0.5).

advantage of new revenue streams	Not relevant	0	0	0	3
Improvement of the market position as a modern utility and differentiate from competitors	Very relevant	3	3	3	3
	Moderately relevant	2	5	2	6
	Not relevant	1	0	0	1
Connect more users to the company's heat supply network	Very relevant	2	3	0	5
	Moderately relevant	2	3	1	2
	Not relevant	2	2	4	1
Satisfy energy efficiency obligations according to EU/national law	Very relevant	1	0	1	7
	Moderately relevant	3	4	3	3
	Not relevant	2	4	1	1

Table 5-6 - Motivations to offer energy renovation services

Energy sector's preferred business models

The most appealing business models for the energy sector are standard-OBF and standard-OBR, the latter being slightly favoured[11]. The more complex variants proposed for the on-bill repayment model (OBRSPV and OBRM) did not spark as much interest.

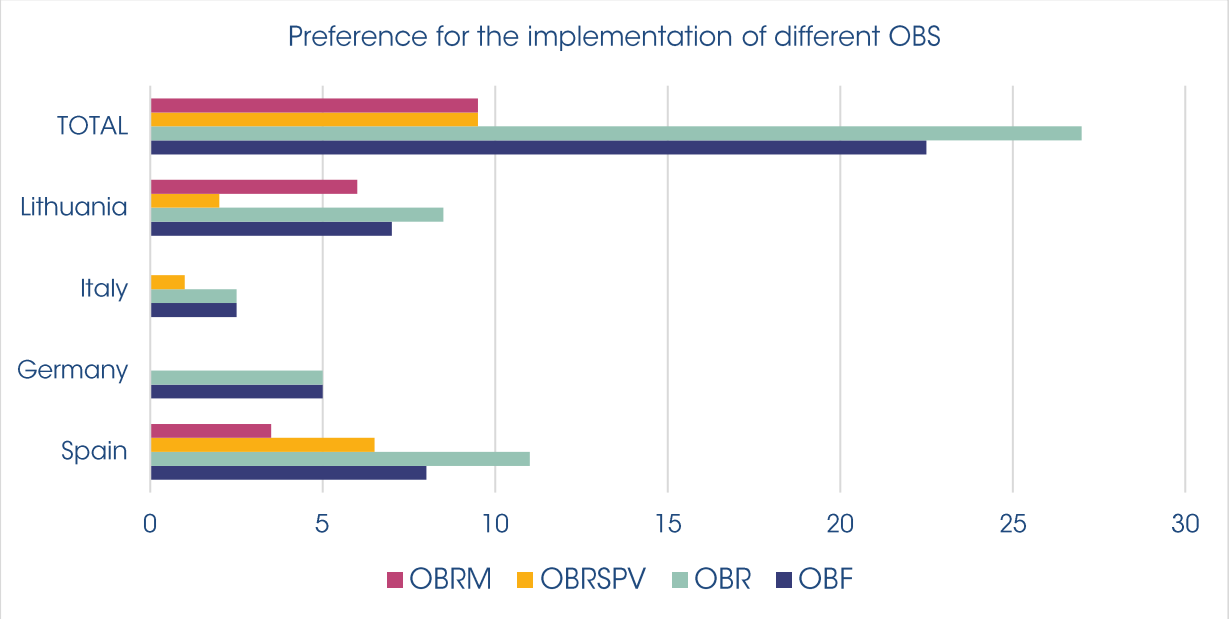


Figure 5-3 - Energy sector's preferred OBS business model

Interest in different OBS models	Spain	Germany	Italy	Lithuania

[11] (Score per vote: very interesting (2), moderately interesting (1), not interesting (-0.5).

On-bill financing (OBF)	Very interesting	2	2	0	3
	Moderately interesting	4	2	3	2
	Not interesting	0	2	1	2
On-bill repayment (OBR)	Very interesting	5	1	0	1
	Moderately interesting	1	3	3	7
	Not interesting	0	1	1	1
OBR incorporating an SPV (OBRSPV)	Very interesting	3	0	0	1
	Moderately interesting	1	0	2	2
	Not interesting	1	3	2	4
OBR incorporating a master servicer (OBRM)	Very interesting	0	0	0	1
	Moderately interesting	4	1	1	5
	Not interesting	1	2	3	2

Table 5-7 - Survey results regarding the energy sector's interest in different OBS business models

The utilities' interest or choice between OBF and OBR will usually come down to their internal financial capabilities or willingness to incur in debt.

Utilities' preferred source of funding

En masse, as shown in Figure 5-4, there is a clear preference to finance renovation measures using third-party capital, consistent with the result provided in the previous section showing that countries generally favourited the on-bill repayment model, highlighting the need to find synergies between utilities and financial institutions. Germany is an outlier in this sense since utilities seem most interested in financing OBS using their own funds. This could be due to these utilities having more core capabilities for the implementation of energy efficiency renovation measures, or more financial muscle. In the section "Ease to implement changes in the utility to set up on-bill schemes" in this annex, German utilities were found to find adding debt to their balance sheet more acceptable than other countries, which could be another reason why utilities would be interested in financing OBS with their own funds.

Regarding public funding, most utilities considered that tapping into these capital funds provided through national government subsidies or tax credits would be attractive when implementing OBS into their business models.

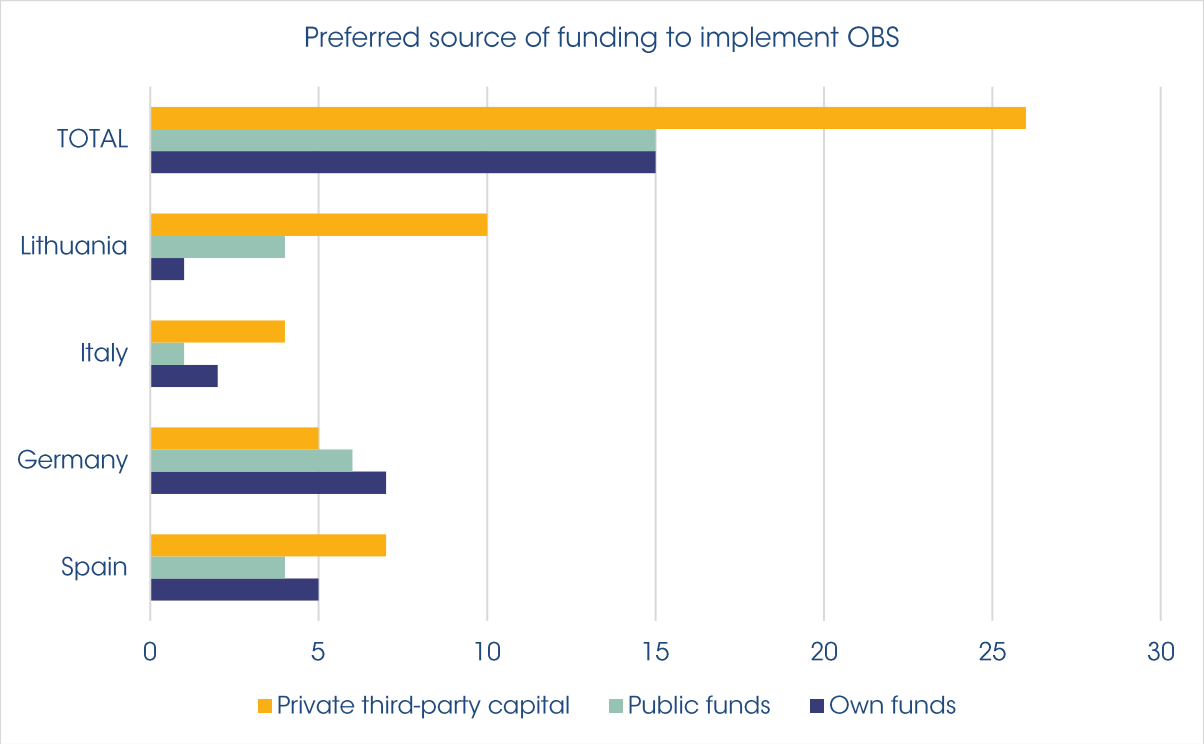


Figure 5-4 - Survey results showing the energy sector's preferred source of funding for the setup of OBS

What financial sources would the utility use to implement OBS?	Spain	Germany	Italy	Lithuania	TOTAL
Own funds	5	7	2	1	**15**
Public funds	4	6	1	4	**15**
Private third-party capital	7	5	4	10	**26**

Table 5-8 - Survey results regarding what financial resources utilities would prefer to use when implementing OBS

Preferred renovation measures to implement using on-bill schemes

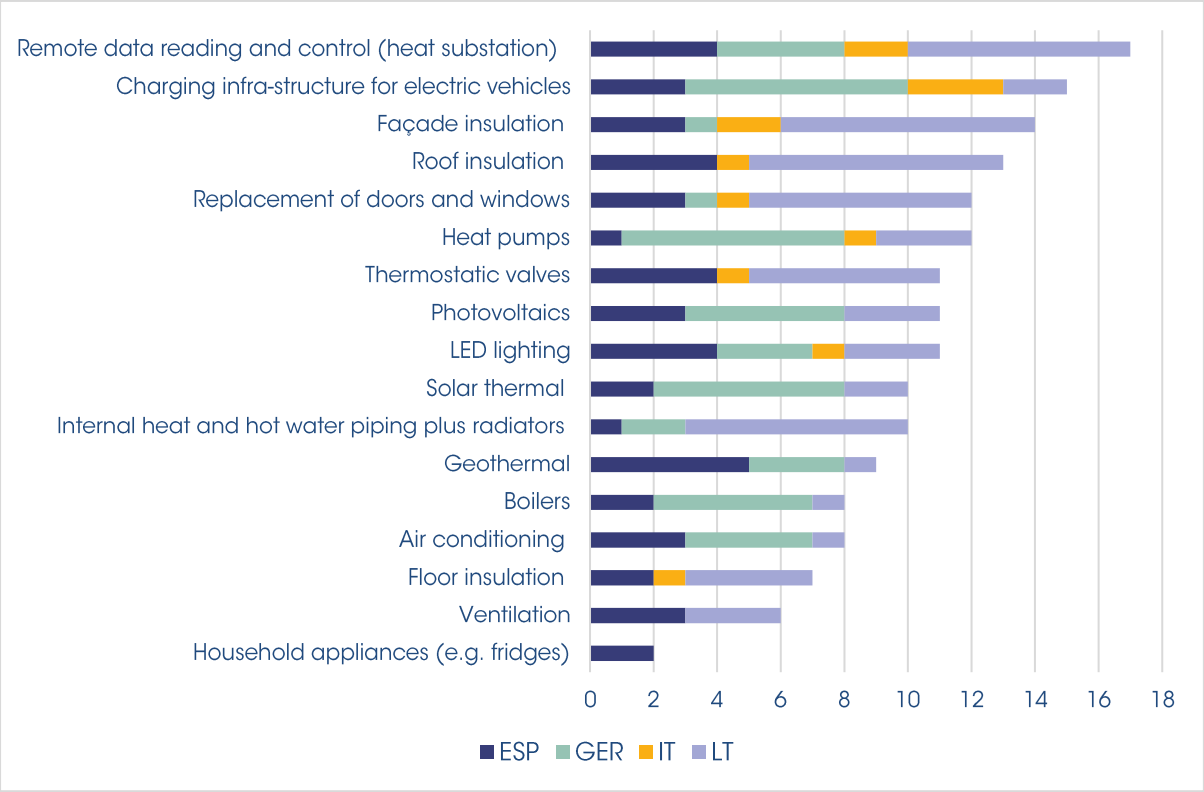


Figure 5-5 - Utilities' preferred renovation measures to implement using on-bill schemes

