Smart energy services to solve the **SP**lit **IN**centive problem in the commercial rented sector

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D7.2 - VALUE CHAIN & STAKEHOLDERS ANALYSIS

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1 INTRODUCTION

One of the major barriers to energy efficient building renovations in commercially rented buildings is the split incentive problem – i.e. the conflict that arises when the benefits of a transaction do not accrue to the person who pays for it. Performance based contracts such as Energy Performance Contracts (EPCs) have been available for a number of years and have proven highly successful in the public sector. However, in most Member States EPCs have not yet penetrated the commercial rented sector due largely to two interrelated barriers: (a) the long contract duration of EPCs (8-15 years is common) which in many cases can be longer than the tenancy contract, and (b) the split incentive problem. Despite the size of the commercial rented sector and the potential for energy savings, no business model for performance based energy efficiency has yet been able to penetrate the market in any significant way, leaving this market largely untapped.

The first step in the SmartSPIN business model is to implement low cost actions to reduce building's energy consumption such as adding sensors to improve state estimation capabilities, fine tuning the operation control of the systems and unifying it under a common goal of improved energy efficiency. Such measures have a short payback time, which mitigates one of the barriers to energy performance contracting (EPC) in the private sector: the long contract duration. To overcome the second major barrier, the split incentive problem, SmartSPIN advances the Energy Efficiency-as-a-Service (EEaaS) model. EEaaS is based on the concept of an energy efficiency service provider offering solutions that: (a) combine demand management services and energy efficiency interventions, (b) facilitate the adoption of renewables, and (c) optimize the balance between demand and supply, while the customer pays for the service through a monthly, quarterly or annual fee that is linked, directly or indirectly, to the energy savings realized on utility bills.

The aim of this value chain and stakeholder analysis is to:

- Identify the most important stakeholder groups within and around the SmartSPIN value chain,
- Understand their challenges and attitudes towards efficiency and flexibility, with the aim to inform work and processes in other parts of the project,
- Facilitate the refinement and validation of the business model & value proposition to be developed in WP6,
- Identify potential future collaborations in order to set up engagement strategies.

2 OVERVIEW OF THE ANALYSIS

The stakeholder analysis is performed using a methodology developed by PNO Consultants, which aims to identify the most relevant stakeholders and categories by examining the innovation landscape. This is done using a systematic and iterative process visualized in Figure 1 and described below.

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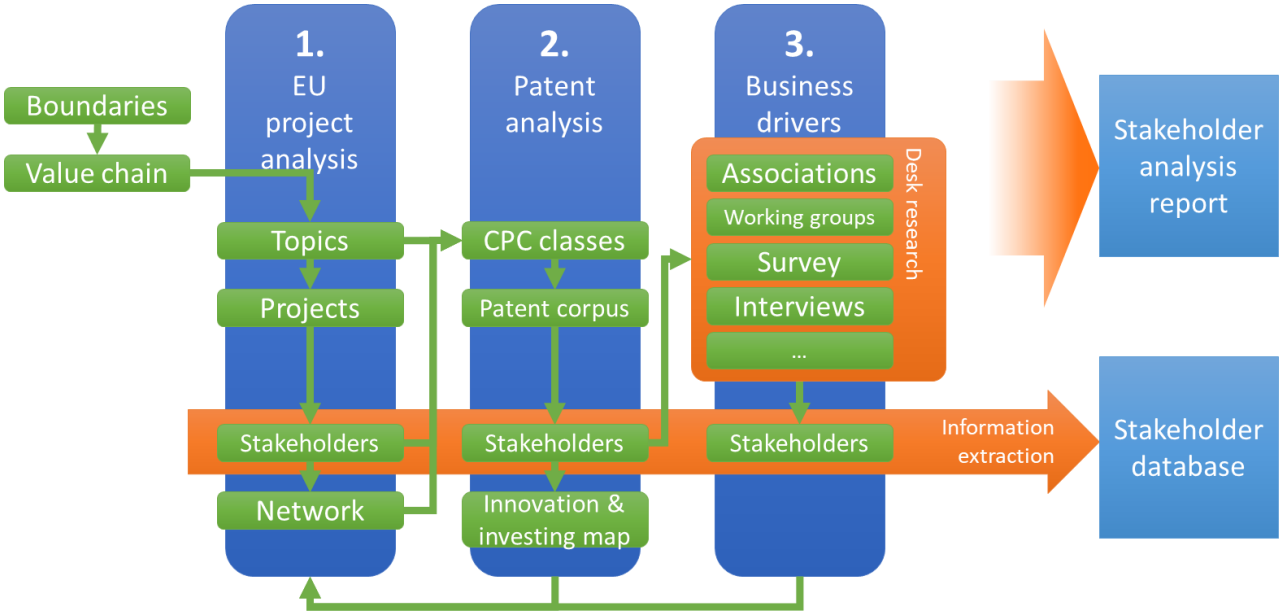

Figure 1. **Stakeholder analysis approach**

The process consists of three complementary phases which, when combined, provide a good overview of the innovation, investment and business landscape. The methodology followed in each part of the process is described in section 3, while the analysis of all phases is provided in section 4 of this report.

1. EU Project analysis

This phase aims to identify innovators in the field through an analysis of EU-wide innovation projects around topics related to the technology of interest. Using available databases of publicly funded projects, complemented by desk research, the most relevant projects and their participants are identified, as well as additional information like distribution across time or geography. The rationale behind this approach is that many innovations take place within the context of collaborations that require subsidies because of the uncertainties involved with innovative developments.

2. Patent analysis

The second phase consists of a patent analysis. This phase is complementary to phase 1 and provides insight into which parties perform R&D on the topic of interest but not (necessarily) within the context of a collaborative, publicly funded project. Being a Coordination & Support Action, SmartSPIN is a less technical project to which the applicability of a patent analysis is very marginal. For this purpose, after having performed the first steps of this analysis and assessing the results have been of lower relevance, it was concluded not to further proceed with this part of the analysis.

3. Business drivers

The third phase consists of an analysis of business drivers, which aims to identify relevant parties that are not (necessarily) directly involved with the innovation process, but are nonetheless relevant to its (business) success. These can be e.g. potential users of the SmartSPIN results, targeted stakeholder groups and their networks and associations, etc.

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Business drivers are further studied with the support of a stakeholders survey, which aims to better understand and measure stakeholder interest in the SmartSPIN business model.

Through this approach, different subsections of the stakeholder landscape are identified. The results from each of the phases can subsequently be used as inputs to the other phase in an iterative approach. The end result consists of two parts:

1. The current stakeholder analysis report, which presents the analysis and the findings and conclusions most relevant to the project. The goal is to identify the most relevant stakeholders and their characteristics, in order to best tailor the communication and dissemination strategy to their needs and interests.

2. A stakeholder database, consisting of a standardized description of the relevant stakeholders, including area of work/expertise, relevance to the project and contact information.

3 APPROACH & METHODOLOGY

3.1 OVERALL METHODOLOGY

This chapter provides a description of the methodology used for each of the different phases of the analysis, namely:

- A value chain & stakeholder analysis where the most relevant stakeholder groups within and around the SmartSPIN value chain that could benefit from the SmartSPIN results are identified and their position towards the project is assessed, based on input from the CORDIS database, EGEN's and the consortium partners' wider network as well as desktop research. The analysis will be conducted in 3 stages;
    - Stage 1: A first version of the value chain analysis was made available in M3 creating a basis for the communication and dissemination strategy as well as the dissemination of the first online survey.
    - Stage 2: The value chain analysis is complemented by the results of the first online survey and a complete stakeholder analysis in M15.
    - Stage 3: An update of this analysis will be provided close to the end of the project (M33) to enhance the implementation of the Exploitation Plan and maximize the impact of the project results and final exploitation workshop.
- An online survey in the beginning of the project (M6) targeting stakeholders such as landlords, tenants, ESCOs, aggregators, their associations, etc. with them aim to identify the challenges they face as well as barriers that prevent them from taking energy efficiency measures and utilise any existing flexibility resources they have access to. Further guidance will be sought from key experts participating as the External Advisory Board members.

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- A dynamic stakeholder consultation process that will take place throughout the project duration and incorporate any input, insights and feedback collected by the project stakeholders during the project dissemination activities.
- A second online survey in the second half of the project (M27) will be designed to measure stakeholder characteristics, like their interest, knowledge and attitude towards the business models developed in the project.

3.2 Value Chain Analysis Methodology

Before proceeding with the main core of the stakeholder analysis, the exercise of setting the boundaries and defining the value chain of the project activities is performed. This is a more confined description of the landscape within which SmartSPIN operates, also expanding on the upstream and downstream stakeholder categories. It is crucial at this stage that the boundaries are set broadly enough in order to make sure that no biases or assumptions lead to unintentionally overlook any relevant stakeholder groups and channels that should fall within scope in all following stages of the analysis.

3.3 EU Project Analysis Methodology

More than 100,000 organisations have been funded by the EC via the FP7, H2020 and Horizon Europe funding programmes. Universities, RTOs, large industries, SMEs and associations with their own ideas populate this dynamic ecosystem that strives for developing innovation from early stage ideas to advanced prototypes. The Community Research and Development Information Service (CORDIS - cordis.europa.eu) is the EC's primary public repository and portal to disseminate information on all the EU-funded research projects and their results.

The EU project analysis is based on the exploitation of the CORDIS database, which makes available a set of structured information about funded projects and the involved entities. With the use of wheesbee (https://www.wheesbee.eu/), the CORDIS repository was explored to identify relevant EU projects and extract the detailed list of all the stakeholders involved in such projects. wheesbee can extract EU funded projects not only from H2020, but from earlier framework programmes such as FP7 as well as newer such as Horizon Europe.

A selection of topics/keywords most relevant to the various aspects covered in SmartSPIN was made. The keyword selection is a trial-and-error process through which those keywords are identified that are neither too generic nor too specific. The analysis using the outlined methodology is provided in section 4.2.

