

DELIVERABLE: D2.1

Draft Smart Energy Efficiency Concept Design

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Building Up Next-Generation Smart Energy Services Offer and Market Up-take
Valorising Energy Efficiency and Flexibility at Demand-Side.

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Summary of deliverable

This deliverable is based on Task T.2.1 Service concept and the concept design of the innovated service model. Blueprinting Smart Energy Efficiency Service involved the partners blueprinting the smart EES concept. Service model ideation using a service model canvas helped identify the key components to be designed. The design of the service model concept included workshops that used interactive methods and helped establish the basic parameters of the EES model. Partners then utilized an iterative process to further refine the concept through collaborative platforms and communication with stakeholders. This iterative process ensured that the service model aligned with the objectives and requirements outlined in the document.

The document then delves into EES service objectives and strategies. Using the Business Model Canvas is highlighted as a method for structuring EES business models effectively, along with its advantages. The range of services and key activities involved in EES is discussed, including building assessment and energy management, energy efficiency measures, smart home equipment (IoT), sizing and installation of renewable energy sources, energy flexibility, and other key activities. Key partners essential for the successful implementation of EES services are identified, ranging from competent authorities and energy professionals to financial institutions, funding institutions, researchers, startups, marketplace platforms, manufacturers, SMEs, energy suppliers, government agencies, service providers, consumers, and utilities.

The document further outlines the value proposition and benefits for both customers and service providers, emphasizing faster involvement in the green transition, economic benefits, increased loyalty, flexibility, access to new data, and market expansion opportunities. Additionally, it discusses the technical infrastructure and systems required, the financial model with revenue streams, cost structure, marketing and communication strategy, channels, customer relationships, and an implementation plan.

1. Introduction

The aim of this deliverable is to provide a comprehensive overview of the Energy Efficiency Service (EES) concept, its development process, and potential benefits for users and society as a whole. It addresses both theoretical and practical aspects of implementing the EES and provides a detailed plan for its realization.

The current situation in the energy sector is characterized by growing challenges related to sustainability, efficiency, and energy availability. Increasing energy demand, along with concerns about the environmental impacts of conventional energy sources, requires innovative approaches to energy utilization and management. The current situation in the field of EES is characterized by following key factors:

- **Growing demand for energy efficiency:** With increasing concerns about climate change and the need to reduce greenhouse gas emissions, there is a growing demand for services that help to reduce energy consumption and improve the energy efficiency of buildings, equipment, and processes.
- **Technological progress:** The development of technologies such as smart sensors, the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML) algorithms and automation enables the creation of increasingly sophisticated and efficient systems for monitoring and managing energy consumption.
- **Regulatory pressures:** Some countries promote the use of EES through implementation of regulations and standards related to energy efficiency. These may include support programs, subsidies, or emissions taxes that incentivize businesses and individuals to invest in energy efficiency.
- **Increased awareness of sustainability:** Growing awareness of environmental issues and pressure from consumers, investors, and regulatory bodies to reduce the ecological footprint raises interest in energy efficiency services.
- **Economic benefits:** Implementation of EES brings significant cost savings on energy, which is appealing to both businesses and individuals, especially in times of unstable and high energy prices.
- **Innovative business models:** EES triggers new innovative business models without significant initial investments, such as performance-based services or financing based on savings.

The goal of EES is to provide users with intelligent and efficient solutions for reducing energy consumption and increasing energy efficiency. This service will integrate modern technologies and analytical tools to enable users to better understand their energy consumption and manage it more effectively.

Economically, operating the EES service has the potential to reduce energy costs for users through more efficient energy utilization and consumption optimization. This can lead to significant savings on energy bills and enhance the competitiveness of businesses.

In terms of societal well-being, EES has the potential to improve quality of life by providing useful tools for reducing energy costs and promoting sustainable development. Efficient energy use contributes for creating better and healthier living conditions for residents and strengthens society's energy security and self-sufficiency. In this context, EES emerges as a response to market and societal needs.

2. Smart Energy Efficiency Service Definition (EES)

Smart Energy Efficiency Service (Smart EES) is a comprehensive service that combines innovative modern technologies, data analytics and expert know-how to provide intelligent solutions for reducing energy consumption and increasing energy efficiency in various areas such as buildings, industrial processes, or infrastructure. This service includes data collection and analysis of energy consumption, identification of areas with the greatest potential for savings, design and implementation of energy efficiency measures and monitoring of results.

Smart EES leverages innovative technologies such as smart sensors, automation, the Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning algorithms to provide users with a detailed view of their energy consumption and offer recommendations for consumption optimization. In this way, it helps users identify energy-saving opportunities and reduce costs associated with operation and maintenance.

Smart EES can be provided as a service by external service providers such as energy companies, consulting firms, or technology companies. It aims to assist users in efficiently utilizing energy, reducing their carbon footprint, and contributing to sustainable development.

EES can effectively identify, implement and monitor strategies to reduce energy consumption, lower the costs and minimize environmental impacts by incorporating the following key features:

- **Data Monitoring and Analysis:** Utilizing advanced data monitoring and analysis tools to track energy consumption patterns, identify trends, and optimize energy use.
- **Smart Metering and Monitoring Systems:** Implementing smart meters and monitoring systems to accurately measure and manage the energy usage in real-time.
- **Energy Management Software:** Utilizing energy management software platforms to collect data, perform analysis, and manage energy consumption efficiently.
- **Building Automation Systems (BAS):** Integrating BAS to control building systems such as HVAC, lighting and ventilation for optimized energy use.
- **Renewable Energy Integration:** Incorporating renewable energy sources and technologies such as solar photovoltaic panels, wind turbines, or geothermal systems to reduce reliance on traditional energy sources.
- **Demand Response Programs:** Implementing demand response programs to adjust energy consumption in response to supply constraints or peak demand periods.
- **Energy-Efficient Equipment and Appliances:** Recommending and installing energy-efficient equipment, appliances, and lighting systems to minimize energy waste.
- **Behavioral Change Programs:** Educating and engaging residents and building users in energy-saving practices through awareness raising campaigns and behavioral change programs.
- **Performance Monitoring and Reporting:** Establishing performance monitoring and reporting mechanisms to track energy savings, measure return on investment (ROI), and demonstrate the effectiveness of energy efficiency measures.
- **Continuous Optimization and Improvement:** Continuous use of optimized energy management strategies, updated technologies, and implementation of new solutions to maximize energy efficiency over time.
- **Regulatory Compliance:** Ensuring compliance with relevant energy efficiency regulations, standards and certification programs to meet legal requirements and qualify for incentives or rebates.

2.1. National Definitions and Regulations Regarding EES and Energy Flexibility

2.1.1. Czech Republic

Energy services in legislation

In the Czech Republic, energy services are anchored in Act No. 406/2000 Coll., the Energy Management Act, which precisely defines the form and legislative rules for energy services and energy service providers. Section 10e of the Act states that the purpose of an energy service is the verifiable and measurable or computationally determined increase in energy efficiency or energy consumption savings through energy-efficient technologies or operational activities, maintenance, or control.

An energy service is provided based on an energy services contract, which is a contractual agreement between the recipient and the energy service provider regarding measures to increase energy efficiency, verified and monitored throughout the duration of the contractual commitment, with costs for these measures being paid in relation to the contractually agreed rate of increased energy efficiency or other agreed energy performance criteria, such as financial savings¹.

An energy service may be provided as a performance-based energy service. This service is provided to achieve predetermined energy savings and related cost savings for a specified period, during which the energy service provider bears a contractually agreed level of financial risk or penalties in the event of failure to achieve savings. The requirements for energy services apply similarly to performance-based energy services. The mandatory requirements of a performance-based energy service contract are determined by the Energy Management Act. This type of activity is known worldwide as Energy Performance Contracting (EPC).

In the Czech Republic, there is a database with a list of energy service providers, which is available at the public administration information system used for the registration of energy service providers. The Ministry of Industry and Trade is the administrator of the list².

Energy flexibility in legislation

Legislation in the Czech Republic regarding the aggregation of flexibility and storage is still not available, this issue has long been criticized by the European Commission.

Association for Energy Services and Energy Flexibility

APES - The Association of Energy Service Providers of the Czech Republic was founded in October 2010 with the aim of contributing to the sustainable development of energy services on the Czech market. Currently, it brings together 30 leading companies engaged in energy efficiency. The activities of the association are aimed at guaranteeing energy consumption savings, through the installation of energy-efficient technologies, that lead to i.e. verifiable and measurable increases in energy efficiency³.

SAF – The association of aggregators and flexibility providers. The purpose of the association is to promote the development of electricity aggregation and the use of flexibility in the energy sector. SAF

¹ Act No. 406/2000 Coll. Energy Management Act

² <https://www.mpo.cz/en/energy/energy-efficiency/energy-services/list-of-energy-services-providers--238856/>

³ <https://www.apes.cz/en/index.php>

coordinates technical issues and promotes unified commercial and legislative positions on behalf of the aggregation sector⁴.

2.1.2. Portugal

Energy services within Portuguese legislation are closely linked to the broader European Union directives focusing on energy efficiency, renewable energy sources, and the liberalization of the energy market. In Portugal, these services encompass various activities aimed at improving energy efficiency and promoting the use of renewable energy sources in both the public and private sectors. The concept integrates the provision of services such as energy audits, implementation of energy-saving measures, maintenance and operation of energy systems, and the provision of energy itself, often through Energy Performance Contracting (EPC).