The most popular renovation measures to implement as a whole are, in order of preference are:

1. Remote data reading and control (heat substation)
2. Charging infrastructure for electric vehicles
3. Building insulation measures (façade, roof, and replacement of doors and windows)

Lithuania had a high participation rate in this question, so to shed some perspective on other renovation measures which were relevant for stakeholders in other countries, a second list has been created without considering the Lithuanian votes:

1. Charging infrastructure for electric vehicles
2. Remote data reading and control (heat substation)
3. Heat pumps
4. Renewable energy sources (PV, solar thermal, and geothermal)
5. LED lighting

In any case, it is noticeable that the preferred energy renovation measures vary from country to country. There are various factors to be considered:

- The ideal renovation measures to implement will depend greatly on the geographical location and climatic conditions of each country. In order to make the largest possible

impact on the energy and economic savings of a household or building block, it is only logical for each country to take into account its specificities and "fortes".

- Utilities' internal capabilities to implement given renovation measures
- Consider the renovation measures that are covered by non-refundable national energy efficiency renovation subsidies. A mechanism can be created where on-bill schemes can cover the renovation measures which are not financed by these funds.

Reasons to include a financial institution in an on-bill scheme

Reasons to include a financial institution in an on-bill scheme	Spain	Germany	Italy	Lithuania	TOTAL
Transfer default rate to a financial entity or a risk-sharing mechanism / public guarantee	5	1	2	5	**13**
Utility's own funds are not enough to scale the programme	5	2	0	6	**13**
Utility would prefer to use its own funds for other strategic investments or operations	2	4	0	3	**9**
Utility is not legally allowed to provide credit for building renovations (national creditor law)	1	0	0	4	**5**

Table 5-9 - Survey results regarding reasons to include financial institutions into OBS from the energy sector's point of view

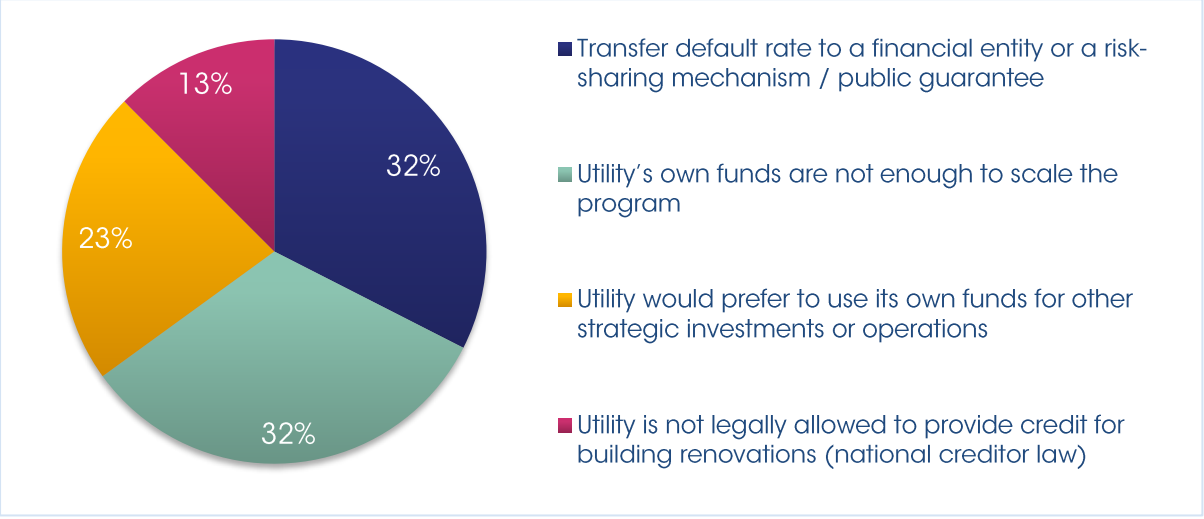


Figure 5-6 - Reasons to include financial institutions into OBS according to energy sector survey participants

The first three reasons shown in Table 5-9 seem very relevant for utilities, whilst the fact that the utility is not legally allowed to provide credit for building renovations does not seem to be such

a relevant factor (except for Lithuania). This is surprising, since as presented in the "Uncertainty about credit provision" section, questionees from the energy sector were generally unsure whether they could incur in credit lending activities, and therefore including a financial institution could overcome this barrier.

Availability of technical expertise to implement on-bill schemes

Utilities from different countries which participated in the questionnaire have different levels of expertise/internal technical capabilities for the implementation of the renovation measures. Utilities in Spain, Germany, and Italy all declared that they have the technical expertise required to implement OBS, therefore subcontracting the task for the renovation measures to external contractors would come down to internal company strategies or preferences. On the other hand, most Lithuanian utilities declared that they do not have technical expertise to take on the renovation measures. Hence, they would have to find partnerships with ESCOs, installers or other service providers to perform the works. The results are as follows:

Does your company currently have the technical expertise to implement OBS?	Spain	Germany	Italy	Lithuania
YES	5	3	2	1
NO	0	0	0	5
We have partnerships with ESCOs, installers, etc.	0	2	2	1
We would be willing to enter partnerships with ESCOs, installers, etc. in order to build up technical expertise	0	2	0	1
We would be ready to buy/start/become an ESCO	0	0	0	0

Table 5-10 - Energy sector's technical expertise to implement OBS

Target investment volume foreseen for the implementation of on-bill schemes

In addition to having a low participation rate in this question, there is no clear consensus as to what the utilities' preferred target volume for the implementation of OBS is. The target volume will likely come down to the customer segment/building typology that the OBS is targeting (the target volume will be much larger for a group of building blocks than an individual single-family home). A risk evaluation will also likely be performed before implementing an OBS, which will also play a role in the determination of the foreseen investment volume.

What target volume could you foresee for the implementation of OBS?	Spain	Germany	Italy	Lithuania
Up to 1M €	0	2	1	1
1-5 M€	2	0	1	1
5-20 M€	1	1		
20-50 M€	1	1		

Over 50M€			1	1

Table 5-11 - Foreseen target volume for the implementation of OBS, according to the energy sector

Uncertainty about credit provision

To the question "Is a utility legally allowed to provide credit for building renovations to the final user?", utilities in Germany and Lithuania seem certain that they are not allowed to provide credit to the final user. In Spain or Italy, the predominant answer was that they do not know. It stands out that although utilities knew or were uncertain that they could not incur in credit lending activities, they did not consider that involving a financial institution in the scheme was important to comply with national creditor laws, as shown in section "Reasons to include a financial institution in an on-bill scheme".

Is your organisation legally allowed to provide credit for building renovations to the final user?	**Spain**	**Germany**	**Italy**	**Lithuania**
Yes	1	0	1	1
I do not know	4	3	2	2
No	0	5	0	6

Table 5-12 - Survey answers regarding the uncertainty about credit provision for energy renovations

Ease to implement changes in the utility to set up on-bill schemes

Utilities were asked how easy it would be to implement the following changes in their organisation to set up on-bill schemes. The results are as follows[12]:

How easy would it be to perform these changes in your organisation to set up OBS?		Spain	Germany	Italy	Lithuania
Add debt to their balance sheet	Not acceptable	0	1	2	8
	Acceptable but difficult	3	2	2	1
	Easy to implement	1	2	0	1
Change the billing system to add a line for the repayment of renovation measures	Not acceptable	0	1	0	3
	Acceptable but difficult	1	2	2	4
	Easy to implement	4	1	3	3
Allocate marketing efforts to promote the offer / develop staff capacities / setting up a dedicated team	Not acceptable	0	1	0	1
	Acceptable but difficult	2	4	2	5
	Easy to implement	3	0	2	3

Table 5-13 - Ease to implement changes in utilities' organisational structure for the set-up of OBS

[12] Score per vote: easy to implement (2), acceptable but difficult (1), not acceptable (- 0.5).