3.4 Patent Analysis Methodology

A large number of stakeholders patent their inventions in order to maintain exclusive rights, reduce competition, but also as an investment, or licensing / selling the patent as an owned asset. Patenting is the first action towards investment, as patenting entail fees for maintaining a patent. The fact that stakeholders are patenting their technologies and know how, indicate that they start a sort of investment. There are different profiles for patent owners, but in the methodology followed here, it's possible to extract the profile of potential investors which is the most interesting profile for a client.

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This phase is complementary to phase 1 and provides insight into which parties perform R&D on the topic of interest but not (necessarily) within the context of a collaborative, publicly funded project. This entails scanning all the patents related to the value chain, making use of online search tools like PatentScope (see Figure 2) (https://patentscope.wipo.int/search/es/search.jsf), PNO's wheesbee (https://www.wheesbee.eu/) (see Figure 3) and Espacenet (see Figure 4) (https://worldwide.espacenet.com/).

Figure 2. PatentScope homepage

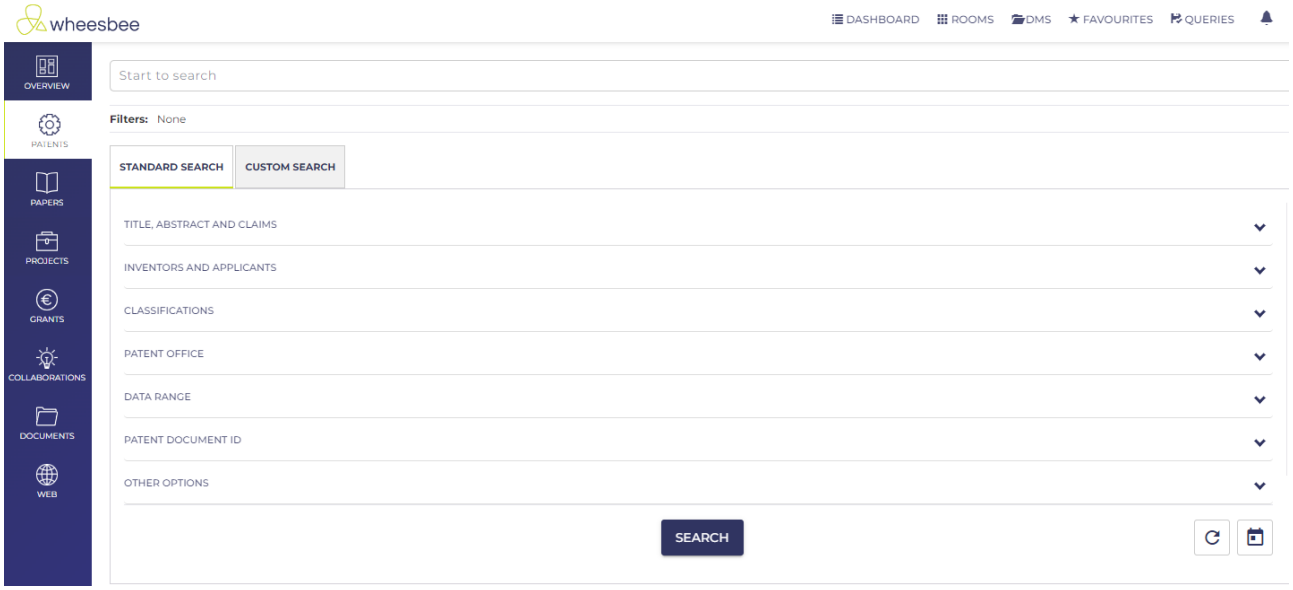

Figure 3. Wheesbee patent search tool

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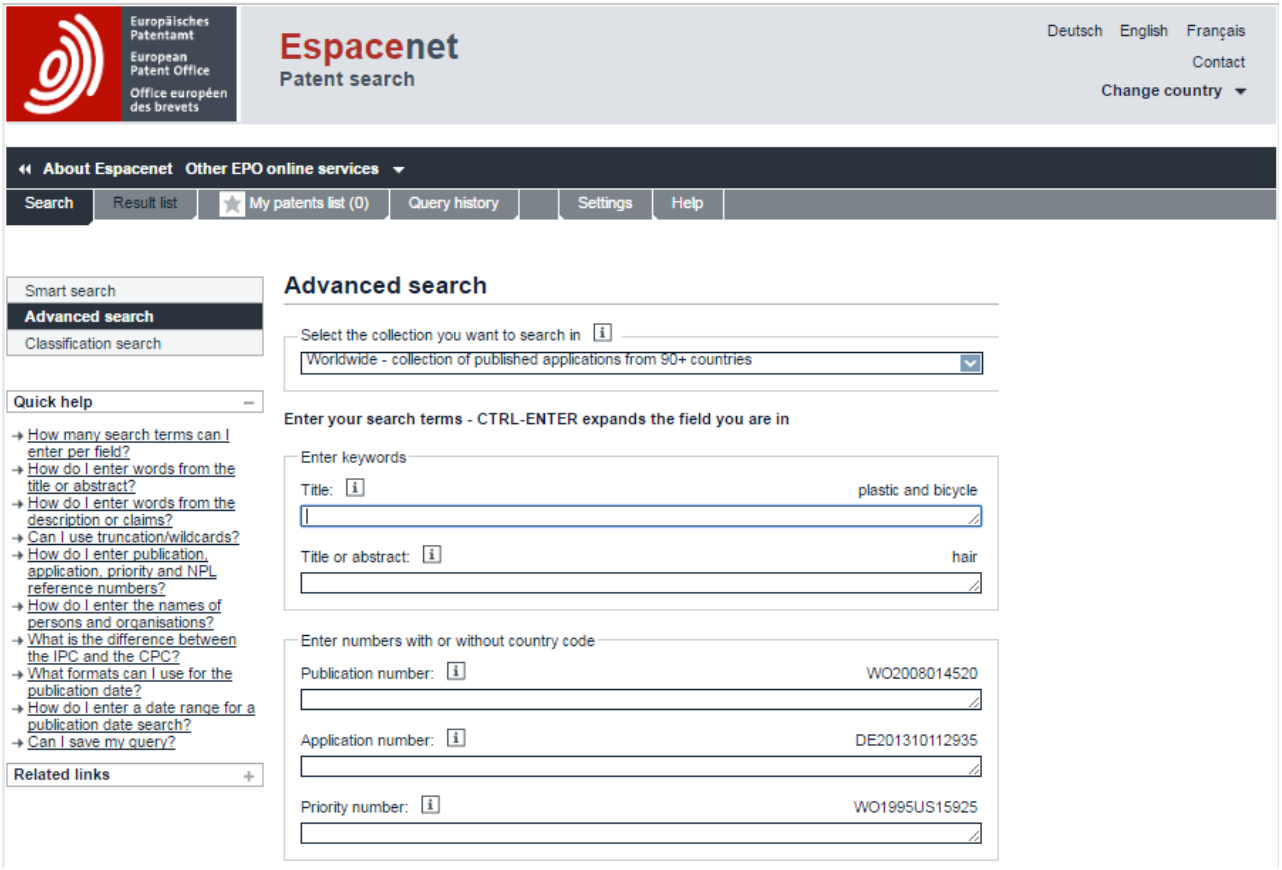

Figure 4. **Espacenet homepage**

The identification of the relevant corpus of patents is done by screening the sections, classes and subclasses of the International Patent Classification (IPC) system. This system allows to sort inventions and their documents into technical fields covering all areas of technology. Every patent document, application and granted patent, has a classification code indicating its allocation to a specific area of technology. This feature allows a fast and effective identification of the corpus of patents on which the analysis is based.

A “quick analysis” is first performed checking the whole corpus of patents, in order to make a preliminary assessment. Plotting the number of patents released over time allows to identify waves of patents and trends over the years while the distribution of documents over countries allows to indicate which countries are leading R&D activities in a sector.

3.5 Business Drivers Analysis Methodology

The potential business drivers are stakeholders that complement and enrich the database of stakeholders that were identified during the EU projects and patents analysis respectively. End users of value chains are sometimes not involved in the innovation process of the same value chain, and may not appear in the EU projects database nor in the patent database. In every market sector, there are consolidated players, generally backed by a robust and longstanding business model that are on the need of the solutions and technologies developed in a project. These actors could potentially

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enter into business deals with a consortium producing specific materials or technologies and integrate them into their own business processes.

Compared to the Innovators and Investors' analysis, there are no single or known databases to consider for the identification of potential business drivers. In order to increase the number of identified stakeholders in this part of the analysis (and also the reach out to them afterwards) the focus has been on **associations** active in the fields relevant to the project. The identification of such associations is based on previous working and networking experience of PNO and the other consortium members, supported by desktop research. For each subsector related to the project some key European and national associations or clusters are identified. The list of their members as potential business drivers is then investigated. This analysis is provided in section 4.4.

3.6 STAKEHOLDERS SURVEY METHODOLOGY

The next part of the stakeholders analysis is a survey that aims to measure stakeholder drivers and barriers of the SmartSPIN business model. This consultation process is divided in three main parts; designing the questions and the overall survey, distributing the survey to the targeted stakeholders and collecting and analysing the input provided.

3.6.1 Survey design

When designing the survey questions, several things have to be taken into consideration. The structure, flow, quality and relevance of the questions can significantly influence the response rates to the survey. Furthermore, the order and way the questions are shaped can influence the extent to which the responses are biased or not.

In order to gain valuable input to the survey, the topics covered in the survey are first identified. A basic structure of the questions is then developed and pilot-tested by a test group for each of the different stakeholder groups already defined in the value chain (section 4.1). This process will define whether sector or stakeholder specific questions are required. Both open and closed-ended questions need to be considered and the right balance between quantitative and qualitative input needs to be achieved, always having the input analysis phase in mind.

3.6.2 Survey distribution

Before distributing the survey, it is important to pre-test it with a small number of stakeholders. This process is recommended in order to validate the survey before its distribution. Upon validation, an online version of the final survey is developed using Microsoft Forms. The right channels for reaching the targeted audience are then used. These channels have been already defined in the earlier communication and dissemination activities of the project and are enhanced by the analysis and results of all previous sections in this report, i.e. the project and partners newsletters and social media, the project website, dedicated emails to the partners' network, European & national associations, any other partner specific channels, etc.