Several key legislative frameworks and regulations underpin energy services in Portugal, aligning them with EU directives such as the Energy Efficiency Directive (EED), the Renewable Energy Directive (RED), and regulations regarding the internal energy market. The following points highlight the essence of energy services within the Portuguese context:

- **Energy Efficiency and Savings:** The focus is on measures and services that lead to a reduction in energy consumption. This can include energy audits, retrofitting buildings with energy-efficient technologies, and implementing advanced energy management systems;
- **Energy Performance Contracting (EPC):** A key mechanism for delivering energy services, where the energy savings achieved are used to pay for the investments in energy efficiency measures. This model often involves a contract with an energy service company (ESCO) that guarantees the energy savings or the performance of the implemented measures;
- **Renewable Energy Production and Supply:** Energy services also extend to the production, distribution, and supply of renewable energy. This can involve the installation and operation of renewable energy systems (such as solar PV panels, wind turbines, biomass energy systems) and the sale of renewable energy to consumers, either directly or through the grid;
- **Regulation and Incentives:** The Portuguese government, through various agencies and regulatory bodies, establishes the legal framework and incentives for promoting energy services. This includes subsidies and financial support for energy efficiency projects, regulations that encourage the uptake of renewable energy, and measures aimed at liberalizing the energy market to foster competition and innovation in energy services;
- **Sustainability and Climate Goals:** Energy services are also viewed through the lens of sustainability and the country's commitments to reducing greenhouse gas emissions. The promotion of energy services is part of Portugal's strategy to meet its climate targets under the Paris Agreement, reinforced by the COP28 efficiency and renewables targets and its own national energy and climate plan;
- **Certification and Standards:** The Portuguese legislation also includes provisions for the certification of energy services providers, quality standards for energy services, and measurement and verification protocols to ensure the reliability and effectiveness of energy savings measures.

⁴ <https://www.akubat-asociace.cz/en/saf/>

The transposition of the European Directives into national legislation allowed energy services to be defined and regulated through various legal frameworks that address renewable energy, energy efficiency, and the broader energy market. Two specific diplomas that play a crucial role in the definition and regulation of energy services in Portugal are Decree-Law 15/2022⁵ and Decree-Law 84/2022⁶.

The Decree-Law 15/2022 introduces a new framework for the National Electrical System (in Portuguese SEN - Sistema Eléctrico Nacional), addressing various aspects of the energy sector, including the establishment of technological zones for renewable energies, the regulation of electrical transport and distribution networks, and specific measures for intensive electricity consumers (installations that have an energy consumption above 500 tep per year) .

The Decree-Law 84/2022 updates the Portuguese targets for the share renewables in the country energy mix. It consolidates the legislation regarding the issuance of guarantees of origin for different energy sources, including renewable electricity and renewable and low-carbon gases. Additionally, it sets out incentives for using biofuels and other low-carbon fuels in the transportation sector, emphasizing the certification and compliance with sustainability criteria for biofuels and biogas.

These diplomas are part of the country efforts to align its national legislation with EU directives, reflecting the country commitment to sustainable energy development, climate goals, and the promotion of innovative energy solutions.

The concept of aggregator and the Legislation on flexibility services are still not available in Portugal. However, due to fact that there is a generalized rising awareness on the importance of aggregators, as well as on the importance of flexibility services as a tool for grid stabilization and energy bill reduction, it is likely that in a very short term both will be available in the Portuguese energy market. Portugal energy mix has a strong presence of renewable energy sources - in January and February 2024, 81,9 % of the energy produced in the country was from renewable sources. The share of renewables is expected to continue to grow which will allow to speed up the adoption of regulation to stimulate the private sector to establish business model to work as aggregators and new energy service supplier with technical and financial capabilities to deliver flexibility services either to the grid and to electricity end-users in Portugal.

In Portugal there is an association for the energy service providers called APESE - Portuguese Association of Energy Services Companies (in Portuguese Associação Portuguesa das Empresas de Serviços de Energia) which is a non-profit organisation set up in 2011 to promote the development and structuring of the energy services market in Portugal. It represents and defends the interests of its associates, which in turn are promoting the efficient use of energy. APESE has close to 20 associates from different areas of expertise (e.g. energy suppliers, DSO, renewable energy systems, research, development & testing laboratories, waste management, legal advisors, etc.) working together in the path to a sustainable future.

2.1.3. Germany

Energy services in legislation

Act on Energy Services and Other Energy Efficiency Measures (EDL-G)

⁵ [Decree Law No. 15/2022 | DR \(diariodarepublica.pt\)](#)

⁶ [Decree Law No. 84/2022 | DR \(diariodarepublica.pt\)](#)

In Germany, the energy service act is drafted under the "Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen (EDL-G), 2010" which was recently amended by Article 2 of the law on November 13, 2023.⁷

The aim of the measures under this law is to cost-effectively increase the efficiency of energy use by end customers in Germany through energy services and other energy efficiency measures. To this end, the federal government is setting energy savings benchmarks that are to be achieved as energy savings targets. Additionally, the EDL-G establishes guidelines for implementing essential energy efficiency mechanisms, incentives, and institutional, financial, and legal frameworks. The aim is to create an environment where market barriers that impede the efficient utilization of energy by end customers can be eliminated. One barrier specifically addressed in §5 is obstructing measures by energy companies to block access to end-consumers for new service providers. This obstruction is explicitly forbidden ("Verbot der Behinderung") by the law.

Furthermore, the EDL-G prescribes the necessary conditions for fostering the growth and promotion of an energy services market and the implementation of other energy efficiency measures for end customers. This legislation includes provisions for energy audits, energy efficiency measures, reporting requirements, and incentives to encourage energy-efficient behaviors and investments. The scope extends to multiple sectors, including industry, commerce, and the public sector, with the overarching objective of reducing energy consumption and greenhouse gas emissions. Energy contracting market volume in Germany is estimated between €9.5 billion and €10.6 billion in the year 2023. Most energy service contracts are typically concluded for energy supply, energy management, and energy performance purposes. However, there is a limited number of contracts that are utilized for energy services such as heating, solar energy usage through rental and leasing models⁸.

Energy flexibility in legislation

Germany is ranked as one of the leading future markets for demand-side energy flexibility (DSEF)⁹. Not only is the industrial flexibility prominent, but flexibility from distributed energy resources in the residential sector is also increasing significantly.

The increasing number of electric vehicles, heat pump installations, and the penetration of solar panels are making demand-side energy flexibility a top priority in the German electricity market. Despite these expectations, digitalization remains a major obstacle. The smart meter roll-out, widely considered a precondition for scaling flexibility markets, stood at less than 3% in 2021, putting Germany near the bottom of the European Union in that regard.¹⁰ Notwithstanding very recent progress, this implies that only a relatively small share of the population can currently benefit from the legal progress.

According to a study conducted by think tank Agora Energiewende, Germany is projected to have the ability to use approximately 100 terawatt hours of electricity flexibly by 2035. This flexible load will account for over ten percent of the total electricity consumption in Germany and about half of the future household electricity consumption. Electric cars alone can contribute over 60 terawatt hours

⁷ Full Text in German: <https://www.gesetze-im-internet.de/edl-g/EDL-G.pdf>

⁸ 2023 – Empirical Analysis of the Market for Energy Services, Energy Audits and other Energy Efficiency Measures Summary of the 2022 Final Report, https://www.bfee-online.de/SharedDocs/Downloads/BfEE/DE/Energiedienstleistungen/edl23_kurzfassung_englisch.html

⁹ 2022 Market Monitor for Demand Side Flexibility, <https://delta.lcp.com/report/2022-market-monitor-for-demand-side-flexibility/> accessed on 26/03/2024.

¹⁰ ENTEC (2023). ENTEC Energy Transition Expertise Centre Common European Energy Data Space, see p. 15 ff.

of shifting load to support the grid. The Agora study assumes that around half of the households will utilize the flexibility of their electric cars, heat pumps, and home storage systems, given appropriate price incentives¹¹.

Several regulatory initiatives have been published to valorize the flexibility market and engage various types of participants. Below are the key initiatives that are driving the promotion of the energy flexibility market in Germany:

- Electricity market 2.0: This act serves as an underlying framework for the German electricity market, aiming to prepare it for the increasing penetration of renewable energy sources. It also promotes competition among supply-side flexibility, demand-side flexibility, and storage solutions. This include flexible consumers, combined heat and power (CHP), energy storage, and European electricity trading¹²;
- StromNEV §19 (2) (Flexibilisation of grid charges): By offering a significant reduction in network fees, based on the final consumer's efforts to reduce or prevent network or substation cost increases, industrial consumers have the opportunity to greatly contribute to the energy transition. This can be achieved by flexibly adjusting their production processes and harnessing their existing flexibility potential, which currently stands at 5 GW in Germany ;
- Introduction of dynamic tariffs: Germany is trying to accelerate the digitalization of its energy sector, with a particular focus on smart meters rollout as part of the Digitalization of Energy Transition Act . Starting from 2025, dynamic electricity tariffs will be introduced for all electricity suppliers, regardless of the number of customers they have. However, currently, only electricity suppliers with over 100,000 final consumers are obligated to provide dynamic electricity tariffs to customers who utilize smart meters. This will boost the flexibility market and invite more participants;
- Electricity Network Fees Ordinance (§ 17 (6) StromNEV): The Electricity Network Fees Ordinance stipulates that small electricity consumers, such as households, are only required to pay grid charges based on the unit price for electricity. This creates an incentive for small electricity consumers to reduce their total annual electricity consumption, improve energy efficiency and contribute to the regional aggregation;
- §14a EnWG: Starting in 2024, distribution network operators (DSOs) will have the ability to intervene in specific cases involving consumption systems like electric vehicle charging systems, heat pumps, refrigeration systems, and battery storage. This intervention aims to prevent any potential threats to the safety or reliability of the network, particularly due to the overload of operational resources. This also allows DSOs to control the demand side assets for energy flexibility purposes.