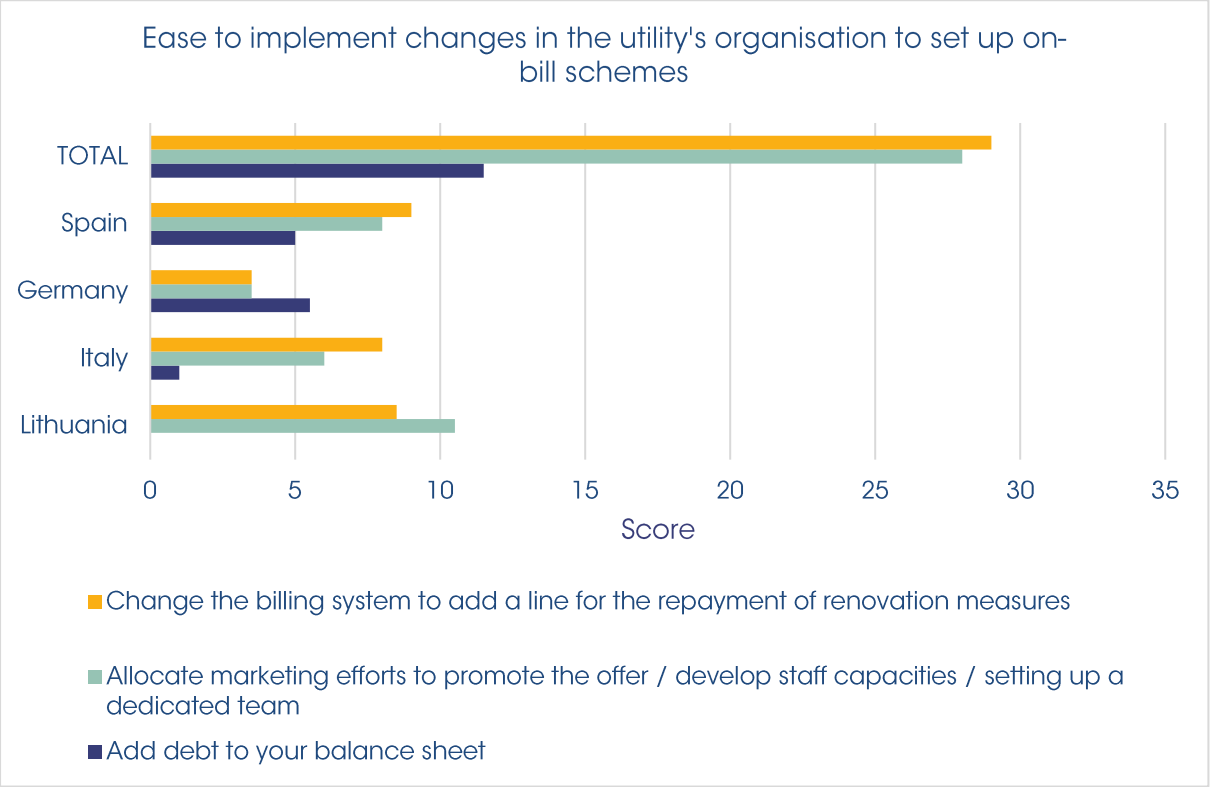


Figure 5-7 - Ease to implement changes to a utility's organisation to set up OBS (higher score means more ease to implement changes)

In general, there is consensus among utilities that the most acceptable changes to implement to offer on-bill schemes to their customers would be to:

- Change the billing system to add a line for the repayment of renovation measures
- Allocate marketing efforts to promote the offer / develop staff capacities / setting up a dedicated team

Questions targeted exclusively towards the financial sector:

Motivations and benefits expected from offering OBS energy renovation services

OBS can also provide an added value to financial institutions, verifying the flexibility and usefulness of implementing energy renovation measures using on-bill mechanisms for various stakeholders in the OBS value chain.

The three main drivers for financial institutions to engage in OBS are[13]:

- To obtain safe and relatively stable revenue streams
- Delegate technical / financial risks
- Gain access to additional financing options (e.g., green bonds, EIB loans, etc.)

[13] Score per vote: very relevant (2), moderately relevant (1), not relevant (-0.5).

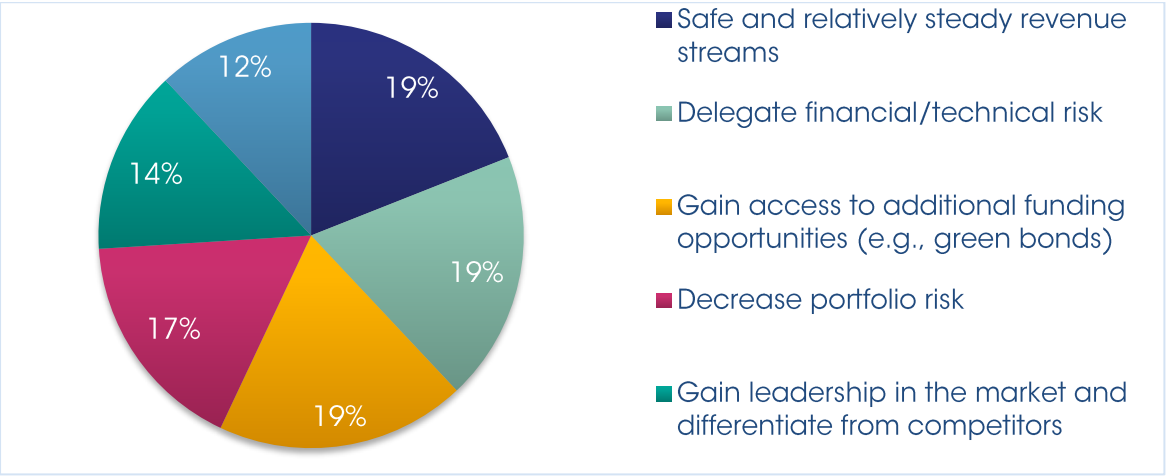


Figure 5-8 - Motivations for financial institutions to offer energy renovation services through OBS

Motivations to offer energy renovation services		Spain	Germany	Italy	Lithuania
Safe and relatively stable revenue streams	Very relevant	1	0	1	1
	Moderately relevant	0	1	2	0
	Not relevant	0	1	1	0
Gain leadership in the market and differentiate from competitors	Very relevant	1	0	0	0
	Moderately relevant	0	2	3	0
	Not relevant	0	1	0	1
Decrease portfolio risk	Very relevant	1	0	1	0
	Moderately relevant	0	2	1	0
	Not relevant	0	0	0	0
Delegate technical/financial risks	Very relevant	0	1	0	2
	Moderately relevant	1	0	1	0
	Not relevant	0	0	0	0
Increase in the share of financing / loans that are aligned with the EU taxonomy	Very relevant	0	1	1	0
	Moderately relevant	0	1	1	0
	Not relevant	0	0	2	0
Gain access to additional financing options (e.g., green bonds, EIB loans, etc.)	Very relevant	0	0	2	1
	Moderately relevant	0	2	0	0
	Not relevant	0	0	0	0

Table 5-14 - Motivations for financial institutions to offer energy renovation services through OBS

Constraints to work with energy companies to offer on-bill schemes

There are various constraints for financial institutions to cooperate with utilities:

- Granularity and transaction costs related to the number of actors involved in the implementation of OBS, and a fragmented market at an end-user level (with a diverse number of customer segments and building typologies which can be targeted for energy renovations). Relating to the latter, other factors must also be considered:
    - The owner-tenant dilemma
    - Barriers related to the need of convincing the majority of homeowners/tenants of a multi-family apartment block in order to take on the renovation measures, and who is responsible for the payment in case of default of one or more dwellings.
- The sharing of technical and financial risks is also a relevant factor and it becomes evident that utilities and financial institutions must align their interests. Some questionnaire participants consider that the utility should align with the protocols and risk levels established by the financing company.

Main constraints for cooperating with a utility to finance energy renovation projects	Spain	Germany	Italy	Lithuania
Financial risks	2	-	1	1
Technical risks	2	-	1	1
Granularity and transaction costs related to OBS/fragmented market	2	3	1	1

Table 5-15 - Main constraints for cooperating with a utility to finance OBS energy renovation projects

A relevant comment added by one of the participants which is useful to understand the financial institutions stance on these factors is that "it is necessary for the utility to align with the protocols and risk levels established by the financing company. There must be consensus in the rigour of the process and risk distribution".

Preferred OBS business models for financial institutions

The most appealing business models from the financial sector's point of view is the OBR and OBRM model, closely followed by OBRSPV, as shown in Figure 5-9 and Table 5-16[14].

[14] Score per vote: very relevant (2), moderately relevant (1), not relevant (-0.5).

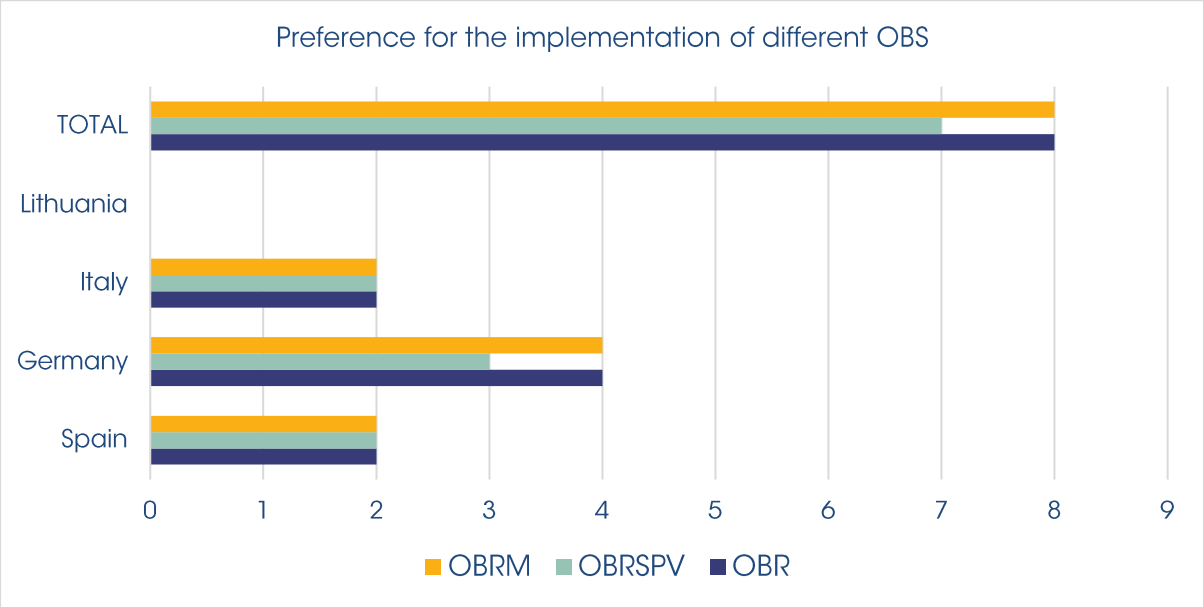


Figure 5-9 - Preferred OBS business models for surveyed financial institutions

Interest of different OBS models		Spain	Germany	Italy	Lithuania
On-bill repayment (OBR)	Very interesting	1	2	0	-
	Moderately interesting	0	0	2	-
	Not interesting	0	0	0	-
OBR incorporating an SPV (OBRSPV)	Very interesting	1	1	0	-
	Moderately interesting	0	1	2	-
	Not interesting	0	0	0	-
OBR incorporating a master servicer (OBRM)	Very interesting	1	2	0	-
	Moderately interesting	0	0	2	-
	Not interesting	0	0	0	-

Table 5-16 - Preferred OBS business models for surveyed financial institutions

Despite the participation rate being rather low, financial institutions considered all the proposed models relevant, leading to the conclusion that they would be interested in collaborations with utilities following different variations of the OBR model depending on their preferred contractual setup.