3.6.3 Input analysis

After the first distribution wave, the process and progress of input collection is closely monitored. This allows to adjust the survey communication & dissemination strategy according to the needs for

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reaching a complete set of responses. A first preliminary analysis of the collected input before closing the survey is recommended for some first insights to be gained on time to assess whether the survey dissemination strategy needs to be adjusted.

Closed ended questions allow for standardisation and better visualisation of the responses collected, whereas responses to open-ended questions are harder to visualise. To the extent possible, some grouping of qualitative input can be achieved. Quotations from certain stakeholders can be quite effective in communicating the results and adding credibility to them.

Based on the outcome of the survey, more targeted dissemination and exploitation actions can be implemented and engagement strategies can be built with key stakeholders. This analysis of the survey is provided in section 4.5.

4 ANALYSIS

4.1 BOUNDARIES AND VALUE CHAIN ANALYSIS

As explained in section 3, the first step was to develop the value chain which is a more confined description of the landscape within which SmartSPIN operates. The core of the SmartSPIN project is smart energy services in the commercial rented sector combining energy efficiency and flexibility. In the broadest sense, this means that the boundaries are given by the entire energy system, including both electricity and heating.

The main stakeholders related to the SmartSPIN project can be seen in Figure 5. Their role, their relevance to the SmartSPIN project and how they could benefit from the project are explained below. Four levels of stakeholders are identified. The 1st level are the stakeholders that are directly related to the SmartSPIN business model; these are the owning entity, occupying entity and Energy Service Company. The 2nd level stakeholders could potentially be directly related to the SmartSPIN business model in different ways and include aggregators, energy suppliers and development & energy services providers. The 3rd level stakeholders are indirectly affected by the SmartSPIN business model and include: subcontractors, network system operators, technology developers/providers, research and policy-makers. The 4th level is the wider public (e.g. citizens, NGOs) which could be interested in the project but are not directly related to the SmartSPIN business model.

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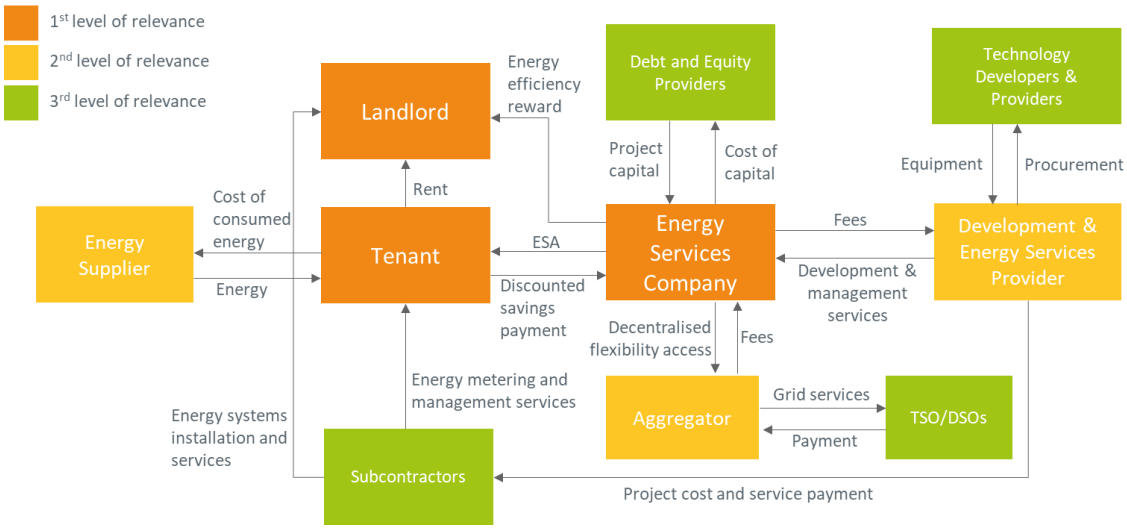

Figure 5. Stakeholder mapping

4.1.1 1st level relevance stakeholders

Owning entity/landlord

According to a report by BPIE[1], approximately 25% of Europe's 25 billion m^2 of useful building floor area is accounted for by non-residential buildings, of which 28% are wholesale or retail premises, 23% are offices, 11% are hotels and restaurants, and 4% are sports facilities. These types of building are often owned by a commercial landlord who rents or leases all or parts of the building to one or more tenants. One of the major barriers to energy efficient building renovations in commercially rented buildings is the split incentive problem – i.e. the conflict that arises when the benefits of a transaction do not accrue to the person who pays for it. To overcome this barrier, SmartSPIN advances the Energy Efficiency-as-a-Service (EEaaS) model. EEaaS is based on the concept of an energy efficiency service provider offering solutions that: (a) combine demand management services and energy efficiency interventions, (b) facilitate the adoption of renewables, and (c) optimize the balance between demand and supply, while the customer pays for the service through a monthly, quarterly or annual fee that is linked, directly or indirectly, to the energy savings realized on utility bills. The main way in which the EEaaS model can address the split incentive problem is by charging the tenant for both the actual energy consumed and the estimated energy savings, while the benefits from efficiency improvements and flexibility services are shared among the energy efficiency provider and the building owner. The owning entity therefore benefits from the SmartSPIN project by getting a reward for the efficiency improvements and the flexibility services. Furthermore, a more energy efficient building could result in a better energy performance certificate and an increase in property value[2].

[1] https://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf
[2] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings_en

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Occupying entity/tenant

The occupying entity rents or leases (parts of the) building from the owning entity. They use energy provided by the energy supplier and pay for their energy usage. The first step in the SmartSPIN business model is to implement low/zero cost actions to reduce a buildings energy consumption such as adding sensors to improve state estimation capabilities, load monitoring, fine tuning the operation control of the systems and unifying it under a common goal of improved energy efficiency. Such measures have immediate or short payback time, which mitigates one of the barriers to energy performance contracting (EPC) in the private sector: the long contract duration. Including flexibility services in this first step through participation in demand response programs or shifting consumption away from peak times using dynamic pricing creates additional revenues that can further reduce payback time. SmartSPIN advances the EEaaS model where the occupying entity pays for the service through a monthly, quarterly or annual fee that is linked, directly or indirectly, to the energy savings realized on utility bills. The occupying entity therefore benefits from the SmartSPIN project by the energy savings and flexibility realized which results in a discounted bill from the energy supplier. Compared to existing business models the tenant gains added value due to utilizing their flexibility potential which also results in reduced costs.

Energy services company

Energy service companies (ESCOs) develop, design, build, and arrange financing for projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities. ESCOs act as project developers for a comprehensive range of energy conservation measures and assume the technical and performance risks associated with a project. ESCOs are distinguished from other firms that offer energy-efficiency improvements in that they use a performance-based contracting methodology. When an ESCO implements a project, the company's compensation is directly linked to the actual energy cost savings. Most agreements between customers and ESCOs are underpinned by energy performance contracts (EPCs). The substantial energy-efficiency retrofits and renewable energy technologies inherent in energy performance contract projects typically require a large initial capital investment and may have a relatively long payback period. The EPC commits the ESCO to installing the necessary equipment, provides a performance guarantee and establishes the terms of any upfront or ongoing payments, which are intended to be less than the financial savings realised by the project.[3] [4]

The ESCOs benefit from the SmartSPIN project as there is a large potential market for them to unlock with help of the SmartSPIN project and business model. Despite the size of the commercial rented sector and the potential for energy savings, no business model for performance based energy efficiency has yet been able to penetrate the market in any significant way, leaving this market largely untapped. The SmartSPIN business model also adds more value by covering flexibility on top of the energy efficiency measures. Due to the split incentive issue, the owning entity and occupying entity show currently little interest in the products that ESCOs offer. With the SmartSPIN business model they could attract both parties better. SmartSPIN will develop tools and model contracts that can be of benefit for the ESCOs and give guidelines on how to share benefits between owner and tenants.

[3] https://www.energy.gov/eere/femp/energy-service-companies-0
[4] https://www.iea.org/reports/energy-service-companies-escos-2/esco-contracts

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ESCOs could innovate by adding flexibility services to their portfolio or work together with aggregators for the flexibility services.

4.1.2 2nd level relevance stakeholders

Aggregator

An aggregator is a new type of energy service provider which can increase or moderate the electricity consumption of a group of consumers according to total electricity demand on the grid. An aggregator can also operate on behalf of a group of consumers producing their own electricity by selling the excess electricity they produce [5] Aggregation thus entails grouping the energy consumption or generation of several consumers. In European markets, there are limited examples of independent aggregators engaging with residential consumers. Existing aggregators are mainly working with industrial or commercial customers. An aggregator can set up an agreement with several consumers, based on which the aggregator can temporarily reduce their electricity consumption when there is high demand for electricity. He then sells this flexibility or the avoided electricity consumption in electricity markets. An aggregator could also increase the consumption of an electricity consumer when electricity prices are favourable. Aggregators look for flexibility mainly at demand-side response and energy storage. The aggregator can deliver energy aggregation services to the energy services company in the SmartSPIN business model. The aggregator can benefit from SmartSPIN as they can explore a new market, focused on commercial buildings by collaborating with the ESCOs.

Energy supplier

The energy supplier is a company that supplies energy (electricity, gas, etc.) to the occupying entity. The occupying entity pays for their energy usage. The energy supplier can benefit from the SmartSPIN project as the SmartSPIN business model optimizes the balance between demand and supply. The energy efficiency measures can also result in lower consumption and might lead of reduced profit for energy suppliers. However, the role of the energy supplier is changing as more energy suppliers deliver green energy. Therefore flexibility becomes increasingly important. With dynamic pricing they could adjust consumption and incentivize their consumers to buy energy when there is much green energy available and vice versa. The SmartSPIN business model can help the energy suppliers in optimizing the balance between demand and supply.

Development and energy services provider

The development and energy services provider develops and manages energy services that improve energy efficiency and demand management. They choose the technologies and design/engineer the energy and demand management system. They deliver this to the ESCO's which in turn pay a fee. They benefit from SmartSPIN as the SmartSPIN business model will enable increased engagement of energy efficiency and demand management services. In addition, if the ESCOs expand their services delivered to the clients, the technology portfolio of the development and energy services provider will be broaden and this may lead to increased profit and client base.