Association for Energy Services providers:

In Germany, the "Deutsche Unternehmensinitiative Energieeffizienz (DENEFF EDL_HUB)" serves as a platform dedicated to facilitating energy service companies (ESCOs) in Germany. It offers resources, tools, and information to support businesses, and other organizations in implementing measures to enhance energy efficiency and reduce energy consumption. It also features case studies, news, events, and networking opportunities to promote knowledge sharing and collaboration in the field of energy

¹¹ Wie E-Autos und Co. die Stromkosten für alle senken können, Agora Energiewende; <https://www.agora-energiewende.de/aktuelles/wie-e-autos-und-co-die-stromkosten-fuer-alle-senken-koennen>. accessed on 26/03/2024

¹² <https://www.bmwk.de/Redaktion/EN/Dossier/electricity-market-of-the-future.html>

efficiency. Overall, EDL_Hub serves as a central hub for stakeholders interested in advancing energy efficiency initiatives in Germany.¹³

Risk to government support from budgetary process:

A particular recent concern in Germany is that many of the government support schemes are tied directly or indirectly to the Climate and Transformation Fund (KTF), the use of which was blocked by the Constitutional Court in late 2023. Following this ruling, there has been considerable uncertainty over which programs and schemes can still receive funding, both immediately and prospectively.¹⁴ The ramifications continue to impact the market for energy efficiency in 2024 and are expected to cause funding shortages for the coming years as well. For example, as recently as March 27, 2024, the federal support for energy consulting / energy audits was frozen effective immediately and surprisingly.¹⁵ This regulatory uncertainty for households and businesses is a barrier for the realization of the above legal progress to promote energy efficiency.

2.1.4. Spain

Energy services in legislation

In Spain, energy services are based on Royal Decree 56/2016 of 12 February, which transposes Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, regarding energy audits, accreditation of service providers and energy auditors and promotion of energy supply efficiency. Article 1 of the Royal Decree represents the characterization of the terms. This royal decree has detailed what an energy performance contract is, defined as follows. Energy performance contract: any contractual agreement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the life of the contract, in which investments (works, supplies or services) in that measure are paid for as result of a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion such as financial savings or guaranteed contractual savings.

An energy service is defined as the physical benefit, utility or good, derived from the combination of an energy with an energy efficient technology or action, which may include the operations, maintenance, and control necessary to provide the service, which is provided under a contract and which under normal circumstances has been shown to achieve verifiable and measurable or estimable energy efficiency improvement or primary energy savings.

In Spain there is a list of energy service providers, which is a public administration information system used for the registration of energy service providers. The IDAE (Institute for Energy Diversification and Savings)¹⁶ is responsible for updating it.

The energy management system is defined as a set of interrelated or interacting elements belonging to a plan that establishes an energy efficiency target and a strategy to achieve it.

Energy flexibility in legislation

Spain lacks legislation on aggregation of flexibility and accumulation, a shortcoming that has long been criticized by the European Commission. On the Spanish side, a Roadmap for demand flexibility in Spain

¹³ <https://www.edlhub.org/>

¹⁴ Overview article from December 2023: <https://www.tagesschau.de/wirtschaft/verbraucher/foederung-kredite-zuschuesse-haus-wohnen-100.html>

¹⁵ <https://www.tagesschau.de/wirtschaft/verbraucher/foederung-kredite-zuschuesse-haus-wohnen-100.html>

¹⁶ <https://www.idae.es/companies/energetic-services>

is being developed. The concept of flexibility is not present in national legislation but can be understood from the demand side as the ability to modify the production or consumption of different distributed energy resources in response to different signals: the price of electricity determined by the market; an established schedule; commitments made such as participation in a capacity auction.

Association for Energy Services and Energy Flexibility

ENTRA – The Spanish Association for Aggregation and Flexibility was founded in April 2018. The association aims to enable an electricity system in which demand plays a more active role in addition to the creation of the demand aggregator concept present in other countries. ENTRA's mission is considered to be to influence the development of legislation and the decarbonization of energy models where the aggregation of distributed resources and the flexibility they bring is allowed and rewarded. ENTRA has more than 20 partners from the energy sector¹⁷ including Eni Plenitude Iberia SL.

A3E – The Association of Energy Efficiency Companies (A3E) was established in 2009 to promote energy efficiency. A3E currently has more than 100 member companies, which are divided as follows:

- Consultants / Energy auditors / Engineering companies (50%)
- Energy services companies (15%)
- Manufacturers or distributors of equipment, components and software (15%)
- Energy distributors and marketers (10%)
- Others... maintainers, installers, certification (10%)

The main objective is to promote the implementation of energy saving and efficiency measures in the business sector, institutions, and society in general, helping them to improve their sustainability¹⁸.

2.1.5. France

Energy efficiency services

The law on energy transition for green growth has set the following objectives:

- A 30% reduction in fossil fuel consumption by 2030;
- A 20% reduction in final energy consumption by 2030;
- A 50% reduction in final energy consumption by 2050; compared to 2012.

The Multi-Year Energy Programming (PPE) sets out guidelines for achieving these objectives¹⁹.

Among the examples of measures implemented to promote energy efficiency among households: the establishment since 2022 of the **France Rénov' platform**²⁰, a public service for housing renovation led by the State in collaboration with local authorities and managed by the National Housing Agency (Anah) to inform and advise French citizens on their renovation projects and available financial assistance. Among these:

¹⁷ <http://entra-coalicion.com/#home>

¹⁸ <https://www.asociacion3e.org/>

¹⁹ Action de la France pour l'efficacité énergétique | Ministère de la Transition Écologique et de la Cohésion des Territoires (ecologie.gouv.fr)

²⁰ <https://www.ecologie.gouv.fr/lancement-france-renov-nouveau-service-public-renovation-lhabitat>

- **Energy Savings Certificates (CEE)**²¹: This scheme, one of the main instruments of energy demand management policy, is based on a triennial obligation to achieve energy savings in CEE imposed by the authorities on energy suppliers (the "obligated parties"). They are thus encouraged to actively promote energy efficiency to energy consumers. CEEs are awarded, under certain conditions, to eligible actors carrying out energy-saving operations. The obligated parties also have the option to purchase CEEs from other actors who have carried out energy-saving actions. Standardized operation sheets are developed and classified by sector to facilitate the implementation of energy-saving actions.
- **MaPrimeRénov**²²: State financial incentives for homeowners wishing to carry out energy renovation work within their homes.
- **Energy Check**: State financial incentives granted to low-income households to help them pay their energy bills and finance their energy renovation work.
- **Reduced VAT at 5.5%** (against 10% otherwise) for given energy renovation works.
- **Financing of renovation work with the eco-zero interest loans.**

Energy flexibility services

Flexibility involves a site adjusting its injection and/or consumption based on an external signal. While historically, the use of production means has been the primary lever of flexibility in the electrical system, consumers can also directly participate today by intentionally modifying their consumption following an external signal (sent by a demand response operator or a supplier). This is referred to as "demand side flexibility". When electrical consumption is intentionally reduced, it is referred to as "demand response".

Article L.271-1 of the Energy Code defines demand response as *"the action aimed at temporarily reducing, upon a specific request sent to one or more final consumers by a demand response operator or an electricity supplier, the effective electricity withdrawal level from the public electricity transmission or distribution networks of one or more consumption sites, compared to a forecast consumption program or an estimated consumption"*.

France is the first country in Europe to have opened all its national market structures to all consumers, including those connected to distribution networks.

Thus, demand response can contribute to the balancing reserves constituted by the French electricity transmission system operator (RTE): since 2007, demand response in buildings (connected to distribution networks) can participate in the adjustment mechanism aimed at ensuring real-time supply-demand balance and safe operation of the network, and since 2016, in system services allowing to always ensure balance between electricity production and consumption.

Furthermore, since 2014, RTE has opened the possibility for demand response to be valued on the electricity market (organized market or over-the-counter market) similar to a production means through the Demand Response Block Exchange Notification mechanism, known as NEBEF.

These can also participate in the capacity mechanism aimed at ensuring supply security in France, supplemented since 2018 by demand response tenders aimed at developing existing demand

²¹ <https://www.ecologie.gouv.fr/dispositif-des-certificats-deconomies-denergie>

²² <https://www.economie.gouv.fr/particuliers/prime-renovation-energetique>

response capacity in France, in order to promote the achievement of objectives set out in the Multiannual Energy Programming (PPE).²³

National practices example

At no cost, Voltalis equips each electrically heated radiator of both residential and professional properties with a device. Through the MyVoltalis mobile application, users can easily and remotely control their heating and monitor their electricity consumption.

This smart thermostat contributes to the protection of French purchasing power and the national effort for energy efficiency: it combines a potential energy savings of 15% and up to 70% reduction in CO₂ emissions from the concerned household or professional space.

Already deployed in over 200,000 households and businesses in France and Europe, the Voltalis thermostat can adjust the consumption of equipped radiators while preserving occupants' comfort. This action is virtuous: it intervenes when the electricity transmission network experiences imbalances (winter peaks, intermittent renewable energy...) to reduce national consumption. Thus, the risks of load shedding or cuts are avoided, as well as the use of polluting thermal power plants, traditionally activated during peak times.