Total financing volume/target portfolio size that would be required to consider collaboration in an on-bill scheme with a utility

What total financing volume/target portfolio size would you require to consider collaboration in an OBS with a utility?	Spain	Germany	Italy	Lithuania
Up to 1M€	0	0	1	-
1-5 M€	1	0	1	-
5-20 M€	0	1	0	-
20-50 M€	0	0	0	-

Table 5-17 - Total financing volume/target portfolio size that financial institutions would require to consider collaboration in an OBS with a utility

There is no consensus as to what the preferred target volume/target portfolio would be required to consider collaboration in an OBS with a utility. As with stakeholders in the energy sector, it will come down to the projects specificities such as the customer segment/building typology, which is being targeted, risk evaluations, scalability of the project, etc. In terms of risk evaluation, the financial institutions will likely not only evaluate the credit risk of the final users or building communities, but also the utilities/service providers which will be carrying out the works (since a lousy technical installation can lead to one the highest risks in these kind of projects).

Investment returns expected from investing in on-bill schemes

In Spain and Lithuania, the expected investment returns would usually be expected to be above 8% (IRR>8%) or 10%. In Germany and Italy, however, they would generally expect an IRR>5%.

What kind of investment returns would your organisation expect from OBS?	Spain	Germany	Italy	Lithuania
IRR>10%	1	0	1	2
IRR>8%	3	1	1	4
IRR>5%	-	3	3	1
Other	2	-	-	-

Table 5-18 - Investment returns expected by financial institutions from investing in OBS

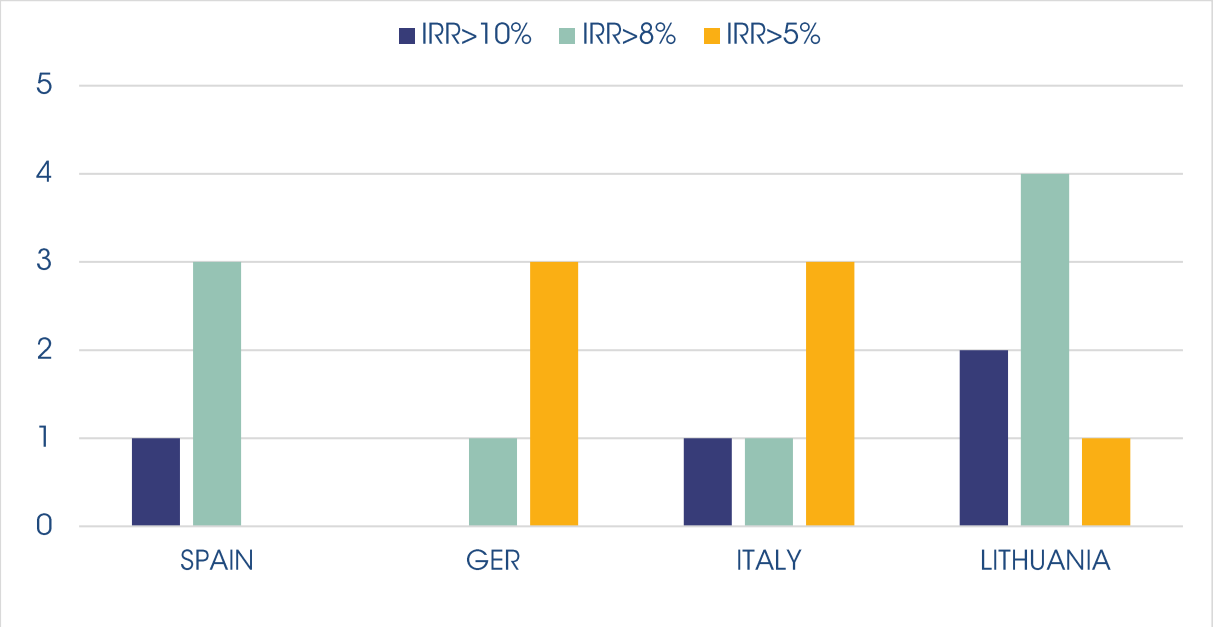


Figure 5-10 - Investment returns expected by financial institutions from investing in OBS

In general, financial institutions will expect higher IRR with higher risk projects, and vice versa.

Opinion regarding whether the creation of an SPV is appropriate

Some financial institutions thought that the integration of an SPV would be appropriate given certain conditions. The comments given by the questionees in different countries are:

- Spain: yes, it makes sense, but not necessarily. It depends on the availability of funds, its limitations and the specific guarantees of the scheme established with the mechanism. Seen in isolation, it could be a way to financially optimise the financing structure, but it will depend on many factors
- Germany: yes, up to 20 M€ in investment volume
- Italy: yes (one participant considers them useful up to 20 M€, and another between 20-50 M€)

Opinion regarding the usefulness of including an escrow account for the implementation of OBS

When asked whether the integration of an escrow account into the scheme is useful to pool capital, financial institutions agreed that its use could be useful (low participation rates must be considered). Participants from different countries gave the following answers:

- Spain: 1 yes
- Germany: 2 yes
- Italy: 2 yes

5.3 Value Flow Charts

Detailed OBF Value Flow model

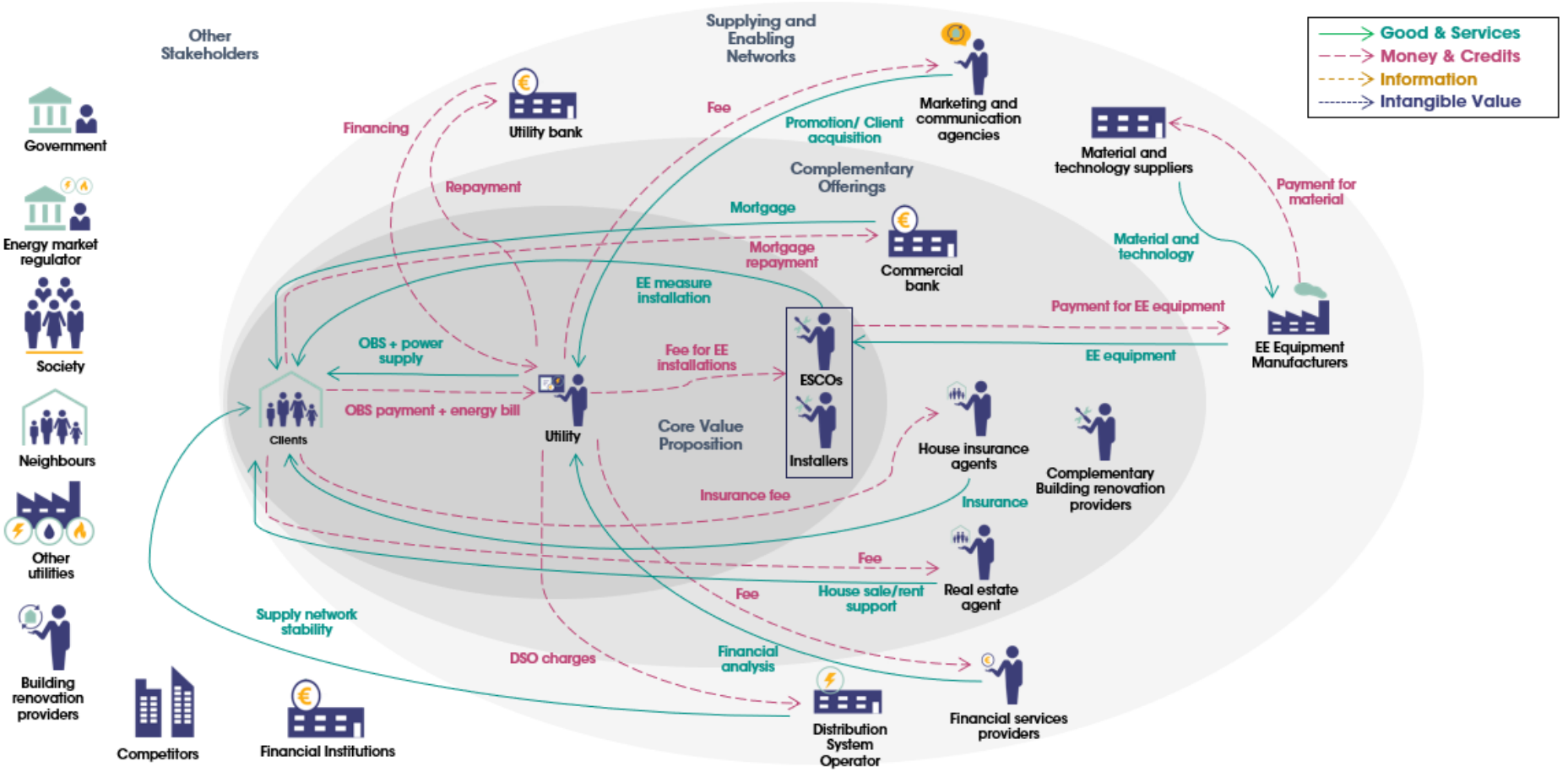


Figure 5-11 – Detailed representation of the value streams (goods & services represented with green arrows, and money & credits, in red) within the OBF Value Flow model ecosystem