[5] https://www.beuc.eu/publications/beuc-x-2018-010_electricity_aggregators_starting_off_on_the_right_foot_with_consumers.pdf

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4.1.3 3rd level relevance stakeholders

Subcontractors

Subcontractors install the energy systems and deliver services at the buildings from the owning entity, such as sensors, renovations, isolation etc. They also deliver energy metering and management services to the occupying entity. Subcontractors service charges are paid by the development and energy services provider. They benefit from SmartSPIN Service implementation will result in an increase in usage of these energy systems and services.

Network system operators

Network system operators include transmission system operators (TSO), distribution system operators (DSO) and heat network companies. A TSO is responsible for transporting energy on a national or regional level, using fixed infrastructure. Transmission grids transport large quantities of high voltage electricity across large distances, often from large power plants to the outskirts of large cities or industrial zones, where it is transformed into lower voltages distributed to all end-users through the distribution network. DSOs are responsible for these energy distribution networks, mostly operating at low and medium voltage levels. These network system operators can benefit from SmartSPIN as the project will enable wider access to flexibility services which can make the network more reliable.

Debt and equity providers

Debt and equity providers provide project capital to the ESCOs. They could benefit from the SmartSPIN project as they can fund more projects which will result in increased return on their investments. Furthermore, the SmartSPIN business model delivers added value and this can result in more profitable projects.

Research/Academia

Research organisations such as universities can benefit from the SmartSPIN project as this project will result in research opportunities on business model innovation, energy efficiency innovation and possible advancements in teaching.

Policymakers

Policymakers can use the recommendations and results produced in the SmartSPIN project to develop and or adjust policies related to split incentive issues, energy markets, regulations or innovation policy.

Technology providers

Technology providers develop and provide the energy efficiency and flexibility technologies. They can benefit from the SmartSPIN project via ESCOs who will be involved in SmartSPIN service implementation by providing their technologies to potential clients of SmartSPIN. This will lead to higher sells value of their products with the increased demand.

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4.1.4 4th level relevance stakeholders

These stakeholders are the wider public, including for example NGOs or citizens, which could be interested in the project but are not directly related to the SmartSPIN business model. Benefits for society include reduction in energy consumption and decarbonization of the commercial sector.

4.2 EU PROJECT ANALYSIS

As outlined in section 3.3, the EU project analysis starts with a selection of topics/keywords most relevant to the SmartSPIN project. Based on the characteristics of the SmartSPIN project, this approach has resulted in the list of used keywords provided in Table 1.

Table 1 Selected keywords for EU project search

Energy efficiency	ESCO
Demand response OR DR OR demand flexibility OR demand side flexibility	EPC OR energy performance contract
Business model OR business opportunity	Energy management system OR efficient energy management

Using these keywords and different combinations of those to search publicly funded EU-projects has resulted in a list of 117 projects. In a next step, these projects were qualitatively evaluated for relevance to the SmartSPIN project based on the project description. Projects directly related to one or more of the concepts in the SmartSPIN projects were assigned a relevance ‘1’. Projects tangentially related to these concepts, or e.g. related to directly competing concepts, were assigned relevance ‘2’. Projects unrelated to SmartSPIN were assigned relevance ‘3’. These might have resulted from the keywords appearing somewhere in the project description, but having no bearing on the core of the project.

This evaluation resulted in 65 projects with relevance ‘3’, which were discarded. That leaves 52 projects, of which 33 projects had relevance 2 and 19 projects had relevance 1 (including SmartSPIN itself). The latter group of projects are listed in Table 2. Note that this evaluation is indicative and these 19 projects should not be regarded as exclusively the most important related projects at this stage.

This list of projects works as input to the overall communication, dissemination and exploitation activities of the project, providing them a basis for creating higher impact. As part of the communication, dissemination and exploitation activities, efforts will be made to liaise with these projects and explore any potential synergies that might be possible (e.g. as potential partners, collaborators or clients).

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Table 2 Indicative list of most relevant projects to SmartSPIN

Project name	Acronym	Start	End	Eligible costs	Funding	Programme
Next Generation Of Energy Performance Contracting	SMART EPC	02/2022	01/2025	€ 1,998,396	€ 1,998,396	H2020
Smart energy services to solve the SPlit INcentive problem in the commercial rented sector	SmartSPIN	09/2021	08/2024	€ 1,996,787	€ 1,996,787	H2020
Valorising Energy Efficiency And Flexibility At Demand-Side Using Vehicle To Grid (V2G) And Vehicle To Building (V2B) Technology	V2Market	09/2021	08/2024	€ 1,999,858	€ 1,999,857	H2020
Next-Generation Integrated Energy Services fOr Citizen Energy CommuNities	NEON	09/2021	02/2024	€ 1,999,812	€ 1,999,812	H2020
New business models for innovative energy service bundles for residential consumers	frESCO	06/2020	11/2023	€ 5,127,738	€ 3,987,195	H2020
Intelligent interconnection of prosumers in positive energy communities with twins of things for digital energy markets	TwinERGY	11/2020	10/2023	€ 7,090,310	€ 5,903,474	H2020
Interoperable Solutions Connecting Smart Homes, Buildings and Grids	InterConnect	10/2019	09/2023	€ 35,793,191	€ 29,999,513	H2020
Next-generation Dynamic Digital EPCs for Enhanced Quality and User Awareness	D^2EPC	09/2020	08/2023	€ 2,993,687	€ 2,499,287	H2020
Innovative Financing for Servitisation and Capitalization of Energy Efficiency Solutions for SMEs Efficient Equipment as a Service	eEaaS	06/2020	05/2023	€ 1,625,531	€ 1,625,530	H2020
establishing Community Renewable Energy Webs - Rolling out a business model and operational tool creating webs of households that jointly manage energy to improve efficiency and renewables uptake	eCREW	06/2020	05/2023	€ 1,996,112	€ 1,996,112	H2020
Smart Energy Services Integrating the Multiple Benefits from Improving the Energy Efficiency of	SENSEI	09/2019	02/2023	€ 1,968,006	€ 1,968,006	H2020

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the European Building Stock						
SUPERmarket Human based innovative financing schemes for Energy Efficiency Retrofitting and Optimisation	SUPER-HEERO	06/2020	11/2022	€ 1,435,167	€ 1,421,417	H2020
eXTENDing the energy performance assessment and certification schemes via a mOdular approach	X-tendo	09/2019	08/2022	€ 2,057,277	€ 2,057,277	H2020
Active managed Buildings with Energy performaNce Contracting	AmBIENCe	06/2019	05/2022	€1,999,875	€1,999,875	H2020
Integrating Real-Intelligence in Energy Management Systems enabling Holistic Demand Response Optimization in Buildings and Districts	HOLISDER	10/2017	03/2021	€ 5,048,796	€ 3,902,071	H2020
New Buildings Energy Renovation Business Models incorporating dual energy services	NOVICE	06/2017	05/2020	€ 2,041,206	€ 2,041,206	H2020
Energy Efficiency with Performance Guarantees in Private and Public Sector	guarantEE	04/2016	03/2019	€ 1,586,558	€ 1,586,558	H2020
Incentives through Transparency: European Rental Housing Framework for Profitability Calculation of Energetic Retrofitting Investments	RentalCal	03/2015	07/2018	€ 1,996,766	€ 1,996,765	H2020
Improving the attractiveness of investments in energy efficiency and sustainability in buildings	BUILDINTEREST	04/2016	06/2018	€ 1,754,635	€ 1,754,635	H2020

To identify the most central stakeholders in the field SmartSPIN operates in, all participants were extracted with a relevance of 1 and 2 and indexed by number of project participations. The total number of partners was 526, of which 81 organisations have more than 1 participations in relevant projects (presented in Figure 6). From the analysis, Hypertech is the organisation with the most expertise in the field with participation in 8 projects related to SmartSPIN, followed by Tecnalia (SmartSPIN partner) and the Fraunhofer Institute, both with participation in 6 relevant projects. Moreover, the details of the eight organisations which have participated in a project related to SmartSPIN more than 3 times are provided in Tables 4-12.