2.1.6. Slovakia

New Electricity Market Design and Energy Flexibility in Legislation

In Slovakia, the EU electricity market legislation (new market design) has been transposed by an amendment of the Energy Act No 251/2012 Coll. The amendment has enabled the establishment and operation of new electricity market participants, such as the active consumer, the energy community, the operator of an electricity storage facility and the aggregator. At the same time, the amendment to the Act defines the rights and obligations of these new market participants, including the conditions for their entry into the electricity market. Another important change is the further strengthening of the position of the consumer on the energy market and the promotion of the development of self-generation and self-consumption of energy. The amendment also introduces a modification around electricity storage, a modification of the legal framework for data flows related to the activities of new market entrants and support for the digitisation of the energy sector.

The approved energy package has modified the existing conditions for the deployment of smart metering systems, regulates the procurement of ancillary or flexibility services and introduces new rights and obligations for distribution system operators and transmission system operators. The new legislation should ensure increased transparency on the energy market by introducing public consultations on technical conditions, operating rules, and development plans of system operators as key documents for system users in terms of investment planning, access conditions and connection of consumers and electricity producers²⁴. The secondary legislation (implementing regulations) is still in the process of putting the new rules into daily practice on the ground.

An energy-performance based service is defined as guaranteed energy service within the meaning of Act 321/2014 Coll., on Energy Efficiency (§ 17 et seq.).

²³ Source : Valoriser vos flexibilités - RTE Portail Services, <https://www.services-rte.com/fr/decouvrez-nos-offres-de-services/valorisez-vos-flexibilites.html>

²⁴ Veľká novela zákona o energetike a o regulácii v sieťových odvetviach schválená, MH SR, <https://www.mhsr.sk/top/velka-novela-zakona-o-energetika-a-o-regulacii-v-sietovych-odvetviach-schvalena>

In EPCs, modernisation of buildings and equipment of the recipient of the service is carried out, which leads to a reduction in energy consumption and related operating costs. The cost of the upgrading, which shall be designed, planned, implemented, and financed by the provider according to the needs of the beneficiary, shall be reimbursed by future savings, which shall be guaranteed by the service provider. During the repayment period of the retrofit, the service provider shall provide energy management and evaluate the savings achieved. In the event of a shortfall in savings, the provider undertakes to reimburse the service recipient for the financial value of the shortfall in savings.

EPC in Slovakia is mainly, although not exclusively, used for retrofitting buildings and lighting systems. EPCs are used in both the private sector and the public sector. In the public sector, it is possible to have an arrangement whereby assets are upgraded which are only under the management (use) of the service recipient (e.g. the owner is the State)²⁵.

The EPC market in Slovakia is, however, blocked due to decision by the authorities to provide 100% grants for energy efficiency improvements in buildings.

Organiser of the short-term electricity market (OKTE) recently launched the energy data centre that should support operation of the market, as several of new activities of market actors cannot be implemented and operated without centralised data flow processing. The new activities are - sharing of electricity from RES, accumulation, creation of energy communities, aggregation and provision of flexibility, active consumers. The aim has been to create and implement a central platform for data exchange that would allow simplification and unification of data exchanges in the electricity market, reducing the administrative burden for existing market participants including customers as well as public institutions by removing duplication and multiple data provision, introducing new data flows that will allow new market participants to operate and making data available to end-users.

Association for Energy Services and Energy Flexibility

APES-SK - The Association of Energy Service Providers of Slovakia is an Interest Association of legal entities established to promote the use of Energy Performance Contracting in the Slovak Republic to strengthen the rational use of scarce energy resources. APES-SK was officially registered on 25.8.2014 and currently has 14 members.

2.2. EES service objectives and strategies

Energy Efficiency Services (EES) plays a crucial role in addressing the urgent challenges of energy consumption, environmental sustainability, and economic efficiency. This employs a variety of objectives and strategies, its goals and aims for reducing energy use, optimizing performance, and promoting sustainable practices. In this chapter, we delve into the fundamental objectives that drive EES initiatives and explore the diversity of strategies employed to fulfill these objectives effectively. The overarching goals and the specific strategies utilized within EES includes:

- **Reducing Energy Consumption:** The primary objective of EES is to reduce energy consumption in buildings, industrial processes, and infrastructures by implementing cost-effective energy-saving measures and optimizing energy usage;
- **Increase Energy Efficiency:** EES aims to increase energy efficiency by improving the performance of energy systems, equipment and processes to achieve more output with less energy consumption;

²⁵ <http://www.apes-sk.eu>

- **Lower Energy Costs:** By reducing energy consumption and improving energy efficiency, EES seeks to lower energy costs for users, businesses, and organizations, leading to significant cost savings over time;
- **Minimize Environmental Impact:** EES strives to minimize the environmental impact of energy consumption by reducing greenhouse gas emissions, carbon footprint, and other pollutants associated with energy production and consumption;
- **Enhance Comfort and Quality of Life/living standards:** EES aims to enhance comfort, productivity, and quality of life for building occupants, users, and communities by optimizing indoor environmental quality, temperature control and lighting conditions;
- **Improve Operational Performance:** EES seeks to improve the operational performance of buildings, facilities and industrial processes by optimizing energy management, reducing downtime, as well as enhancing reliability and resilience;
- **Promote Sustainability:** EES promotes sustainability by encouraging the use of renewable energy sources, promoting resource conservation and supporting sustainable practices in energy management and consumption;
- **Enable Smart and Connected Systems:** EES leverages smart technologies, including data analysis, machine learning involving connected systems to enable real-time monitoring, control and optimization of energy consumption by improved efficiency and effectiveness;
- **Empower Stakeholders:** EES empowers stakeholders, including building owners, operators, tenants and users, with knowledge, tools and resources to actively participate in energy management and decision-making processes;
- **Facilitate Regulatory Compliance:** EES helps organizations to comply with energy efficiency regulations, standards and requirements by providing guidance, support and solutions to meet legal obligations and to achieve certification.

EES uses various strategies such as conducting energy audits, implementing energy management systems, upgrading equipment and infrastructure, educating stakeholders, promoting behavioral change and leveraging incentives and financing options to achieve its objectives. By aligning objectives with effective strategies, EES can successfully deliver on its promise of reducing energy consumption, improving efficiency, and driving sustainable outcomes.

- **Energy Audits and Assessments:** Conducting thorough energy audits and assessments to identify areas of inefficiency, energy waste and opportunities for improvement. This involves analyzing energy consumption patterns, evaluating equipment performance and assessing building envelope efficiency;
- **Energy Management Systems (EMS):** Implementing advanced EMS to monitor, control and optimize energy use in real-time. EMS integrates data from various sources, such as smart meters and building automation systems, to provide insights into energy consumption and enable proactive energy management;
- **Technology Upgrades and Retrofits:** Upgrading existing equipment, systems and infrastructure with energy-efficient technologies and retrofit solutions. This may include installing energy-efficient LED lighting, HVAC systems, insulation, and smart controls to reduce energy consumption and improve performance;
- **Behavioral Change Programs:** Implementing educational programs and awareness raising campaigns to promote energy-saving behaviors among building occupants, employees and users. This involves providing training, incentives and behavior feedback mechanisms to encourage energy savings and sustainable practices;
- **Renewable Energy Integration:** Incorporating renewable energy sources, such as solar photovoltaics, wind turbines, and geothermal systems to supplement or replace conventional

energy sources. This involves assessing suitability of the site, designing the project for renewable energy systems, and optimizing the integration with an existing infrastructure;

- **Demand-Side Management (DSM):** Implementing DSM strategies to manage and control energy demand during peak periods or grid constraints. This may involve implementing demand response programs, load balancing and load shifting measures to reduce energy consumption and alleviate stress on the grid;
- **Energy-Efficient Design and Construction:** Integrating energy-efficient design principles and sustainability criteria into the planning, design, and construction of new buildings, facilities, and infrastructure or their reconstructions or major renovations. This includes optimizing building orientation (only for new construction), envelope design, and material selection to minimize energy consumption and enhance thermal comfort;
- **Measuring and Verification (M&V):** Establishing M&V protocols to monitor, measure and verify the performance of energy efficiency measures and investments. This involves setting baseline energy consumption levels, tracking energy savings and validating the cost-effectiveness of implemented measures over time;
- **Financial Incentives and Financing Options:** Offering financial incentives, rebates and financing options to encourage investment in energy efficiency projects. This may include government grants, utility rebates, tax incentives and innovative financing mechanisms such as Energy Performance Contracting (EPC) and Energy Service Agreements (ESAs).
- **Continuous Improvement and Optimization:** Implementing a continuous improvement process to identify, prioritize and implement ongoing energy efficiency opportunities. This involves conducting regular reviews, audits and performance evaluations to identify areas for optimization and innovation.

3. Using the Business model canvas

The Business Model Canvas (BMC) is a strategic management tool that serves as a visual framework for describing, analyzing, and designing business models. It has been developed by Alexander Osterwalder and Yves Pigneur and provides entrepreneurs, startups, and established businesses with a systematic approach to understanding the fundamental aspects of their ventures and how they create, deliver, and capture value.²⁶

At its core, the BMC consists of a single-page diagram divided into nine key building blocks, each representing a critical aspect of a business model. These building blocks include Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure. By filling in these blocks, users can map out their entire business model, allowing for a comprehensive overview of how their venture operates and generates value.