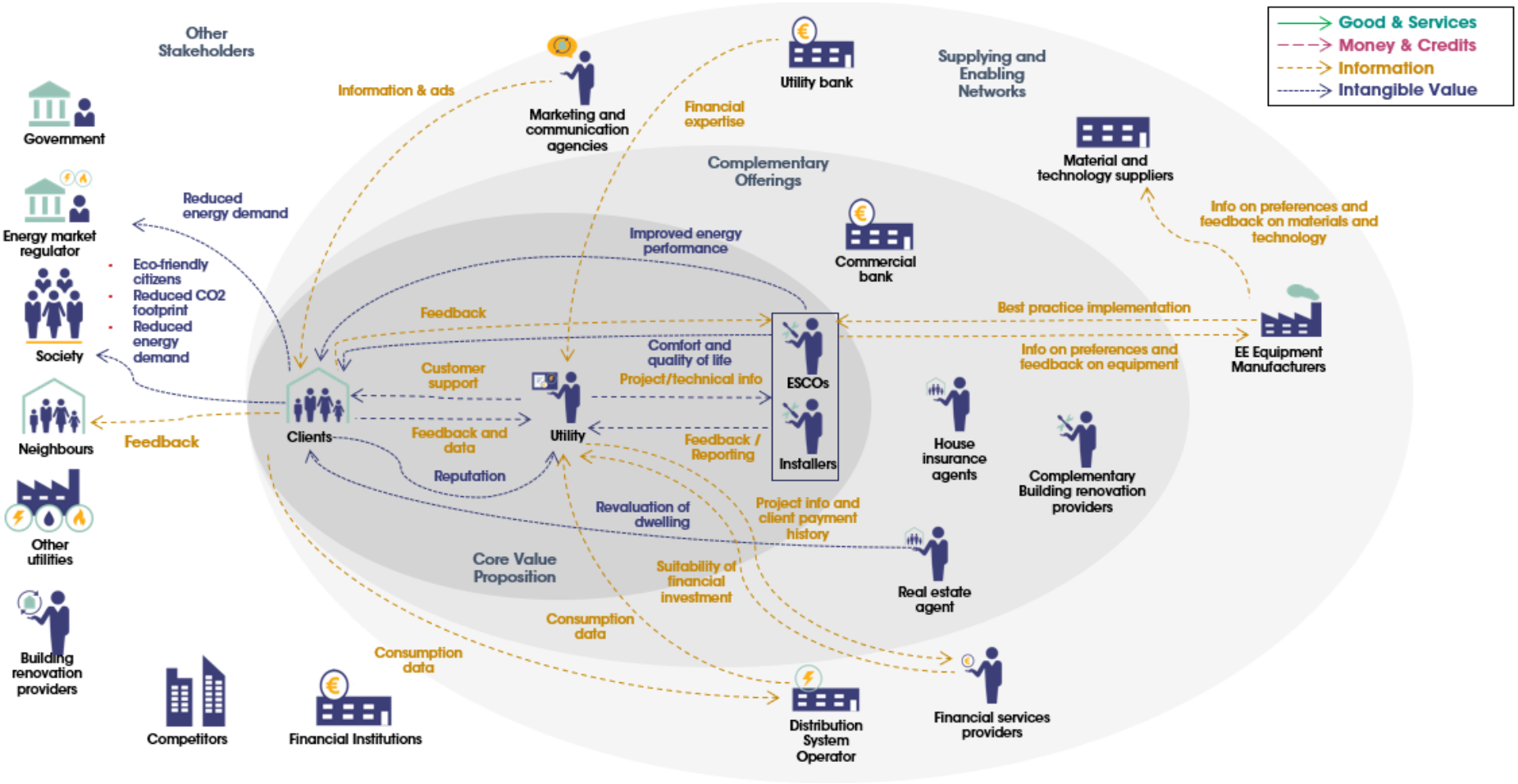


Figure 5-12 - Detailed representation of the value streams (information represented with yellow arrows, and intangible value streams, in blue) within the OBF Value Flow model ecosystem

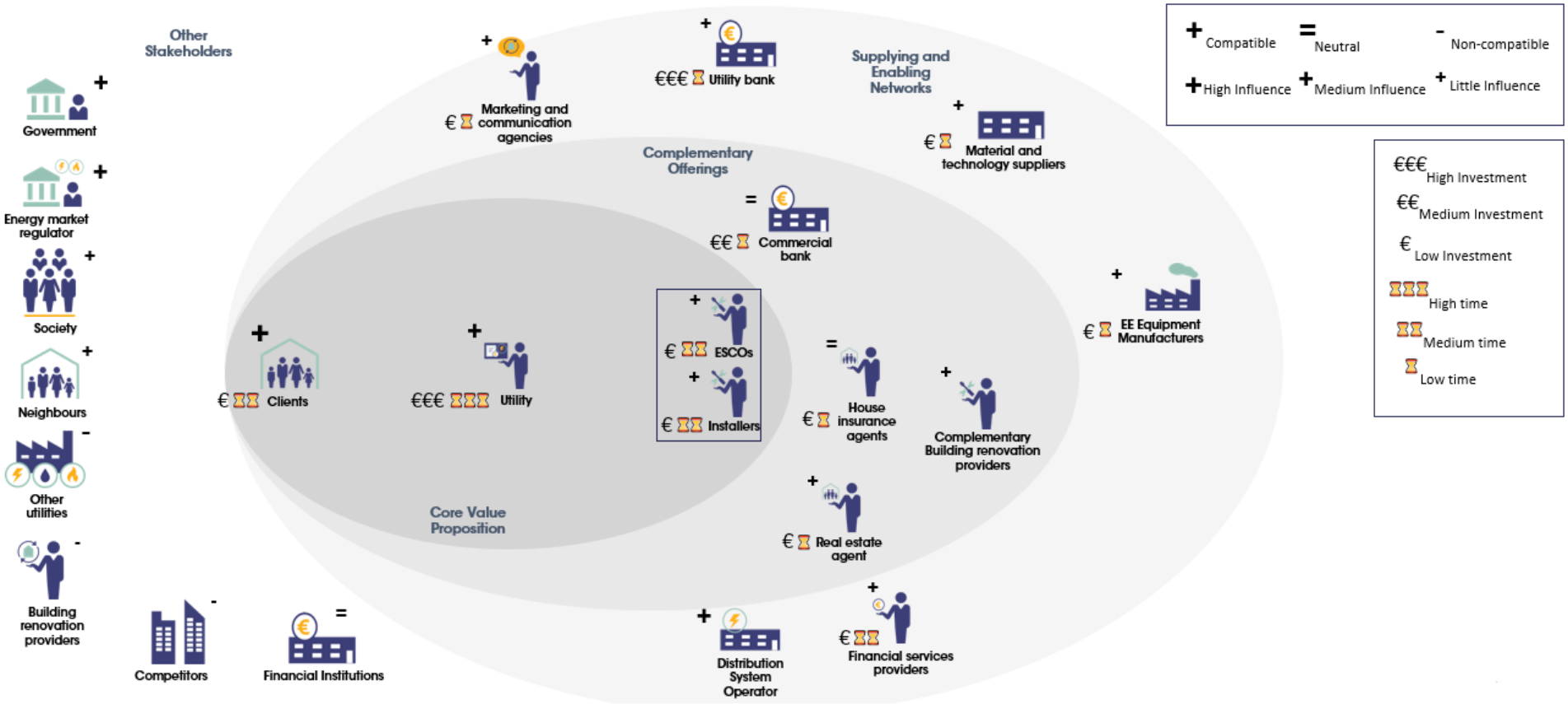


Figure 5-13 – Visual representation of the compatibility, influence, investment, and throughput time of the actors involved in an OBF Value Flow Model

Detailed OBR Value Flow model

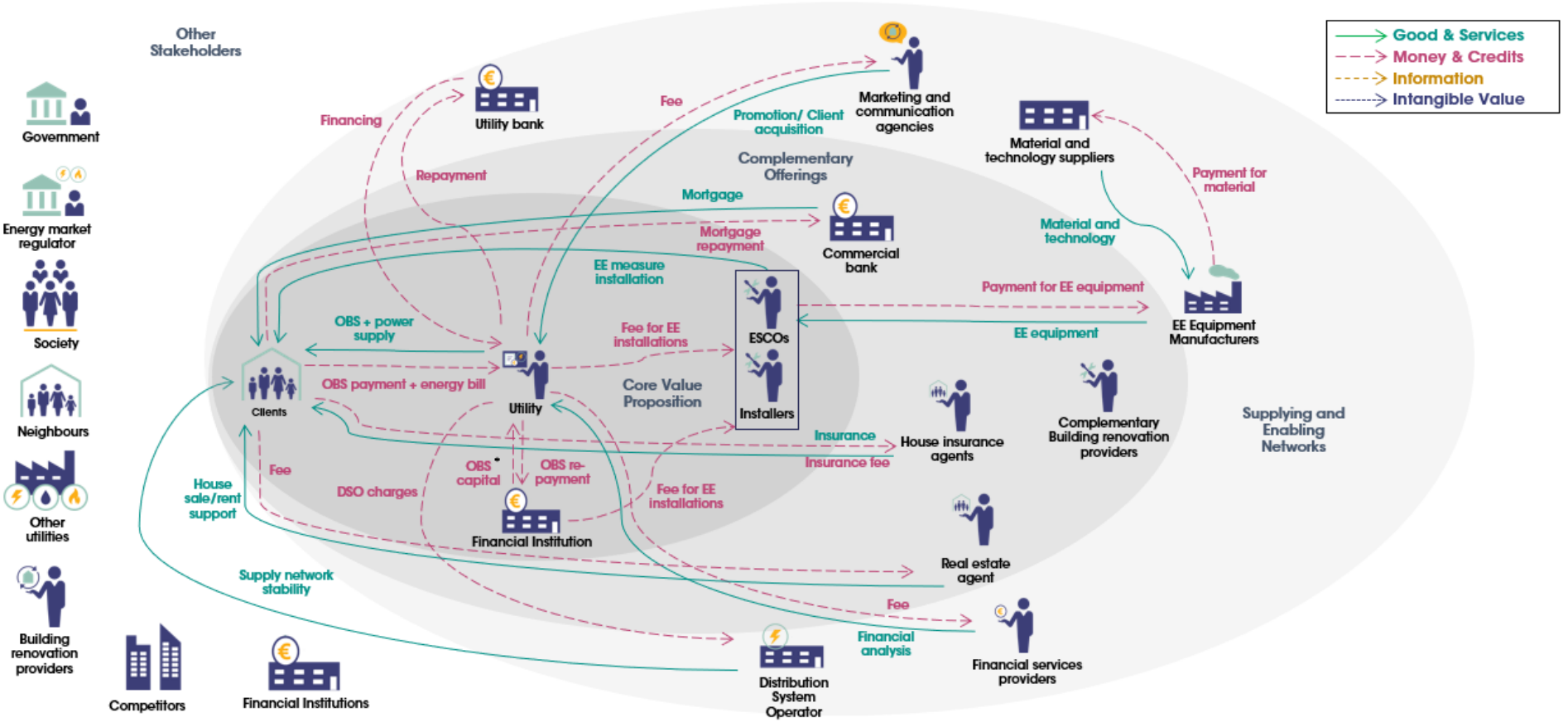


Figure 5-14 - Detailed representation of the value streams (goods & services represented in green, and money & credits, in red) within the OBR Value Flow model ecosystem