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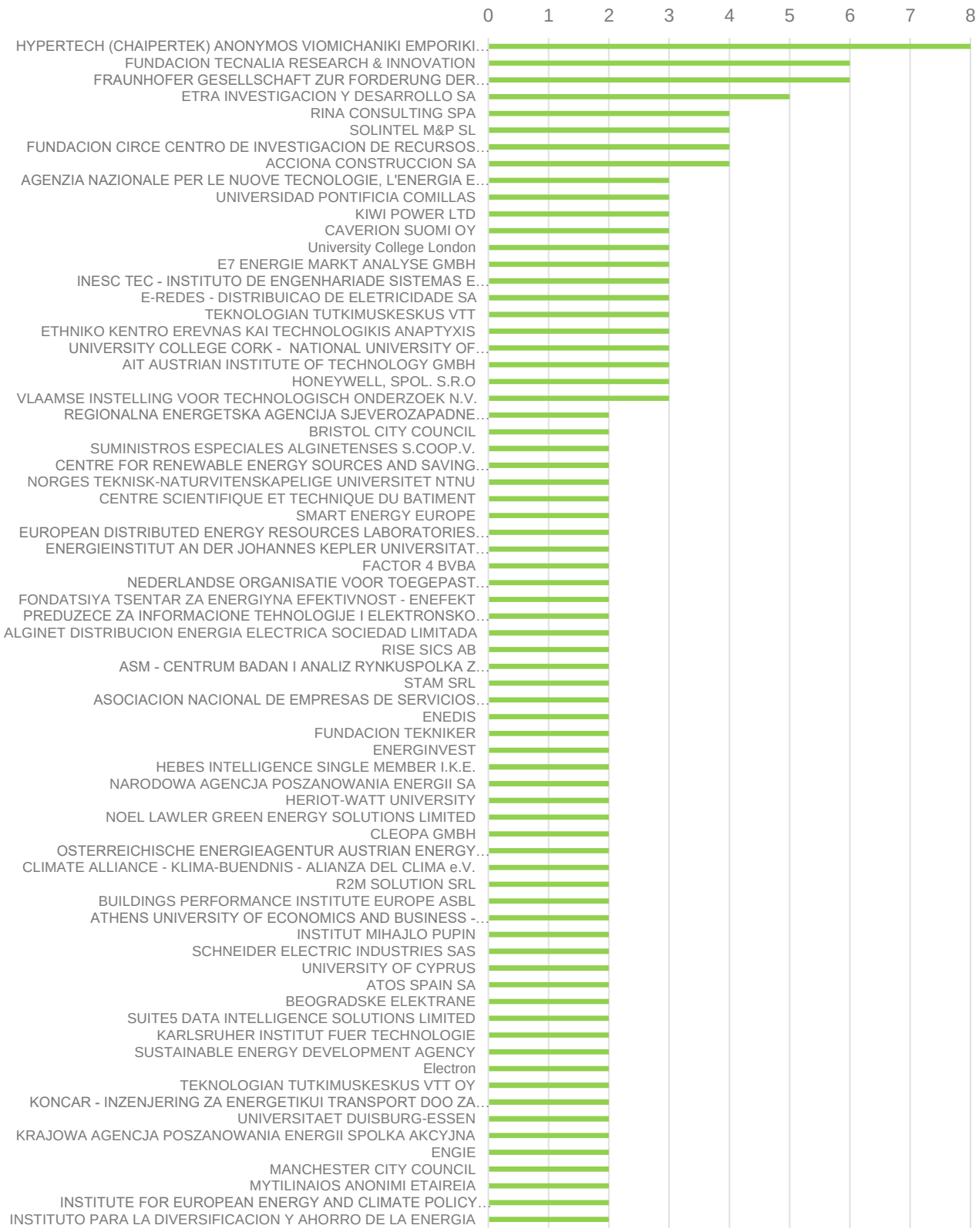

Figure 6. Partners with participation in more than 2 of the identified projects (relevance 1 & 2)

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Stakeholder Tables

In the following tables, a more detailed description is provided of those stakeholders identified in Figure 6**Error! Reference source not found.** with the highest number of participations in EU projects that are relevant to SmartSPIN and are not already a SmartSPIN project partner as well as their projects.

Table 3 Stakeholder table – Hypertech

Company information	Name: Hypertech Type: ICT-services & consultancy Country: Greece Website: www.hypertech.gr
General description	Hypertech provides digital transformation, communication, and research & innovation solutions to public organisations, cultural institutions, and private businesses.
Participation in related projects	1. NOVICE 2. NOBEL GRID 3. BESOS 4. DRIMPAC 5. HOLISDER 6. D^2EPC 7. MOEEBIUS 8. IELECTRIX
Contact	Phone: +30 2106179441

Table 4 Stakeholder table – Frauenhofer-Gesellschaft

Company information	Name: Frauenhofer Gesellschaft zur Forderung der Angewandten Forschung Type: Research institution Country: Germany Website: www.fraunhofer.de
General description	The Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung is a German organisation for applied scientific research.
Participation in related projects	1. NOBEL GRID 2. NEWBEE 3. InterConnect 4. MOEEBIUS 5. EEPOS 1. DEESME
Contact	Phone: +49 8912050

Table 5 Stakeholder table – Etra Investigacion

Company information	Name: Etra investigacion y desarrolo

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	Type: Research institution Country: Spain Website: www.grupoetra.com/
General description	ETRA is a large business group dedicated to putting at the service of society the most advanced technologies in the areas of mobility, traffic and transport network, lighting, energy, security and communications.
Participation in related projects	1. NOBEL GRID 2. BESOS 3. HOLISDER 4. TwinERGY 1. NOBEL
Contact	https://www.grupoetra.com/en/contact/

Table 6 Stakeholder table – Rina Consulting

Company information	Name: RINA Type: Consulting Country: Italy Website: www.rina.org
General description	RINA engages in partnering with customers in developing solutions to complex problems, while leveraging our expertise to anticipate and address any challenges along the way. Improving the quality of life and building sustainable values for future generations.
Participation in related projects	1. Fresco 2. SUPER-HEERO 3. IREEN 1. EPIC-HUB
Contact	Phone: +39 010 31961

Table 7 Stakeholder table – Solintel

Company information	Name: Solintel M&P S.L. Type: Construction company & consultancy Country: Spain Website: www.solintel.eu
General description	SOLINTEL is a high-technological SME with more than two decades of experience in construction and energy sectors developing business in the interconnected building-energy value chain. Solintel combines engineering and consultancy services with their own building and energy projects acting as investor and/or developer.
Participation in related projects	1. NOVICE 2. HOLISDER 3. MOEEBIUS 1. EEPOS
Contact	Phone: +34 91 229 13 68

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033744.

Table 8 Stakeholder table – CIRCE

Company information	Name: Centro de Investigación de Recursos y Consumos Energéticos Type: Research institution Country: Spain Website: www.fcirce.es
General description	CIRCE is a technology centre with the aim of improving the competitiveness of companies by generating and transferring technological solutions through R&D&I and training activities, oriented to the market in the field of sustainability and resource efficiency, electricity grids and renewable energies.
Participation in related projects	1. fresco 2. eCREW 3. E[plus] 1. IELECTRIX
Contact	Email: circe@fcirce.es Phone: +34 976 976 859

Table 9 Stakeholder table – Acciona

Company information	Name: Acciona construction Type: construction company Country: Spain Website: www.acciona.com
General description	Acciona is a developer of regenerative infrastructure, covering the entire value chain from design and construction to operation and maintenance. Acciona is active in more than 40 countries and committed to contribute to the economic and social development of the communities in which we operate.
Participation in related projects	1. NEWBEE 2. E[plus] 3. IREEN 1. EPIC-HUB
Contact	Phone: +34 91 663 28 50 Email: responsabilidadcorporativa@acciona.com

As indicated in the figure below (Figure 7), the number of projects funded (relevance 1 to SmartSPIN), has been increasing over the years and especially during the time of Horizon 2020 (2014 up until now). In 2021, the number of relevance 1 projects funded showed a decrease, which could be explained by the transition from H2020 to Horizon Europe. The 2022 figures are not complete as this analysis was performed before the end of 2022.

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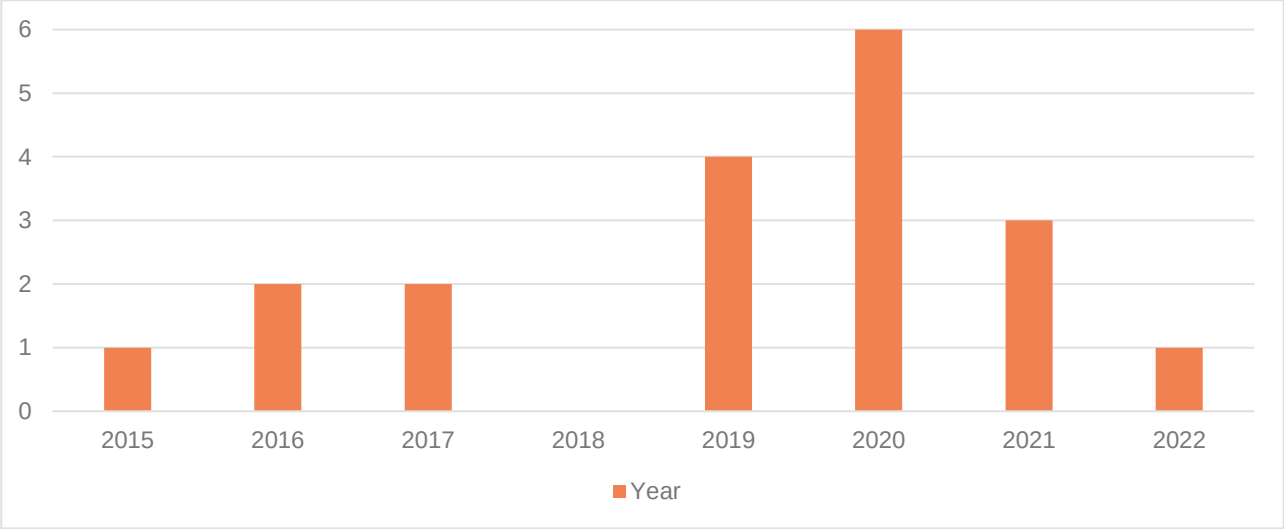

Figure 7. Number of projects of relevance 1 to SmartSPIN per year

The following figure (Figure 8) shows the distribution of the 585 partners that participated in all 73 projects of relevance 1 and 2 to SmartSPIN per country. To clarify, one organisation can reoccur multiple times. For example, Hypertech is a project partner in 8 projects, so will return 8 times in Greece. This map thus shows a geographical spread of the most active countries. It can be seen that Spain is the most active country with 95 project participations, followed by the UK (61), Germany (52), and Italy (40).