In addition to its practical applications, the BMC has gained widespread popularity and recognition within the entrepreneurial community and academia. It has become a standard tool used in business schools, incubators, accelerators, and startup ecosystems worldwide, helping aspiring entrepreneurs develop viable business models and transform their ideas into successful ventures.

One of the primary advantages of the BMC is its simplicity and clarity. By condensing complex business concepts into a single, easy-to-understand format, the BMC enables entrepreneurs to communicate their business ideas effectively and facilitates collaboration among team members, stakeholders, and

²⁶ Osterwalder, Alexander; Pigneur, Yves; Clark, Tim (2010). Business Model Generation: A Handbook For Visionaries, Game Changers, and Challengers

investors. Moreover, the visual nature of the canvas encourages creativity and innovation, prompting entrepreneurs to explore new ideas and experiment with different business models.

Furthermore, the BMC serves as a versatile tool that can be used throughout the entire lifecycle of a business. Whether entrepreneurs are launching a new startup, exploring opportunities for growth and expansion, or pivoting their business in response to changing market conditions, the BMC provides a flexible framework for strategic decision-making and business model innovation.

Overall, the Business Model Canvas offers a holistic and structured approach to business model development and analysis, empowering entrepreneurs to gain deeper insights into their ventures, identify opportunities for improvement, and create sustainable and scalable business models. Whether used as a planning tool, a communication tool, or a strategic management tool, the BMC remains an indispensable resource for entrepreneurs navigating the complexities of the modern business landscape.

This is a simple and compact framework that allows entrepreneurs and managers to better understand, describe, and discuss how their business operates and creates value. BMC is structured into nine key elements, which include:

- **Customer Segments:** Identification of different groups of customers that the company serves or aims to serve;
- **Value Propositions:** Description of the company's products or services and how they bring value to customers;
- **Channels:** Methods by which the company communicates with its customers and delivers value to them;
- **Customer Relationships:** Description of the types of relationships the company builds with its customers and how these relationships contribute to value creation;
- **Revenue Streams:** Sources of income that the company generates through its products or services;
- **Key Resources:** Resources that the company needs to provide its value propositions, such as human resources, financial resources, technologies, etc;
- **Key Activities:** Key operations that the company performs to deliver value to its customers.
- **Key Partnerships:** External partners with whom the company collaborates to provide its products or services;
- **Cost Structure:** Expenses associated with running the company and providing its products or services.

3.1. Advantages of using the Business model canvas

The Business Model Canvas (BMC) is a tool that provides a structured framework for creating and analyzing a business model. It is a visual tool that helps entrepreneurs and managers better understand their business and identify key elements that influence its success. There are several advantages associated with using the Business Model Canvas.

The first advantage of BMC is its simplicity and clarity. Thanks to its visual format, it is easy to understand the individual components of the business model and their interconnections. This facilitates shared understanding among team members and enables effective communication and collaboration in the creation and analysis of the business model.

Another advantage of BMC is its flexibility and adaptability. Because it is a visual tool, it is easy to make changes and adjustments to the business model. This allows entrepreneurs and managers to quickly

respond to changes in the environment, new opportunities, or threats and adjust their business model to better fit the new conditions.

Another significant advantage of BMC is its complexity and inclusion of all key aspects of the business model in one diagram. This allows entrepreneurs and managers to gain a comprehensive view of their business and better understand the relationships between the various parts of the business model. This improves their ability to identify potential weaknesses and opportunities and develop strategies for long-term success.

Another advantage of BMC is its universality and applicability in various industries and types of organizations. Whether it is a startup, a small business, or a corporation, BMC can provide a valuable framework for analyzing and developing a business model. This universality allows entrepreneurs and managers to better understand the nature of their business and develop strategies that are relevant to their specific situation.

Overall, using the Business Model Canvas brings a number of benefits for entrepreneurs and managers. The simplicity, flexibility, complexity, and universality of this tool enable more efficient creation and analysis of the business model and provide entrepreneurs and managers with a better understanding of their business and the environment in which they operate. Following chapters specify the outcomes and main findings for each key element of the BMC exercise carried out within the framework of this project.

4. Range of services – Key Activities

Energy Efficiency Service providers offer a comprehensive range of services aimed at improving energy efficiency and reducing energy consumption for businesses and organizations. These services play a crucial role in helping clients optimize their energy usage, lower operational costs, and minimize the environmental footprint. Key activities that these company should perform are:

Conducting a meticulous examination of energy consumption patterns, pinpointing areas ripe for energy savings through Energy Audit and Analysis. This involves scrutinizing existing equipment, systems, and processes devouring energy and proposing strategies to optimize energy utilization.

Devising tailored recommendations to boost energy efficiency through Design and Implementation of Energy Efficiency Measures based on the findings of the energy audit. This could entail installing energy-efficient equipment, retrofitting systems for enhanced efficiency, and deploying innovative technologies to slash energy consumption.

Providing extensive training and consultation services to clients, employees, and management on leveraging energy effectively through Training and Consultation. This includes education on energy management, preventing energy wastage, and maximizing the efficiency of technologies deployed.

Regularly or continuously monitoring energy consumption and the performance of implemented measures through Monitoring and Evaluation. This allows for the assessment of achieved savings and identification of further improvement opportunities, facilitating the ongoing optimization of energy efficiency and maximizing return on investment.

Offering certification and audit services to ensure compliance with energy standards and regulations through Certification and Audit Services. This encompasses energy efficiency certification for buildings, auditing services for companies and organizations, and recommendations for meeting legislative requirements.

Providing guidance on financial and investment aspects related to implementing energy efficiency measures through Financial and Investment Advisory. This involves evaluating investment returns,

assessing available financial incentives and grants, and aiding in the development of financial plans for project implementation.

List of key activities for Energy Efficiency Service providers:

- **Energy Audits and Analysis:**
 - Conduct comprehensive energy audits for clients;
 - Analyze energy consumption patterns and trends;
 - Identify energy-saving opportunities in buildings and processes;
 - Perform energy performance benchmarking;
 - Analyze data to identify energy-saving opportunities.
- **Recommendations and Planning:**
 - Recommend energy-efficient technologies and solutions;
 - Develop customized energy efficiency savings plans for clients;
 - Offer technical assistance for energy optimization;
 - Conduct feasibility studies for energy efficiency initiatives;
 - Develop sustainability plans and goals.
- **Implementation and Upgrades:**
 - Implement energy-saving measures, such as lighting upgrade/retrofitting;
 - Install energy management systems and controls;
 - Optimize HVAC (Heating, Ventilation, and Air Conditioning) systems operation;
 - Upgrade insulation and weatherization in buildings;
 - Integrate renewable energy sources, like solar panels;
 - Perform energy retrofits for existing buildings.
- **Training and Education:**
 - Provide training on energy-efficient practices for staff;
 - Develop energy awareness raising campaigns;
 - Conduct water efficiency assessments;
 - Recommend behavior-based energy-saving strategies.
- **Financial and Consulting Services:**
 - Offer financial analysis of energy-saving projects;
 - Provide assistance for a securing funding and incentives for projects;
 - Provide consulting on energy efficiency procurement strategies;
 - Offer guidance on energy regulatory compliance;
 - Conduct life-cycle cost analysis for energy systems.
- **Monitoring and Maintenance:**
 - Monitor energy use in real-time;
 - Provide ongoing maintenance for energy-efficient systems;
 - Offer virtual energy management services;
 - Provide remote energy monitoring solutions;
 - Offer energy performance contracting services;
- **Certification and Compliance:**
 - Offer energy certification services;
 - Assist with LEED (Leadership in Energy and Environmental Design) certification;
 - Develop carbon footprint assessments;
 - Offer green building certification services;
 - Provide energy-efficient building design service.
- **Transportation and Fleet Management:**
 - Conduct energy-efficient transportation planning;

- Provide efficient fleet management solutions.
- **IT Infrastructure and Supply Chain:**
 - Implement energy-efficient IT infrastructure;
 - Offer energy-efficient product sourcing;
 - Assist with green supply chain management.
- **Energy Risk Management and Resilience:**
 - Implement demand-side and flexibility management strategies;
 - Offer energy risk management services;
 - Provide energy resilience planning.

4.1. Building assessment and energy management

Energy Efficiency Service providers can undertake a variety of activities in the realm of building assessment and energy management to enhance the energy performance and sustainability of buildings; leading to cost savings, reduced environmental impact and enhanced occupant comfort and well-being, such as:

Energy Audits: Conduct comprehensive energy audits of buildings to assess current energy usage patterns and identify areas for improvement;

Building Performance Benchmarking: Evaluate the energy performance of buildings by comparing their energy consumption to industry standards or similar buildings;

Energy Modeling: Utilize advanced software tools to simulate the energy performance of buildings and assess the impact of potential energy efficiency measures;

Building Energy Labeling: Provide labeling services to indicate the energy efficiency rating of buildings, helping owners and occupants understand their energy performance;

Energy Management Systems (EMS) Installation: Implement EMS to monitor, control, and optimize energy usage in buildings, including systems for lighting, HVAC and equipment;

Partial metering Installation: Install partial meters to measure energy consumption in specific areas, circuits, equipment or systems within buildings, enabling targeted energy management strategies;

Occupant Engagement Programs: Develop programs to engage building occupants in energy-saving behaviors, such as energy conservation awareness raising campaigns and incentive programs;

Energy Performance Contracting (EPC): Offer EPC services where energy service companies finance and implement energy efficiency improvements in buildings, with payment based on achieved energy savings;

Energy Management Training: Provide training to building users, owners, operators and maintenance staff on energy management best practices, including efficient operation and maintenance of building systems.