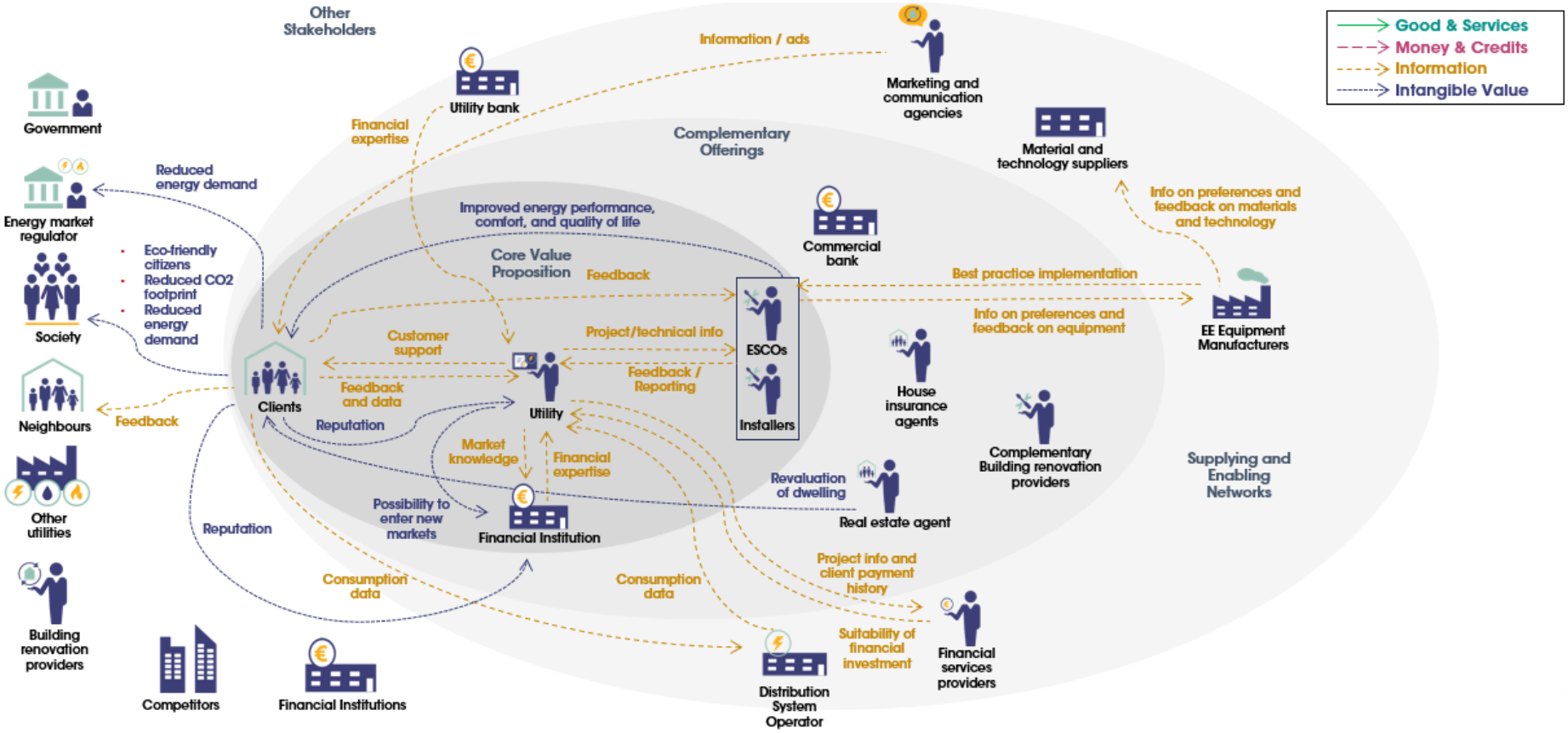


Figure 5-15 - Detailed representation of the value streams (information represented with yellow arrows, and intangible value streams, in blue) within the OBR Value Flow model ecosystem

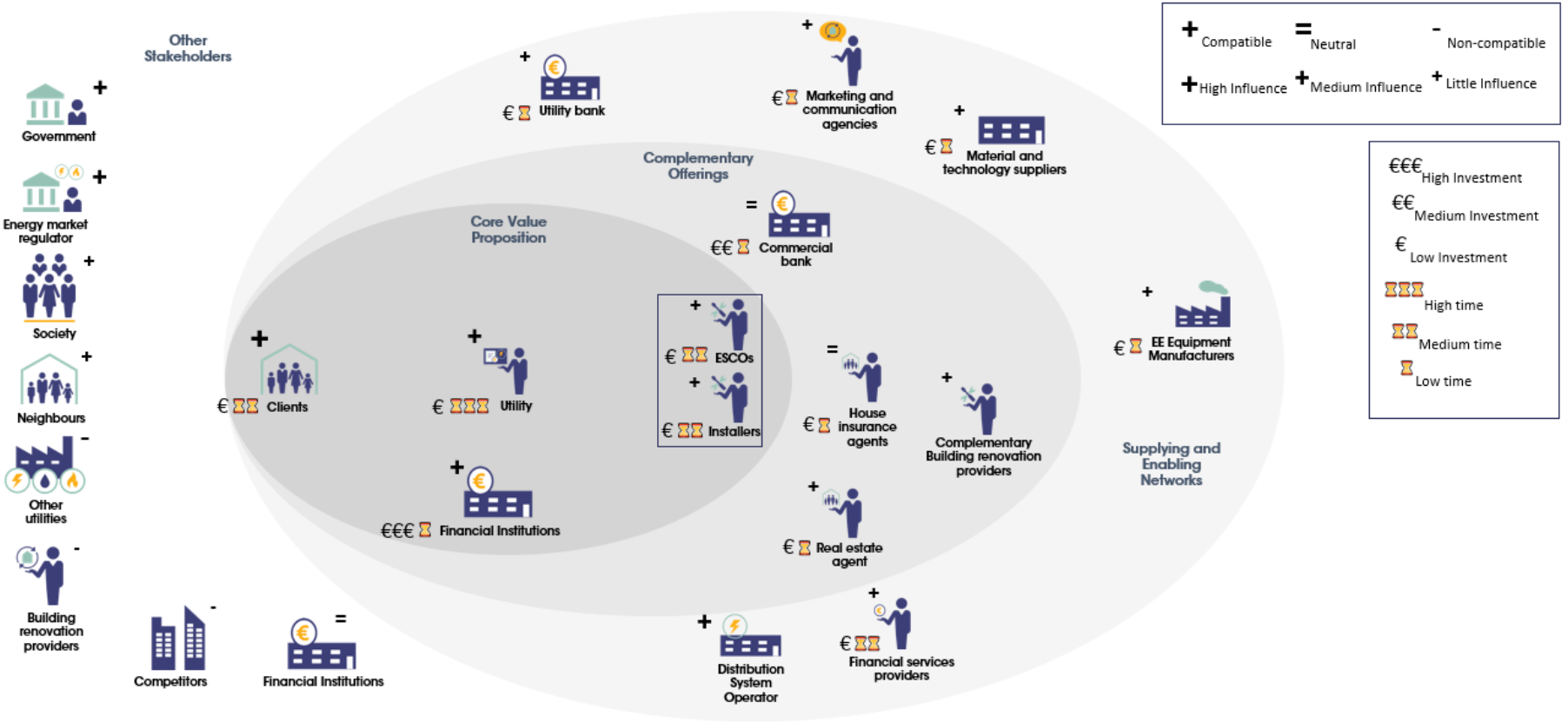


Figure 5-16 - Visual representation of the compatibility, influence, investment, and throughput time of the actors involved in an OBR Value Flow Model

Detailed OBRSPV Value Flow model

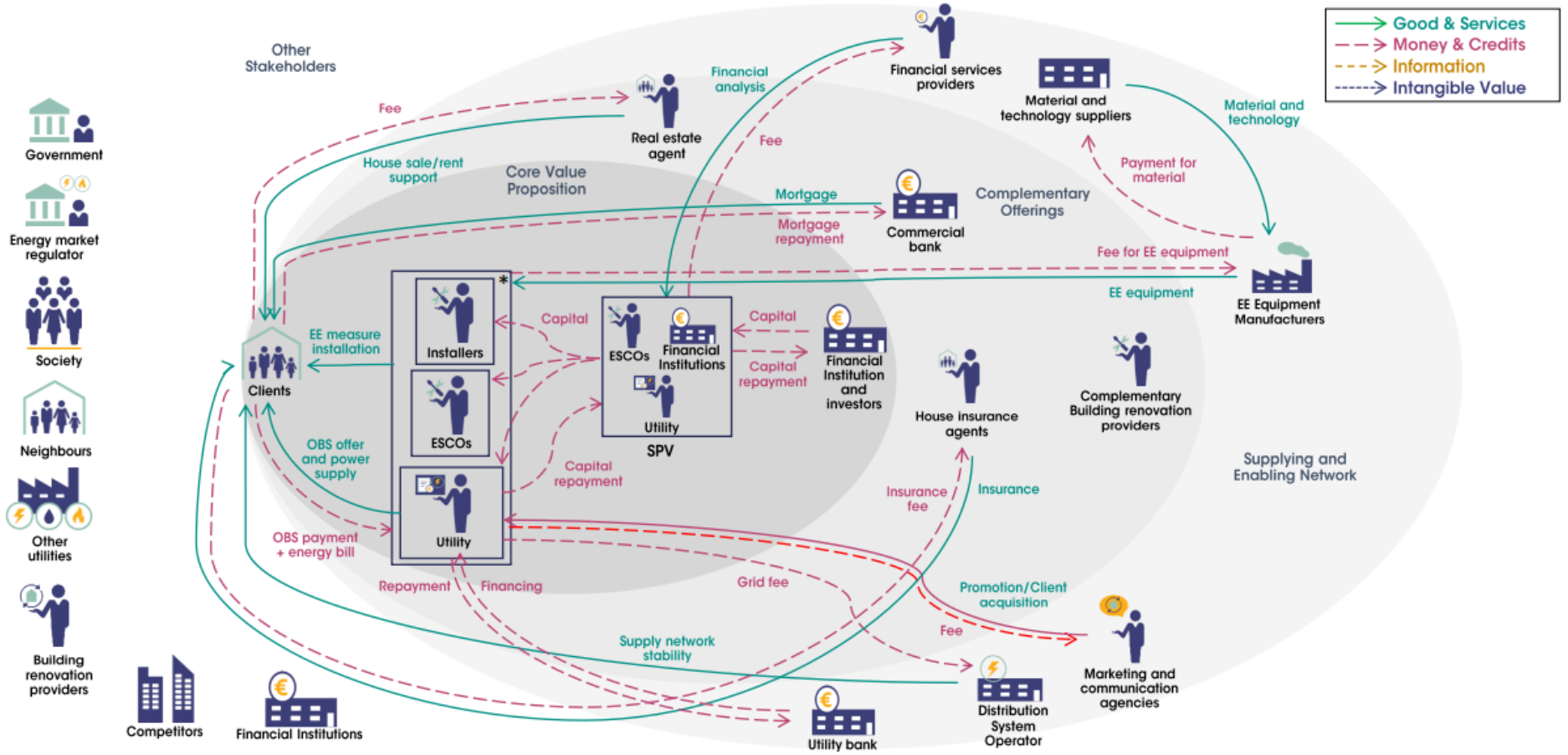


Figure 5-17 - Detailed representation of the value streams (goods & services represented in green, and money & credits, in red) within the OBRSPV Value Flow model ecosystem