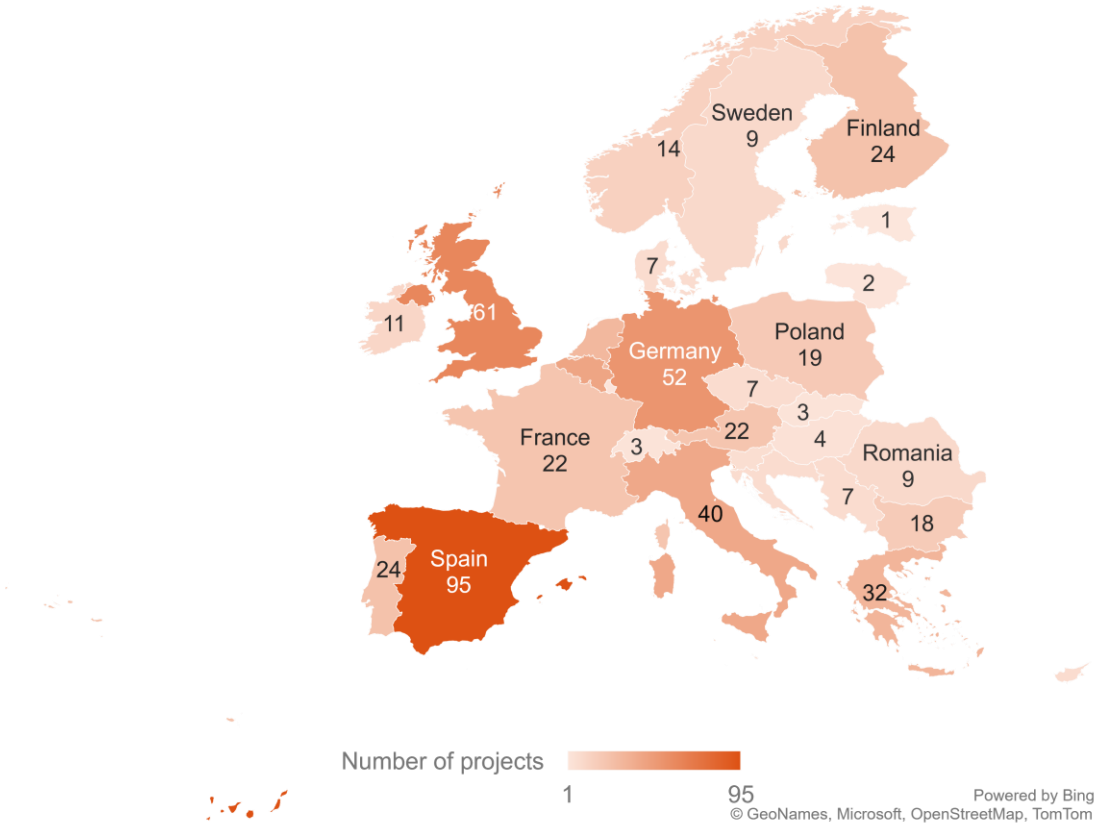

Figure 8. Number of partners per country in projects of relevance 1 and 2 to SmartSPIN

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4.3 PATENT ANALYSIS

This phase is complementary to the EU project analysis and provides insight into which parties perform R&D on the topic of interest but not (necessarily) within the context of a collaborative, publicly funded project. A "quick analysis" was first performed in accordance with the methodology presented in section 3.4 checking a wide range of patents, in order to make a preliminary assessment. Being a Coordination & Support Action, SmartSPIN is a less technical project, primarily focussing on business model innovation which is typically not patented. Therefore, expectedly, the assessment that was made as part of the "quick analysis" concluded that the results have been of lower relevance, which led to not proceeding with further steps in the patent analysis.

4.4 BUSINESS DRIVERS ANALYSIS

After the identification of stakeholders involved in EU projects and in patents, the stakeholders analysis was complemented with a third pillar which we call "potential business drivers". As explained in the methodology section of the report (section 3), the approach here was focused on the identification of stakeholders that could benefit from the innovative approaches and results of the project through their European associations or clusters, as these most often work as networks of national associations as well.

Below is a non-exhaustive list, including the weblinks, of more than 1.500 members of national, European or international associations of ESCOs, owners and tenants:

- eu.ESCO: European Association of Energy Service Companies – euesco.org
- eu.bac: European Building Automation and Controls Association – eubac.org
- eceee: European Council for an Energy Efficient Economy – www.eceee.org
- BPIE: Buildings Performance Institute Europe – www.bpie.eu
- EuroACE: European Alliance of Companies for Energy Efficiency in Buildings – euroace.org
- Global ESCO Network – globalesconetwork.unepdtu.org
- IUT: International Union of Tenants – www.iut.nu
- smartEn: Smart Energy Europe – smarten.eu
- REHVA: Federation of European Heating, Ventilation and Air Conditioning Associations – rehva.eu
- National ESCO associations:
    - Austria: Dienstleister Energieeffizienz und Contracting Austria (DECA)
    - Austria: Contracting-Portal für Österreich (ÖGUT)
    - Belgium: Belgian ESCO Association (BELESCO)

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- Bulgaria: Alliance For Energy Efficiency (AEE)
- Cyprus: EPC registry (MECI)
- Czech Republic: Asociace poskytovatelů energetických služeb (APES)
- Finland: Motiva's list of ESCOs (FEDENE)
- France: The Federation of Energy-Environment Services (FEDENE)
- Germany: Verband für Wärmelieferung e.V. (VfW)
- Greece: Μητρώο Επιχειρήσεων Ενεργειακών Υπηρεσιών (EEY)
- Italy: Federazione Italiana per l'uso Razionale dell'Energia (FIRE)
- Italy: Associazione italiana delle Energy Service Company e degli Operatori dell'Efficienza Energetica (AssoESCO)
- Italy: Federazione Nazionale delle ESCO (federesco)
- Netherlands: ESCoNetwerk (PPS Netwerk)
- Netherlands: Kenniscentrum Energieprestatie Gebouwde Omgeving (KEGO)
- Portugal: Associação Portuguesa de Empresas de Serviços de Energia (APESE)
- Romania: Asociatia ESCOROM a Societatilor de Servicii Energetice din Romania (ESCOROM)
- Slovakia: Asociácia Poskytovateľov Energetických Služieb (APES)
- Spain: Asociación de Empresas de Mantenimiento Integral (AMI)
- Spain: Asociación de Empresas de Servicios Energéticos (ANESE)
- Switzerland: swissESCO (swissESCO)
- United Kingdom: Energy Services and Technology Association (ESTA)

4.5 Stakeholders Survey Analysis

As explained in the methodology section of the report (section 3), after having completed the previous stages, the analysis is complemented by a survey that aims to measure, analyse and better understand stakeholder interest, attitude and knowledge with regards to the SmartSPIN business model as well as provide input used to enhance the future dissemination and exploitation strategy. This consultation process is divided in three main parts; designing the questions and the overall survey, distributing the survey to the targeted stakeholders and collecting and analysing the input provided. The work conducted for these three parts is explained below.

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a) Survey design

Based on input from the value chain analysis (section 4.1), the survey has been structured around the three SmartSPIN (1st relevance) stakeholder groups, i.e. tenants, landlords and ESCOs. It soon became clear that certain questions were only relevant to specific stakeholders or the same questions should be expressed differently when asked to different stakeholders. The questions in the survey were therefor divided into 3 parts. The first part were general profiling questions and were the same for all respondents. The second part was dedicated to questions specific to the target group the respondent belonged to. The third and final part was general again and asked for respondents' permission to be further contacted in future activities of the project.

After the basic structure and questions were developed, the survey was pilot-tested by a test group consisting of EGEN colleagues and consortium partners, covering all different stakeholder groups already defined in the value chain (section 4.1). This process allowed to finalise the structure and flow of the questionnaire, ensuring high quality and relevance to the stakeholders.

The overall survey consists of 8 sections and 66 questions. Depending on the stakeholder group, the survey took 5-15 minutes to complete. The online version can be accessed under: https://forms.office.com/r/WeLsDT7dEA

b) Survey distribution

Before distributing it to a wider audience, the survey was pre-tested in a dedicated meeting with EGEN colleagues, where the structure and content was validated. Following that, EGEN together with colleagues from PNO that are responsible for SmartSPIN's communication and dissemination strategy launched the survey and started a communication campaign using all possible channels for reaching the targeted audience, i.e. the project and partners newsletters and social media, the project website, dedicated emails to the partners' network, European & national associations, etc. (see communication and dissemination channels identify in D7.1).

c) Input collection and analysis

The survey was launched in the first week of February 2022 and remained open until the first week of April 2022. 30 complete responses of very good quality, given the high level of detail in the questions, were collected overall (see next section on profiles). Given the limited number of responses, however, the analysis draws more general conclusions based on the stakeholder's answers instead of providing a largely quantitative analysis. Having said that, the qualitative data derived from the survey is very valuable as well. As the following sections will enhance, several strong conclusions can be drawn from the survey, providing insights in the stakeholders profiles, drivers and barriers, as was the goal of this survey. Collection of input to this survey also served as a first engagement opportunity with the project stakeholders, which has helped establish a link with them also for future engagement activities (e.g. exploitation activities).

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Respondents' profile

30 responses were collected from the 3 targeted stakeholder groups, but also the wider value chain. The respondents were distributed as follows: 7 tenants, 7 landlords, 6 ESCOs and 10 'others'. For the full overview of stakeholder groups, see Figure 9.

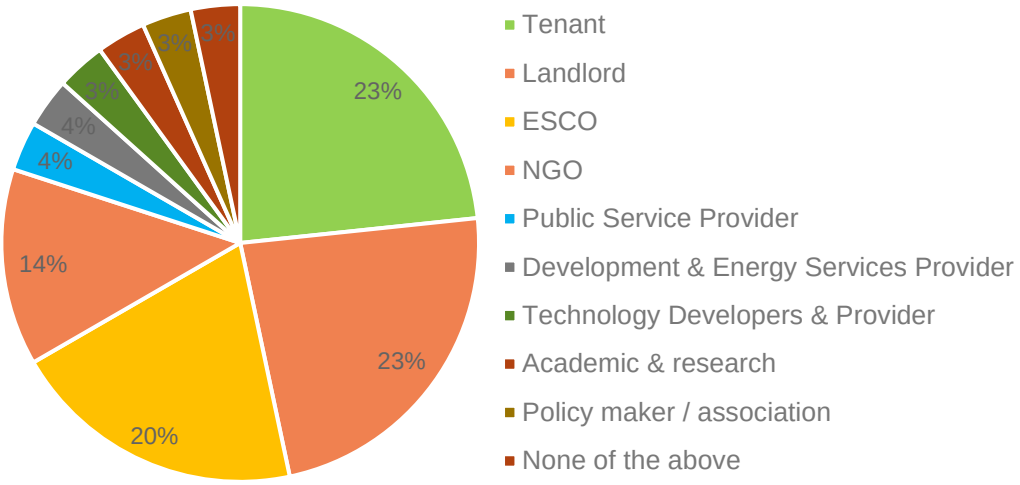

Figure 9: **Stakeholder groups**

The survey was distributed well under different European countries. All respondents were active in the European Union, but some of them also operated in other countries. The countries in which the consortium members are most active were represented the most in the survey, showing that the consortium members utilized their network well. For the full country split, see Figure 10.