4.2. Energy Efficiency measures

EES providers are instrumental in addressing the pressing need for energy conservation and sustainability in today's world. By offering a range of specialized services, these providers play a pivotal role in helping businesses, organizations and individuals optimize their energy usage, reduce costs and minimize their environmental footprint. With the increasing focus on mitigating climate change and ensuring resource efficiency, the demand for Energy Efficiency Service providers has grown significantly. These professionals are equipped with the expertise, tools and technologies necessary to assess energy usage patterns, identify inefficiencies and implement tailored solutions to enhance energy efficiency across various sectors. Whether it's conducting comprehensive energy audits,

recommending and implementing energy-saving measures or providing ongoing monitoring and optimization services, Energy Efficiency Service providers offer holistic solutions to meet the diverse needs of their clients. As the global emphasis on sustainability continues to intensify, the role of Energy Efficiency Service providers becomes increasingly vital in driving positive change towards a more energy-efficient and environmentally sustainable future. Energy Efficiency Service providers implement different energy efficiency measures to achieve their goals, such as:

Energy Efficiency Assessments: Conduct thorough assessments to identify energy-saving opportunities and recommend suitable measures tailored to the specific client's needs and circumstances;

Technology Evaluation: Evaluate and recommend energy-efficient technologies and equipment suitable for the client's facilities, such as high-efficiency HVAC systems, LED lighting, and energy-efficient appliances;

Energy Management System (EMS) Implementation: Design and install EMS to monitor, control and optimize energy use in buildings and industrial facilities, allowing real-time monitoring and adjustments to maximize energy efficiency;

Building Automation Systems (BAS): Install BAS to automate and control building systems, including heating, cooling, lighting and ventilation, optimizing energy usage based on occupancy and environmental conditions;

Lighting Upgrades: Recommend and implement lighting upgrades, such as replacing traditional bulbs with energy-efficient LED fixtures, installing daylight sensors and implementing lighting control systems to minimize unnecessary usage;

HVAC System Optimization: Assess HVAC systems for efficiency improvements, including upgrading to energy-efficient equipment, implementing zone control and optimizing temperature setpoints for comfort and efficiency;

Building Envelope Improvements: Identify opportunities to improve the building envelope's thermal performance through measures like insulation upgrades, air sealing and window replacements to reduce heating and cooling requirements;

Renewable Energy Integration: Evaluate the feasibility of integrating renewable energy systems, such as solar photovoltaic (PV) panels, wind turbines or geothermal systems to offset energy consumption from traditional sources;

Energy-Efficient Appliances and Equipment: Recommend and install energy efficient appliances and equipment, including products with a high energy efficiency label, to reduce energy consumption in residential, commercial and industrial premises;

Behavioral Change Programs: Develop and implement programs to promote energy-efficient behaviors among building occupants, such as energy conservation awareness campaigns, employee training and incentive programs;

Water Efficiency Measures: Identify and implement water-saving measures, such as installing low-flow fixtures, optimizing irrigation systems and implementing water reuse systems to reduce water consumption and associated energy usage;

Industrial Process Optimization: Analyze industrial processes to identify opportunities for energy efficiency improvements, such as process optimization, equipment upgrades and waste heat recovery systems;

Energy-Efficient Building Design: Provide design services for energy-efficient buildings and renovations, incorporating passive design principles, energy-efficient materials and advanced building systems to minimize energy consumption from the outset.

4.3. Smart home equipment (IoT)

The use of IoT (Internet of Things) is crucial for Energy Efficiency Service providers for several reasons; Real-time monitoring allows for instant data collection on energy consumption and identification of areas needing improvement. Predictive maintenance enables the prediction of equipment failures or inefficiencies before they occur, allowing for preventive maintenance and prevention of energy waste. Optimization of energy systems through the connection of various devices and systems, allowing for automated adjustments such as temperature or lighting settings based on room occupancy. Data analytics generated by IoT enables the uncovering of trends and insights into energy consumption, aiding service providers in making informed decisions about energy efficiency measures. Automation of various processes, such as turning off lights or adjusting temperature settings when rooms are unoccupied, leads to significant energy savings without manual intervention. Integration with renewable energy sources such as solar panels or wind turbines allows for the optimization of energy production and consumption, further increasing overall energy efficiency.

The Internet of Things (IoT) refers to the network of physical objects — "things" — that are embedded with sensors, processors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These objects can range from ordinary household items to sophisticated industrial tools. IoT represents a significant shift in how technology can be integrated into every aspect of daily life and business operations, promising increased efficiency, enhanced services, and closer interaction between the physical and digital worlds. However, realizing its full potential requires addressing the accompanying challenges, particularly regarding security, privacy, and data management. Some of the key components/equipment with IoT capabilities that energy efficiency service providers can use in buildings are:

Smart Thermostat Installation: Recommend and install smart thermostats that utilize IoT technology to optimize heating, cooling and air quality settings based on occupancy patterns and external conditions, thereby reducing energy waste;

Energy Monitoring Systems: Implement IoT-enabled energy monitoring systems to track energy usage in real-time, providing homeowners with insights into their consumption patterns and opportunities for optimization;

Smart Lighting Solutions: Recommend and install IoT-enabled smart lighting systems that allow for remote control and automation of lighting schedules, dimming levels, and energy-efficient LED bulbs, resulting in reduced energy consumption;

Home Energy Management Platforms: Offer comprehensive IoT-based home energy management platforms that allow homeowners and users to monitor and control various energy-consuming devices and appliances or manage devices working with a building's solar gains, etc. from a centralized interface;

Appliance Automation and Control: Integrate IoT-enabled smart plugs and switches to automate the operation of appliances and electronics based on predefined schedules or triggers, optimizing energy use and reducing standby power consumption;

Demand Response Integration: Implement IoT-based demand response systems that enable participation in utility programs, automatically adjusting energy use during peak demand periods to reduce strain on the grid and potentially earn incentives;

Smart Energy Storage Solutions: Recommend and install home energy storage systems integrated with IoT technology, enabling homeowners to store excess energy generated from renewable sources like solar panels for use during periods of high demand or grid outages;

Integration with Renewable Energy Systems: Integrate IoT devices with renewable energy generation systems such as solar PV panels or wind turbines to optimize energy production and consumption, maximizing self-consumption and minimizing reliance on the grid;

Behavioral Analytics and Feedback: Use IoT data analysis to provide users and homeowners with personalized feedback and recommendations for energy-saving behaviors, fostering awareness and encouraging sustainable habits;

Remote Monitoring and Maintenance: Offer remote monitoring and diagnostics services using IoT-enabled devices to detect potential energy efficiency issues or equipment malfunctions, enabling proactive maintenance and troubleshooting;

Home Automation and Integration: Provide comprehensive home automation solutions leveraging IoT technology to seamlessly integrate energy management with other smart home functionalities, such as security, entertainment and comfort systems;

Energy-Efficient Home Design Consultation: Offer consultation services for users, homeowners and builders on integrating IoT-enabled energy efficiency features into the design and construction of new homes or renovations, maximizing energy savings from the outset.

4.4. Sizing and Installation of RES

EES providers execute the correct/adequate sizing, installation and construction of renewable energy systems according to the approved design and schedule. For each of the following technologies, the importance of sizing of PVs, inverters and storage systems (if available) is crucial to ensure the cost-effectiveness of the system. It is important that EES providers take under consideration this stage which will allow to prevent future problems (e.g. situations that impact the future operation and efficiency of the system, etc.). EES providers need to coordinate with subcontractors, technicians and construction crews to ensure safe and efficient implementation. It involves consideration of following points when installing the renewable energy system, which can include technologies like:

- **Solar Photovoltaic (PV) Panels**
 - Selection of appropriate mounting systems, such as rooftop, ground-mounted or tracking systems;
 - Installation of solar panels on support structures, including racks, frames and pole mounts;
 - Connection of panels to inverters, charge controllers and electrical distribution systems;
- **Wind Turbines**
 - Installation of wind turbine towers, including foundation installation and tower assembly;
 - Installation of turbine blades, nacelles and rotor hubs;
 - Connection of turbines to electrical systems, including wiring and control mechanisms.
- **Heat Pumps**
 - Excavation and installation of ground loops or boreholes for geothermal heat exchange;
 - Placement of heat pump units (air-to-air, or air-to-water) and distribution systems within buildings;
 - Connection to HVAC systems, ductwork and thermal storage components.

- **Biomass Energy Systems**

- Construction of biomass storage facilities, such as silos and bunkers;
- Installation of biomass boilers, furnaces, or gasifiers;
- Connection to heat distribution systems, including piping, radiators and heat exchangers.