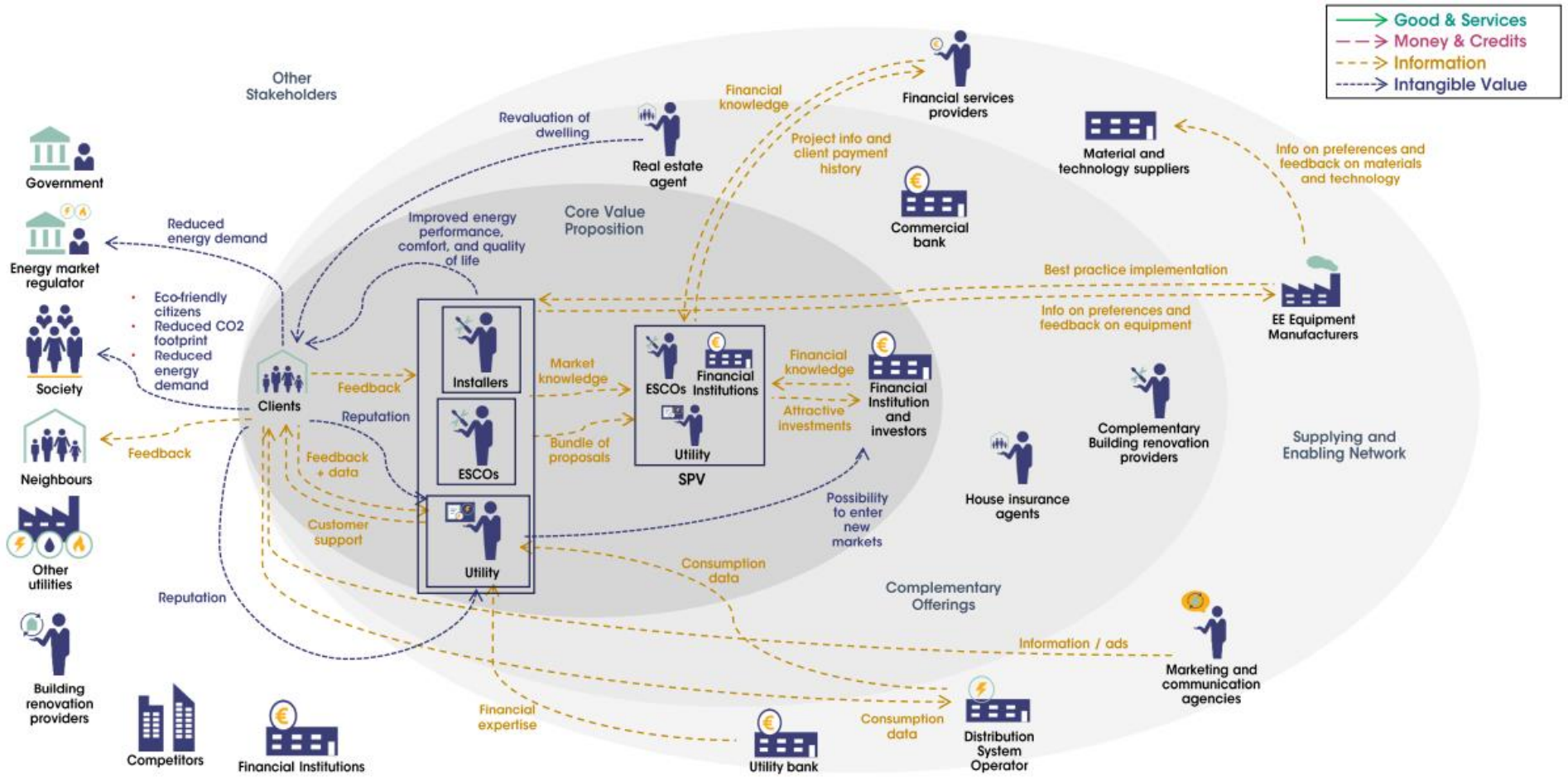


Figure 5-18 - Detailed representation of the value streams (information represented with yellow arrows, and intangible value streams, in blue) within the OBRSPV Value Flow model ecosystem

Detailed OBRM Value Flow model

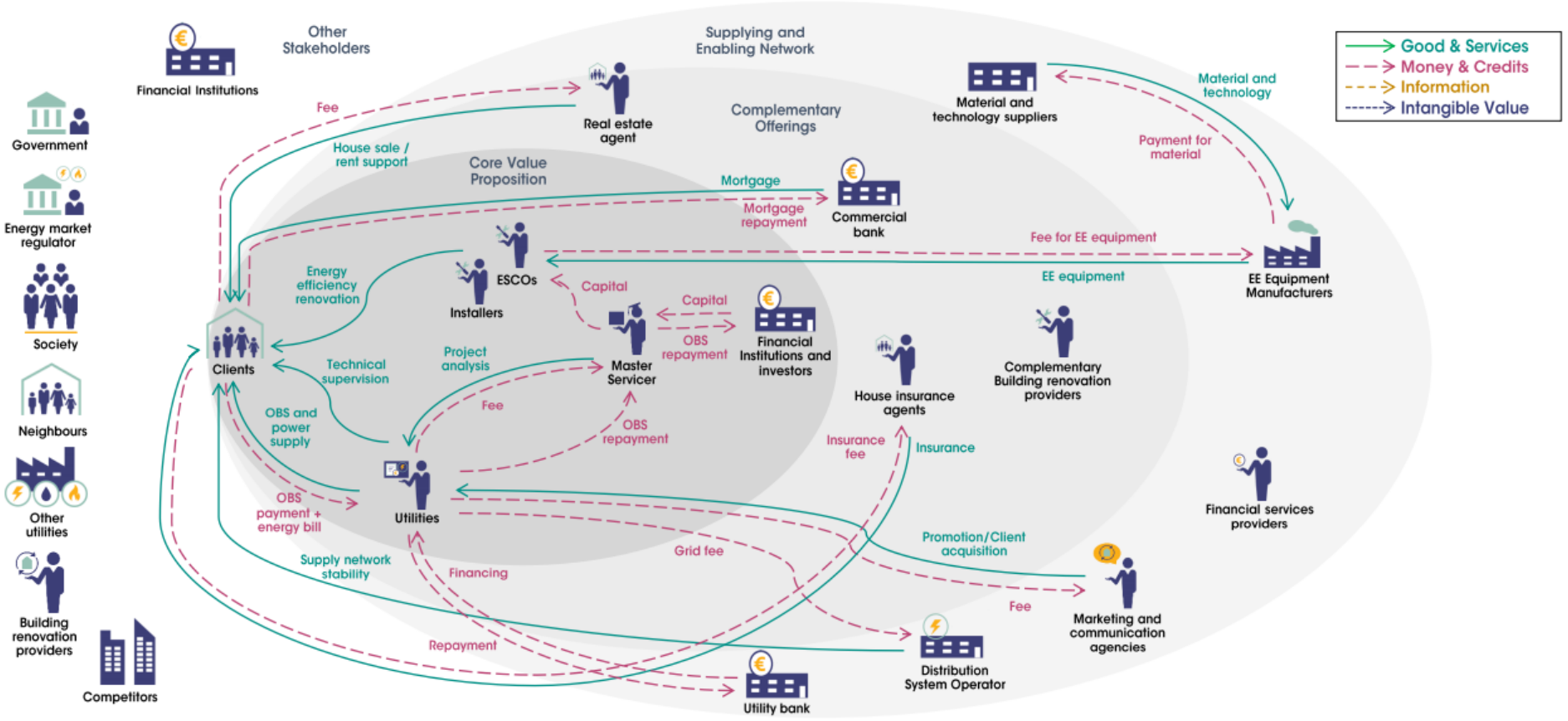


Figure 5-19 - Detailed representation of the value streams (goods & services represented in green, and money & credits, in red) within the OBRM Value Flow model ecosystem