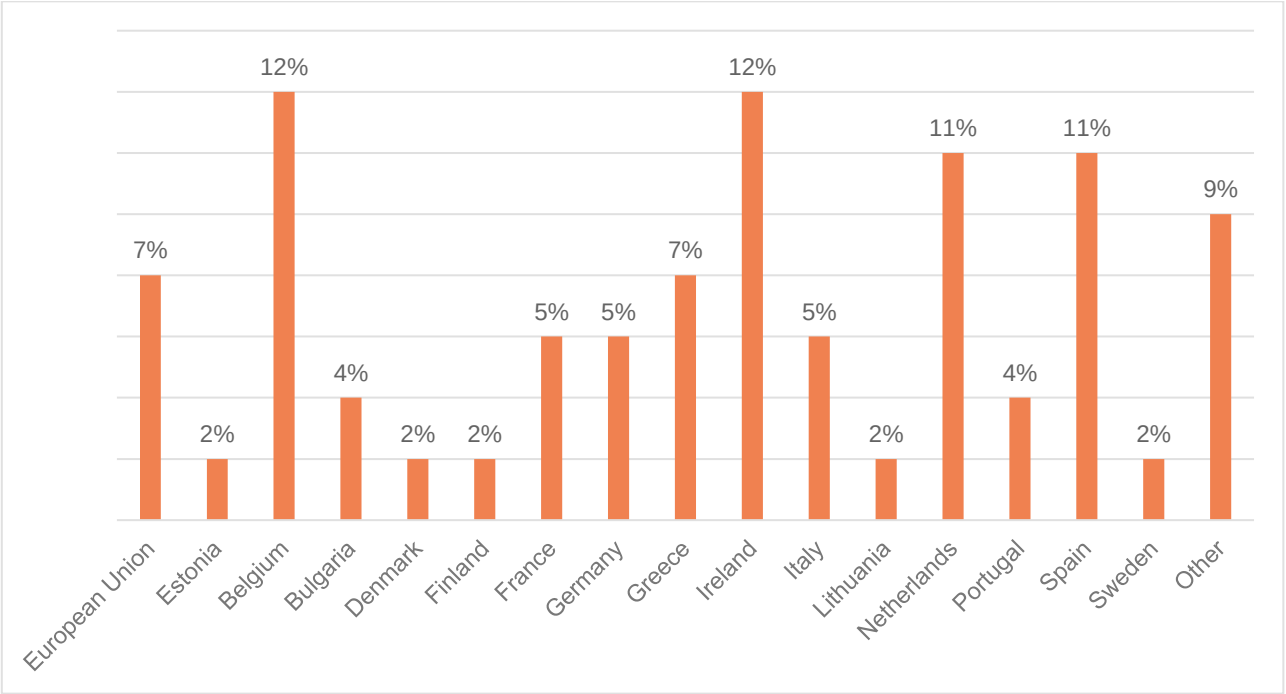

Figure 10: **Country split**

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Knowledge and attitude towards sustainability

The tenants and landlords were asked several questions regarding their knowledge and attitude towards sustainability. Several conclusions can be drawn from this.

- The respondents overall had a very positive attitude towards sustainability and taking action in decreasing the size of their buildings footprint. It must be noted that this might not be representative for the sector as a whole, as a) a big part of the tenants and landlords that have taken the survey come from the wider network of the SmartSPIN consortium partners who are particularly active in the field of sustainability and b) a certain level of interest in sustainability is probably needed in order to take part in a survey such as this one.
- Almost 75% of the respondents' buildings either have a low (C or lower) energy label or they don't know what the energy label is (see Figure 11)Figure 11: Energy label (tenant and landlord). This is in line with the general assumption that there is very low energy efficiency in Europe's buildings and there is a lot of improvement to make in this area.
- The vast majority (10 out of 14) of the tenants and landlords are willing to invest time and money in reducing the environmental footprint of their building. The rest of them (all tenants) do not feel like it is their responsibility to do so.
- Both tenants and landlords found cost efficiency, sustainability, and a safe environment for the buildings' occupants the most important factors regarding their buildings. However, ESCOs perceived sustainability and cost efficiency would be of most importance to their clients while a safe environment was assessed as the lowest priority factor. This indicates that ESCOs should possibly consider comfort, health and safety more seriously in their value proposition and services to tenants and landlords.

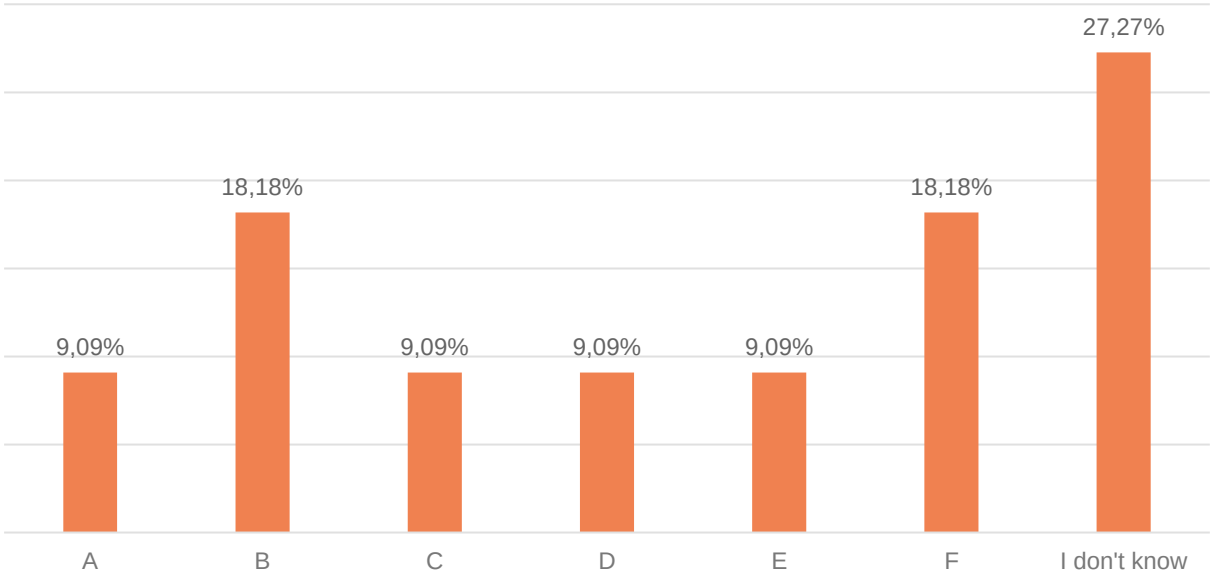

Figure 11: **Energy label (tenant and landlord)**

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Tenants and landlords' potential drivers and barriers for SmartSPIN Business Model

Tenants and landlords were also asked about their knowledge, drivers and barriers on energy efficiency and flexibility. The following conclusions were reached:

- The tenants and landlords responding to this survey perceive themselves as knowledgeable on energy efficiency and flexibility. About 80% of them were familiar with the concept.
- Half of the landlords and the majority of the tenants didn't have any flexibility assets they were aware of in their buildings (see Figure 12). The flexibility assets that were identified were charging points for electric vehicles.

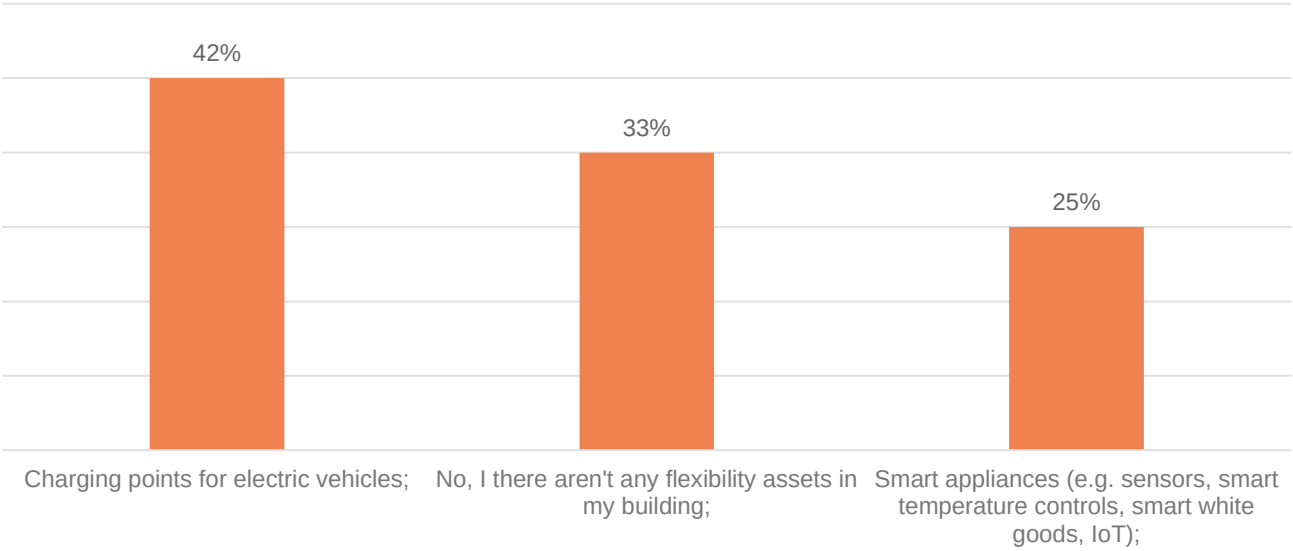

Figure 12: **Flexibility assets (tenants and landlords)**

- Landlords are mostly in charge of the energy bill, according to both tenants and landlords. Only one respondent (landlord) stated that they are in charge of the energy bill together with the tenant. This indicates that energy cost sharing isn't common.
- Those respondents that were in charge most often chose their energy supplier based on the lowest cost (5 out of 9). The remaining ones either chose based on the greenest in the area (2 out of 9) or a combination of low-risk fixed prices and sustainability (2 out of 9). This shows that, indeed, sustainability is perceived as important, but not at the expense of cost efficiency and predictability.
- As expected, the respondents that chose their energy supplier based on lowest costs were also the ones that answered that cost efficiency in their buildings was the most important factor.