The installation of the RES system comprises additional responsibilities for EES providers, such as:

Grid Interconnection and Integration: Facilitate the grid interconnection process for grid-tied renewable energy systems, including completing necessary paperwork, coordinating with utilities and ensuring compliance with interconnection standards and regulations;

Off-Grid System Setup: Install standalone off-grid renewable energy systems for remote locations or areas without access to the utility grid. Design and implement battery storage solutions and backup power systems to ensure reliable electricity supply;

Commissioning and Testing: Perform thorough testing and commissioning of installed renewable energy systems to verify proper operation, functionality and performance. Ensure that systems meet design specifications and performance targets;

Training and Handover: Provide comprehensive training to clients on the operation, maintenance and monitoring of renewable energy systems. Transfer ownership and hand over all relevant documentation, manuals and warranties upon project completion;

Operation and Maintenance Services: Offer ongoing operation and maintenance services for renewable energy systems, including regular inspections, cleaning, troubleshooting and repairs. Ensure optimal system performance, longevity and reliability over time;

Performance Monitoring and Reporting: Implement monitoring systems to track the performance and energy production of renewable energy systems in real-time. Generate periodic reports and analytics to assess system performance, identify issues and optimize operation;

Financial Analysis and Incentive Procurement: Conduct financial analysis and cost-benefit assessments to evaluate the economic viability and return on investment (ROI) of renewable energy projects. Assist clients in securing financial incentives, rebates, grants, tax credits and financing options to offset upfront costs and maximize savings.

4.5. Energy flexibility

Optimizing energy consumption enables better adjustment to market price and production changes, allowing EES to provide services that increase efficiency and energy savings for their clients. Integrating renewable energy sources, such as solar panels and wind turbines, into energy systems benefits from flexibility. This can lead to higher reliability and sustainability of energy networks. Enhancing energy efficiency through flexible technologies and strategies contributes to overall energy savings and reduces environmental impacts across various industries and sectors. Supporting energy stability is crucial in maintaining grid stability during periods of high demand or unexpected events, helping to prevent power outages and ensure reliable energy supply. Therefore, energy flexibility is an essential component of the services portfolio provided by EES and contributes to achieving their main goals in energy efficiency, sustainability, and reliability.

4.6. Other key activities

Among other key activities that need to be carried out as part of providing EES include the following examples:

- Recruitment of the costumers
- Monitoring and communication of the systems
- Verification and controlling the installations
- Initial data collection
- Customer management and care
- Implementation of EE measures

5. Key partners

Operating a business often requires close collaboration with key partners, who play a crucial role in achieving common goals and contribute significantly to the company's success. Establishing an effective network of partnerships is essential for ensuring stable and sustainable business development. The Business Canvas Model focuses on identifying these key partners and their contributions to the business, whether they are suppliers of key resources, collaborating firms, distribution channels or strategic alliances. Understanding and properly managing relationships with key partners is therefore essential for the successful operation of the business and gaining a competitive advantage in the market.

Partnering with these key stakeholders is critical for Energy Efficiency Service providers to effectively deliver solutions, access resources and navigate regulatory landscapes in the dynamic energy efficiency market.

Competent authorities (regulator, legal conditions)

Key Role: Provide regulatory oversight and establish legal frameworks governing energy efficiency initiatives.

Importance: Assuring the compliance with regulatory requirements is essential for EES providers to operate legally and adhere to industry standards.

Energy professionals (installers, engineers, consultants)

Key Role: Offer expertise in implementing energy efficiency measures, including installation, engineering and consultancy services.

Importance: Collaboration with skilled professionals ensures the effective execution of energy efficiency projects and the delivery of high-quality services.

Financial institutions banks to the customer or energy supplier

Key Role: Provide financial resources, such as loans, to support energy efficiency projects and investments.

Importance: Access to funding from financial institutions is crucial for EES providers to finance projects and expand their operations.

Funding institutions (funds, public banks, public bodies, development agencies, etc.)

Key Role: Offer funding and investment opportunities to support energy efficiency initiatives.

Importance: Partnership with funding institutions enables EES providers to access capital and secure financing for energy efficiency projects.

Researchers

Key Role: Conduct research and development activities to improve energy efficiency technologies and solutions.

Importance: Collaboration with researchers facilitates innovation and the development of cutting-edge energy efficiency products and services.

Startups

Key Role: Bring innovation and disruptive solutions to the energy efficiency sector.

Importance: Partnering with startups allows EES providers to leverage new technologies and business models to address emerging challenges and opportunities, as well as it allows startups to test in real-world their innovative products and solutions.

Marketplace

Key Role: Provides platforms services for buying, selling and trading energy efficiency products and services.

Importance: Integration with marketplaces expands the reach of EES providers and enhances consumers and businesses accessibility to their products and solutions to.

Platforms (apps, software for managing energy aggregator's platform)

Key Role: Offer technological solutions for managing energy efficiency projects, data analytics and to increase customer engagement.

Importance: Utilizing platforms and adequate software enhances operational efficiency, data management and customer interaction for EES providers.

Manufacturers (devices and technologies)

Key Role: Supply energy-efficient devices, technologies and equipment for implementing energy efficiency measures.

Importance: Collaboration with manufacturers ensures access to high-quality products and innovative solutions for energy efficiency projects.

SMEs (Small Medium Enterprises)

Key Role: Represent small and medium-sized enterprises that contribute to the energy efficiency ecosystem as suppliers, service providers or customers.

Importance: Partnership with SMEs fosters collaboration and innovation within the energy efficiency sector, driving economic growth and job creation.

Energy suppliers (providing the one stop shop service)

Key Role: Offer comprehensive energy efficiency solutions and services to end customers.

Importance: Collaboration with energy suppliers enables EES providers to deliver integrated, end-to-end solutions that meet the diverse needs of customers.

Government agencies and other public authorities

Key Role: Represent government entities and agencies that support energy efficiency policies, programs and incentives.

Importance: Partnership with government agencies and other public authorities facilitates access to resources, funding and regulatory support for energy efficiency initiatives.

Service Providers (providers of concepts, technologies)

Key Role: Offer specialized services, technologies and concepts related to energy efficiency.

Importance: Collaboration with service providers enhances the capabilities, products and services offered by EES providers, allowing them to deliver innovative solutions and value-added services to customers.

Consumers

Key Role: Represent end-users who benefit from energy efficiency products and services.

Importance: Engaging consumers is essential for promoting energy efficiency awareness, adoption and behavior change, driving demand for EES products and services.

Utilities

Key Role: Includes energy utility companies that provide energy services, distribution and infrastructure as a dissemination channel for good practices in energy efficiency.

Importance: Collaboration with utilities enables EES providers to leverage existing infrastructure, data and customer relationships to deploy better energy efficiency solutions at a large-scale.

6. Value Proposition (Benefits)

Energy efficiency is not just about reducing energy consumption, but also about delivering a wide range of benefits to customers and service providers. This chapter focuses on describing the value proposition (benefits) of our energy efficiency services and their impact on different stakeholders.

One of the key aspects of EES are the so-called non-energy benefits, which represent a broader spectrum of benefits beyond energy and financial savings. A more detailed description of these non-energy benefits and their importance can be found in Deliverable D2.3, where their impacts and benefits for both end customers and society as a whole are analyzed in detail.

6.1. For Customers

Energy Efficiency Services deliver a compelling value proposition to customers by offering cost savings, environmental sustainability, improved comfort and productivity, regulatory compliance, asset value enhancement, risk mitigation, climate change mitigation, competitive advantage, access to incentives and financing, data-driven decision-making and long-term sustainability. By leveraging these benefits, customers can achieve their energy efficiency goals while driving successful businesses and societal impact. The following text presents an in-depth look at the value proposition provided by Energy Efficiency Services:

Cost Savings: One of the primary benefits of EES is the potential for significant cost savings. By optimizing energy usage and reducing consumption, customers can lower their utility bills, leading to long-term financial savings. Energy Efficiency Services encompass a wide range of measures aimed at reducing energy consumption and optimizing energy usage. These measures may include upgrading lighting systems to energy-efficient LEDs, improving insulation and building envelope integrity, optimizing HVAC systems, implementing building energy management systems and integrating renewable energy sources, as well as energy storage systems.

EES providers conduct comprehensive financial analysis to assess the potential cost savings associated with implementing energy efficiency measures. This analysis considers factors such as upfront costs, energy savings estimations, payback periods, return on investment (ROI) and lifecycle cost analysis (LCA).

While there may be initial investment costs involved in implementing energy efficiency measures, the long-term savings potential are substantial. Energy-efficient practices and technologies typically result

in lower utility bills, reduced maintenance costs, extended equipment lifespan and decreased reliance on expensive fossil fuels.

Long-Term Sustainability: EES offer long-term sustainability by promoting energy conservation and resource efficiency. By investing in energy-efficient technologies and practices, customers contribute to the preservation of natural resources, energy security and economic stability for future generations. Energy Efficiency Services play a crucial role in conserving natural resources by reducing energy consumption and minimizing waste. By optimizing energy usage and transitioning to renewable energy sources, customers contribute to the preservation of finite natural resources such as water and at the same time avoid the increase in dangerous greenhouse gas emissions.

Energy efficiency measures help to mitigate environmental impacts associated with energy production and consumption, including air and water pollution and habitat destruction. By reducing carbon footprint, customers support global efforts to combat and mitigate climate change and protect ecosystems.

EES promote long-term economic stability by fostering energy security, reducing energy dependence and enhancing resilience related to energy-related risks. By investing in energy efficiency, customers can mitigate the adverse effects of energy price volatility, supply disruptions and geopolitical tensions on their operations and finances.

Improved Comfort and Productivity: EES aim to enhance the indoor environment of buildings by improving thermal comfort, air quality and lighting conditions. Upgrades such as efficient HVAC systems, proper ventilation and high-quality lighting contribute to a more comfortable and healthier indoor space for occupants. A comfortable and healthy indoor environment is conducive to improved occupant productivity and well-being. Studies have shown that optimized lighting, temperature control and indoor air quality can lead to higher employee satisfaction, reduced absenteeism, increased concentration and enhanced cognitive performance.