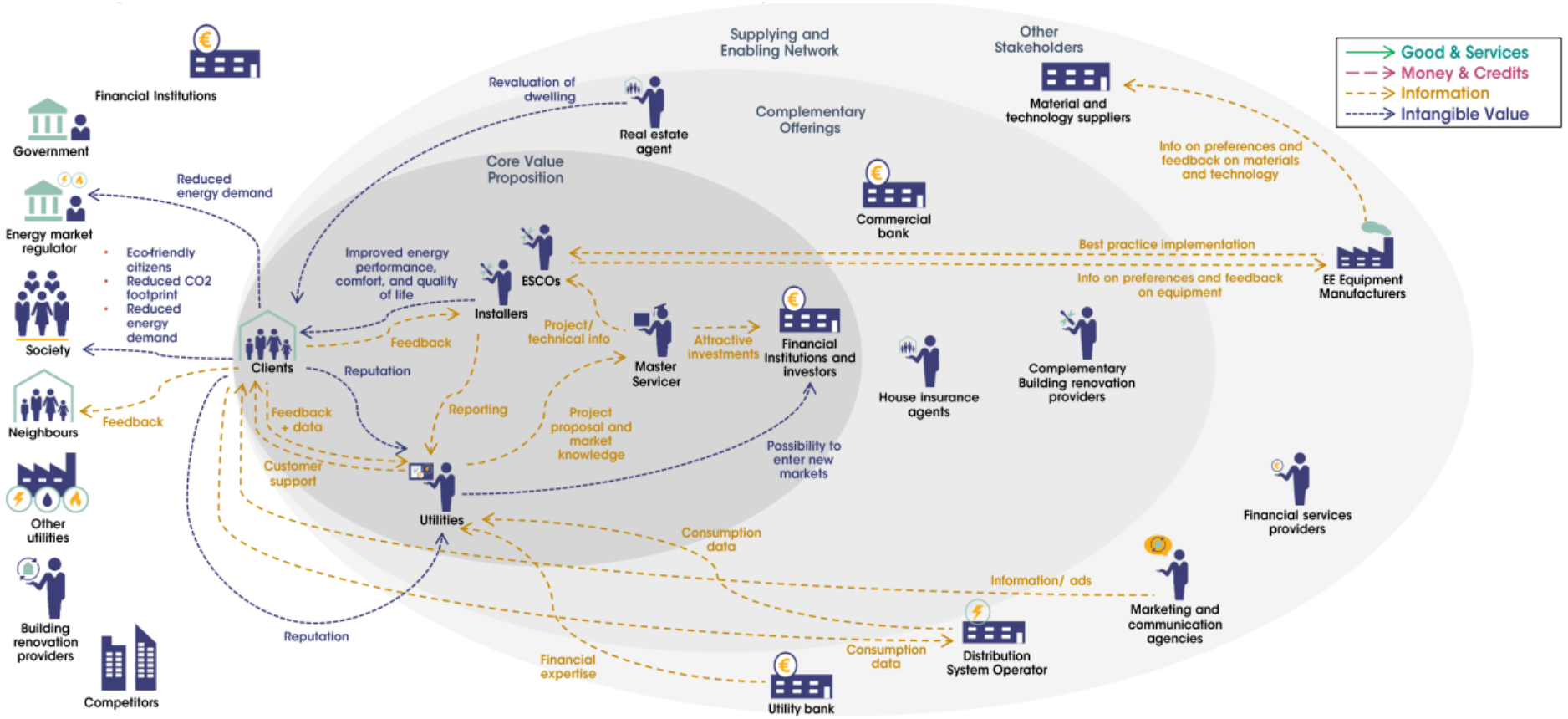


Figure 5-20 - Detailed representation of the value streams (information represented with yellow arrows, and intangible value streams, in blue) within the OBRM Value Flow model ecosystem

Detailed DSOF Value Flow model

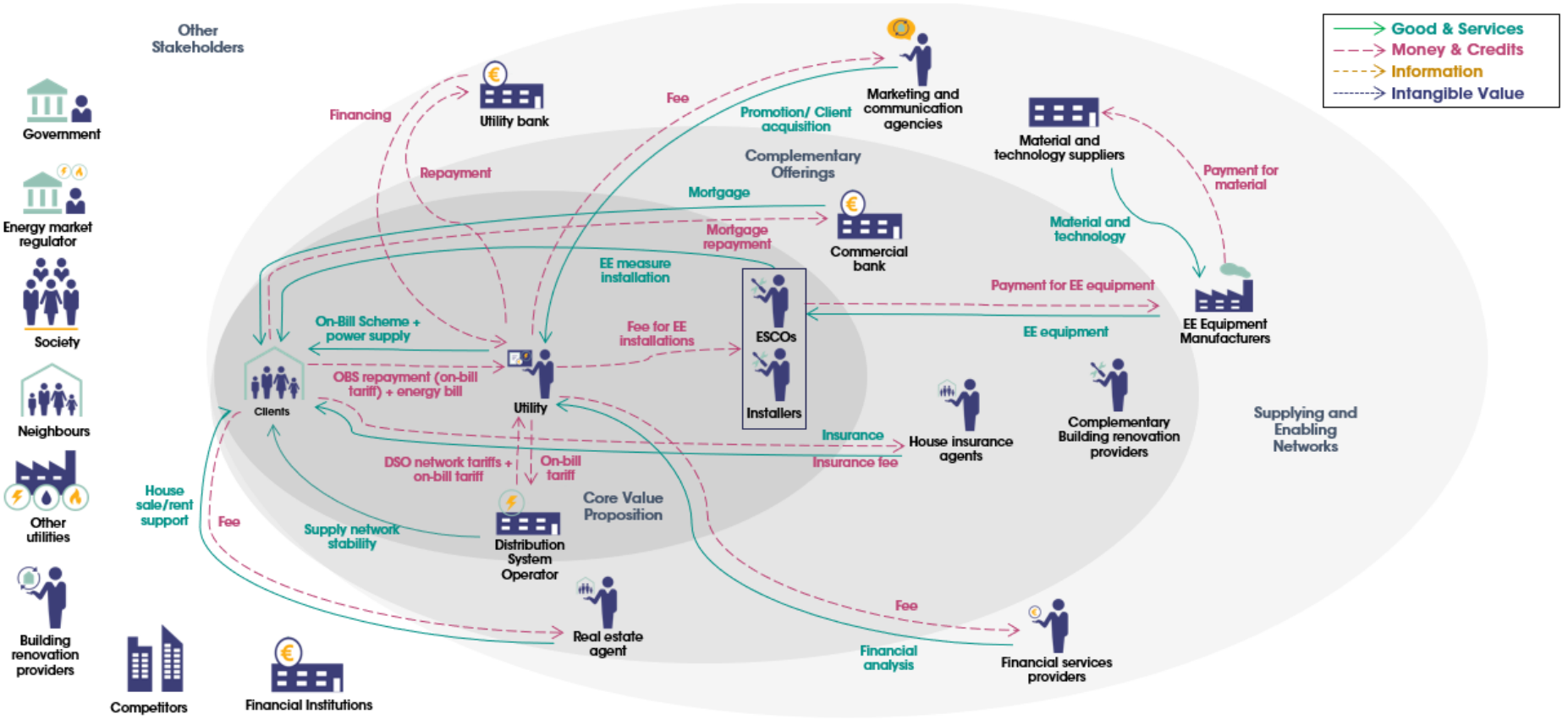


Figure 5-21 - Detailed representation of the value streams (goods & services represented in green, and money & credits, in red) within the DSO Value Flow model ecosystem

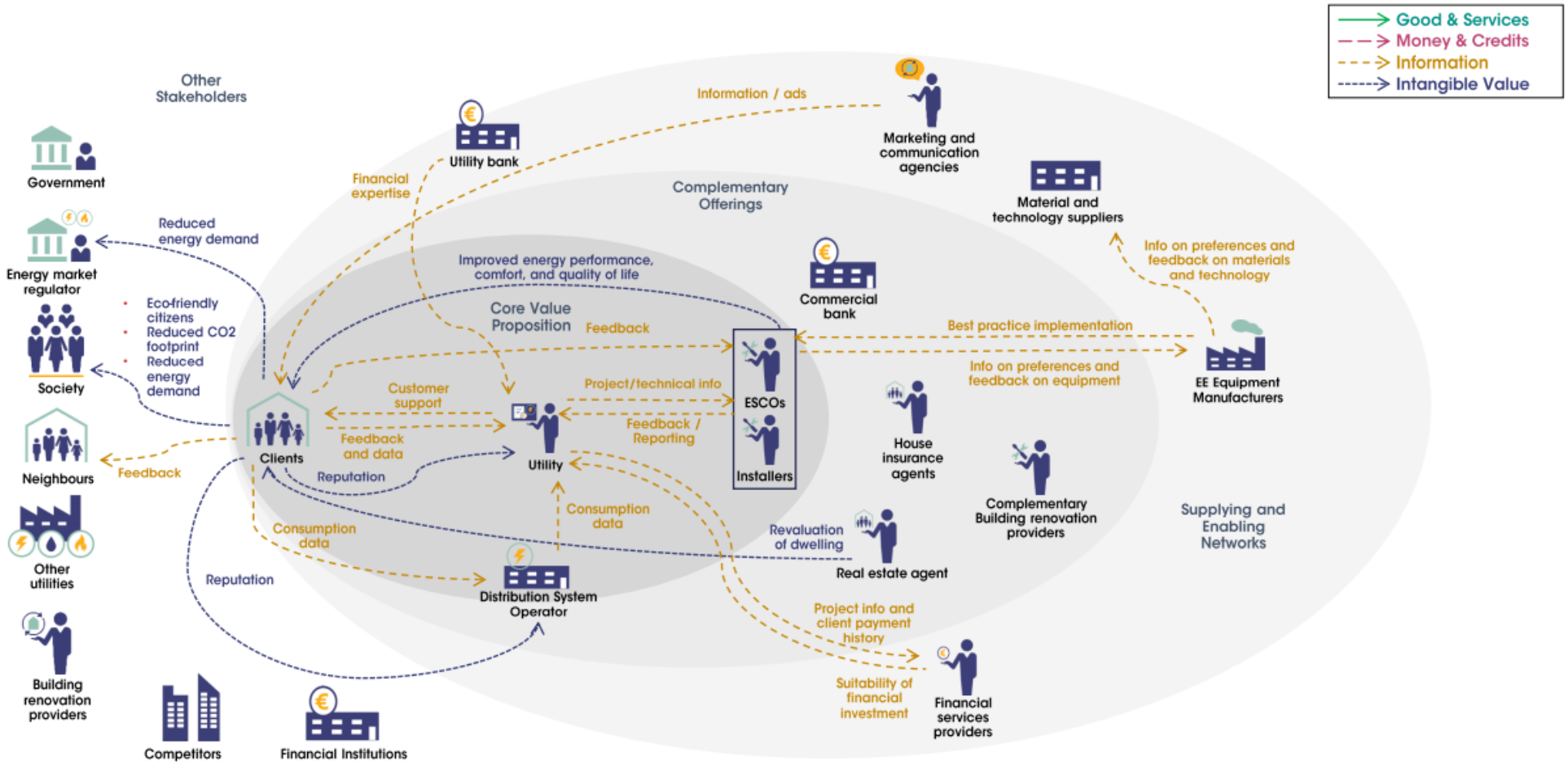


Figure 5-22 - Detailed representation of the value streams (information represented with yellow arrows, and intangible value streams, in blue) within the DOSF Value Flow model ecosystem

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