Tenants:

- A striking result from the survey is that none of the tenants are considering or have considered taking measures to improve the building's energy efficiency. This could mostly

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be due to their perception that this should be done by the landlord or they simply don't have the time and money to make these kinds of investments.

- About half of the tenants would be willing to pay ESCOs a fee, but only if they would see immediate cost reductions in their energy bill. It therefore seems like tenants are willing to take measures, but only if it takes little investment and time. This is something that ESCOs should consider in their value proposition and services to tenants.

Landlords:

- In contrary to the tenants, all of the landlords are considering or have considered taking measures to improve the building's energy efficiency. This possibly indicates their higher willingness to engage in such measures.
- The landlords that taken any measures yet (but are still considering it) haven't done so because of limited resources. Again, costs are extremely important.
- Half of the landlords have discussed potential energy efficiency or flexibility measures with an energy services company (ESCO) or a flexibility aggregator and have taken measures accordingly. Taking into account the low number of flexibility assets indicated by the respondents, ESCOs are strongly recommended to conduct onsite visits for a careful assessment of the flexibility potential of their clients' buildings should such sources be utilized.

Conclusions drawn from ESCOs

Questions to the ESCOs were intended to understand their drivers and barriers to the current way they work rather than understanding their knowledge and attitude towards sustainability, efficiency and flexibility related aspects, which should be considered as given. Several insights from these questions are shared below.

- ESCOs see cost efficiency, sustainability and no interruptions during operations as the most important factors. The first two align with the answers of the tenants and landlords, however they also see comfort, health and safety as important factors, which doesn't seem to be the case for ESCOs. This indicates that ESCOs should possibly consider comfort, health and safety more seriously in their value proposition and services to tenants and landlords.

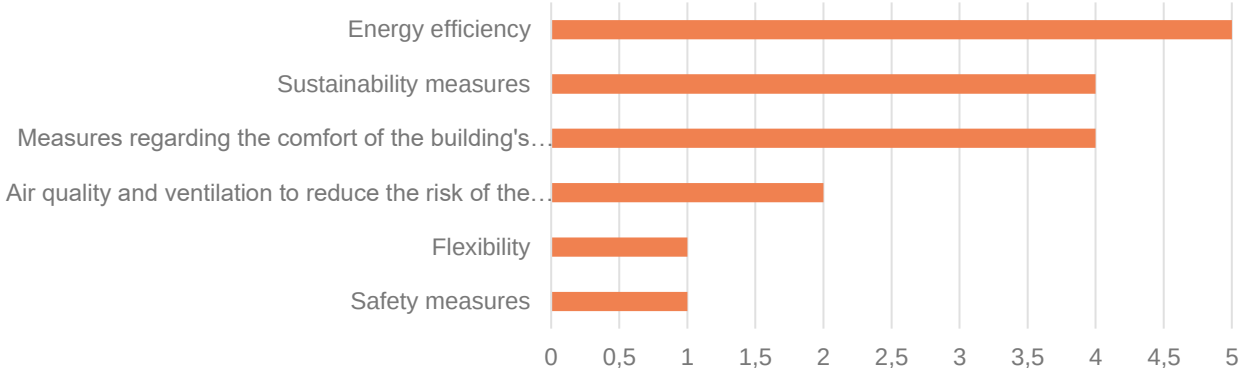

Figure 13: ESCOs' offered services

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- Awareness needs to be raised about the benefits of energy efficiency and flexibility measures and the role ESCOs can play in utilizing these resources through various business models and services.

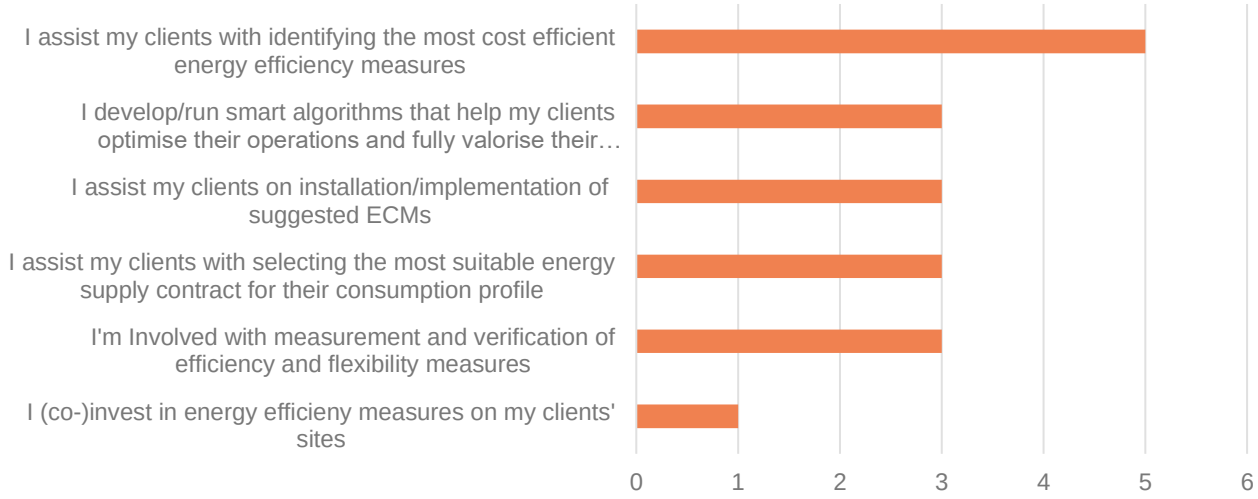

Figure 14: ESCOs' business models

- Trust is vital in every collaboration between ESCOs and their clients, which means transparent contracts, reporting and account settlements are generally a good practice. The higher transparency ESCOs can offer through real time monitoring and reporting of efficiency and flexibility gains the higher the level of trust between the involved parties.

- From the questions about challenges that ESCOs face, a conclusion can be reached that most challenges derive from lack of knowledge or misunderstandings between all involved parties (e.g. tenants, experts, contractors, etc.). Communications and engagement with all parties in such projects is key to solving issues of this kind.

- There is a large difference in availability of governmental support across different EU countries. There were too little answers to these questions to draw robust conclusions of what countries within Europe have easy or harder access to governmental support. The responses however indicate that access to national funding seems easier in Ireland and harder in Greece, which is in line with BPIE's pan-European ESCO market development assessment positioning the Irish market as mature and the Greek one as embryonic[6].

Exploitation opportunities

Besides the useful insights derived from the survey outlined above, this consultation process helped the SmartSPIN project grow its network as the project partners engaged with a number of various stakeholders. A very large percentage of the 30 respondents either stated that they would like to keep in contact by receiving a summary, would like to be further contacted by SmartSPIN members, or would willing to be brought in contact with other stakeholders like ESCOs (for tenants and

[6] https://www.bpie.eu/wp-content/uploads/2020/09/REPORT-ESCO_FINAL-1.pdf

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landlords) or Aggregators (for ESCOs). The contacts established throughout this process will be utilised later on as part of the WP2 and WP3 interviews and the exploitation activities of the project.

Lastly, a large group of the respondents (10 out of 30) were amongst the 'other' stakeholders group. These participants were asked what their interest in energy efficiency was and if they would like to keep in contact. The answers to the first question were very divers. Some were representatives of associations in the field of built environment or energy efficiency, some represented communities of citizens and some were service providers that wanted to learn more about their options in reducing climate change. These are possibly very useful contacts and will be used for future exploitation activities as well.

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5 CONCLUSIONS

This value chain and stakeholders analysis provides concise information on potential stakeholders related to the SmartSPIN activities. This study provides input to the dissemination communication and exploitation strategy that is adopted by the project to set up targeted actions and engagement with the identified group of stakeholders.

The findings of the phases implemented provide a detailed description of the stakeholders landscape (Figure 5), their role and relevance to the SmartSPIN project as well as indicate how they could benefit from the project. Although the list of stakeholders identified is by no means exhaustive, the report lays down the foundations of an international community of more than 2,000 stakeholders and provides concise information about their main interests in the areas related to SmartSPIN. The emphasis was placed on ESCOs, landlords and tenants that could directly benefit from the results of the project or could potentially develop business relationships with the SmartSPIN consortium partners as well as research organisations that are relevant for potential synergies and collaborations. More specifically:

- The EU project analysis (section 4.2) has identified a list of 73 projects and 585 organisations participating in them, filtering them down to the 19 most relevant projects (Table 2) and 81 organisations with participations in more than 2 relevant projects (Figure 6). As expected, SmartSPIN partners such as TECNALIA, IERC, HEBES and LS have a strong presence in these projects. The top 8 participating organisations are analysed.
- The business drivers analysis (section 4.4) has identified a list of more than 1.500 members of national, European or international associations of ESCOs, owners and tenants..
- The stakeholder survey (section 4.5) indicates that the respondents overall had a very positive attitude towards sustainability with the vast majority (10 out of 14) of the tenants and landlords willing to invest time and money in further reducing the environmental footprint of their building. Key conclusions drown:
    - Cost efficiency, sustainability, and a safe environment for the buildings' occupants the most important factors regarding their buildings. However, ESCOs perceived sustainability and cost efficiency would be of most importance to their clients while a safe environment was assessed as the lowest priority factor. This indicates that ESCOs should possibly consider comfort, health and safety more seriously in their value proposition and services to tenants and landlords.
    - Tenants are of the perception that taking measures to improve the building's energy efficiency is the responsibility of their landlord and are only willing to pay ESCOs a fee if they expect to see immediate cost reductions in their energy bill. This is in line with landlords' responses which indicate their higher willingness to engage in such measures.
    - Awareness needs to be raised about the benefits of energy efficiency and flexibility measures and the role ESCOs can play in utilizing these resources through various business models and services.
    - Trust is vital in every collaboration between ESCOs and their clients, which means transparent contracts, reporting and account settlements are generally a good practice.

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