Environmental Sustainability: EES contribute to environmental sustainability by reducing energy consumption and greenhouse gas emissions. By implementing energy-saving measures and transitioning to renewable energy sources, customers can minimize their carbon footprint and contribute to mitigating climate change. This environmental stewardship aligns with corporate social responsibility goals and enhances brand reputation.

Regulatory Compliance: EES help customers navigate regulatory requirements and comply with energy efficiency standards and building codes. By staying abreast of regulatory changes and implementing energy-efficient solutions, customers can avoid penalties, fines and legal liabilities associated with non-compliance.

Asset Value Enhancement: Investing in energy efficiency improvements can enhance the value of properties and assets. Energy-efficient buildings tend to have a higher market value and rental rates due to lower operating costs and increased desirability among tenants and investors. Energy performance certifications, such as LEED (Leadership in Energy and Environmental Design) certification, further validate a property's sustainability credentials and attractiveness to stakeholders.

Risk Mitigation: Energy Efficiency Services mitigate operational risks associated with energy supply disruptions, price volatility and dependence on fossil resources. By diversifying energy sources, implementing energy storage solutions and optimizing energy management practices, customers can enhance their resilience to energy-related risks and ensure business continuity.

Competitive Advantage: Adopting energy-efficient practices and technologies can provide a competitive advantage in the marketplace. Energy-efficient buildings and products appeal to environmentally conscious consumers, investors and tenants, distinguishing businesses as leaders in

sustainability and innovation. This differentiation can lead to increased market share, brand loyalty and revenue growth.

Access to Incentives and Financing: Energy Efficiency Services facilitate access to financial incentives, rebates, grants and financing options available for energy efficiency projects. These incentives help offset upfront costs and improve the return on investment for customers, making energy efficiency upgrades more affordable, cost-effective and attractive.

Data-Driven Decision-Making: Energy Efficiency Services leverage data analytics and monitoring systems to provide actionable insights and recommendations for optimizing energy performance. By analyzing energy usage patterns, identifying inefficiencies and tracking performance metrics, customers can make informed decisions to further enhance energy efficiency and operational effectiveness.

6.2. For Service providers

Energy Efficiency Services offer a multitude of benefits to service providers, enhancing their competitiveness, profitability and sustainability.

6.2.1. Faster involvement in green transition

Offering Energy Efficiency Services allows service providers to quickly align themselves with the growing trend towards sustainability and environmental responsibility. By integrating energy-efficient solutions into their offerings, service providers demonstrate their commitment to the green transition and position themselves as proactive contributors to environmental conservation. This accelerated involvement in the green transition not only enhances the reputation of service providers but also enables them to capitalize on emerging opportunities in the rapidly evolving sustainable business landscape.

6.2.2. Economic benefits (new revenues)

Energy Efficiency Services present service providers with a significant opportunity to generate new revenue streams and diversify their sources of income. By expanding their service portfolio to include energy-efficient solutions, service providers can tap into a lucrative market segment driven by increasing demand for sustainability and cost savings. Revenue streams from consulting fees, project management, equipment sales, installation services and ongoing maintenance contracts contribute to the economic growth and financial sustainability of service providers, bolstering their competitive position in the market.

6.2.3. Increase loyalty to the service

Providing Energy Efficiency Services fosters stronger relationships with customers and enhances loyalty to the service provider. By delivering tangible benefits such as cost savings, environmental stewardship and improved comfort, service providers deepen their connection with clients and build trust over time. Satisfied customers are more likely to remain loyal and continue to engage with service providers for their energy management needs, resulting in higher retention rates and recurring revenue opportunities. This increased loyalty strengthens the long-term viability and profitability of service providers' businesses.

6.2.4. Increased flexibility

Integrating Energy Efficiency Services into their portfolio gives service providers an increased flexibility to adapt to frequent market changing conditions and customer preferences. By diversifying their service portfolio, service providers can respond to evolving trends, regulatory requirements and technological advancements in the energy efficiency sector. This flexibility enables service providers

to stay ahead of the competition, capitalize on emerging opportunities and address the unique needs of their diverse customer base, ensuring their continued relevance and success in the marketplace.

6.2.5. New data available (from the customers)

Engaging in Energy Efficiency Services provides service providers with access to valuable data and insights from their customers. By monitoring energy usage patterns, consumption trends and performance metrics, service providers gain a deeper understanding of their clients' needs and preferences. This data-driven approach enables service providers to tailor their offerings, optimize energy efficiency solutions and provide personalized recommendations to customers, enhancing the overall customer experience and satisfaction.

6.2.6. New market (business model)

Offering Energy Efficiency Services opens up new market opportunities and business models for service providers. By tapping into the growing demand for energy-efficient solutions, service providers can expand their market reach, attract new customers and capture additional revenue streams. Whether through direct sales, partnerships or subscription-based models, service providers can leverage their expertise in energy efficiency to create innovative business models that deliver value to customers while driving sustainable growth and profitability for their businesses.

7. Technical infrastructure and systems

In order to effectively deliver Energy Efficiency Services (EES), a robust technical infrastructure and systems are essential. The planned technical infrastructure encompasses a variety of components, including sensors, equipment, communication networks, and other elements crucial for the successful implementation of EES services.

Key to the operation of EES services are the sensors deployed throughout the energy systems. These sensors are responsible for collecting real-time data on energy consumption, equipment performance, and environmental conditions. Various types of sensors are utilized:

- Smart meters;
- Temperature sensors;
- Occupancy sensors;
- Power quality monitors.

These sensors provide valuable insights into energy usage patterns, allowing EES providers to identify areas for optimization and implement tailored energy efficiency measures.

Alongside sensors, the equipment deployed plays a vital role in supporting EES services. This equipment includes energy storage systems, smart appliances, HVAC (Heating, Ventilation, and Air Conditioning) systems, lighting controls, and renewable energy technologies. Energy storage systems, such as batteries and thermal storage units, enable the storage of excess energy for later use, helping to balance energy supply and demand. Smart appliances and HVAC systems feature advanced controls that enable optimization based on real-time data, contributing to overall energy efficiency. Additionally, the integration of renewable energy technologies, such as solar panels and wind turbines, further enhances the sustainability and resilience of the energy systems.

Communication networks serve as the backbone of the technical infrastructure, facilitating the exchange of data between sensors, equipment, and centralized control systems. These networks utilize various technologies, including wired (Ethernet, Powerline) and wireless (Wi-Fi, Zigbee, LoRaWAN) communication protocols. Secure and reliable communication is essential to ensure the seamless operation of EES services and enable remote monitoring and control capabilities.

In conclusion, the planned technical infrastructure and systems for EES services encompass a comprehensive array of sensors, equipment, communication networks, and other elements essential for optimizing energy usage, reducing consumption, and enhancing overall efficiency. Through the integration of advanced technologies and robust infrastructure, EES providers are equipped to deliver impactful solutions that drive energy savings and environmental sustainability.

8. Financial model – Revenue streams

In this chapter, we will delve into the financial aspects of Energy Efficiency Services (EES) within the context of the Business Model Canvas. Energy Efficiency Services encompass a wide range of solutions aimed at optimizing energy usage, reducing costs and enhancing sustainability for businesses and individuals. As we explore the revenue streams associated with EES, we will also discuss various financing methods that facilitate the implementation of energy efficiency projects.

Discussing the financial aspects of EES services and financing methods is essential for understanding the economic dynamics and viability of energy efficiency initiatives. By examining the revenue models and financing options available, stakeholders can assess the financial feasibility of EES projects, identify potential sources of income and develop sustainable business models.

Possible revenue models for Energy Efficiency Services include subscriptions, service charges, energy savings and other sources of income. Subscription-based models offer recurring revenue streams through ongoing service agreements, maintenance contracts or access to energy management platforms. Service charges may involve one-time fees for energy audits, consulting services or project implementation.

Furthermore, energy savings represent a significant revenue stream for EES providers, as clients benefit from reduced utility bills and operational expenses resulting from energy efficiency measures. Additionally, EES providers may generate income from ancillary services such as equipment sales, financing solutions, performance-based incentives and carbon credits.

By exploring these revenue models and financing methods, stakeholders can gain insights into the financial dynamics of Energy Efficiency Services and develop strategies to maximize profitability, attract investment and accelerate the adoption of energy-efficient solutions. As we delve deeper into the revenue streams associated with EES, we will analyze their implications for business sustainability, customer value and market competitiveness.

8.1. Selling energy

This revenue model involves selling excess energy generated through energy efficiency measures back to the grid or to other consumers. EES providers can install renewable energy systems such as solar PV panels or wind turbines, allowing clients to generate their electricity. Any surplus energy not used by the client can be sold to utility companies or neighboring businesses, providing an additional revenue stream.

Additional Revenue Stream: Selling excess energy back to the grid or other consumers provides an additional source of revenue for EES providers.

Monetization of Excess Capacity: EES providers can monetize surplus energy generated by clients' energy efficiency measures, maximizing the utilization of renewable energy systems.

Enhanced Client Value: Offering energy selling services enhances the value proposition for clients by providing them with an opportunity to generate revenue from their energy assets.

Regulatory Compliance: Compliance with regulations governing energy trading and grid interconnection is essential to avoid penalties and legal liabilities.

Market Volatility: Fluctuations in energy prices and market dynamics may impact the profitability of selling energy, requiring EES providers to adapt their strategies accordingly.

Grid Stability: EES providers need to coordinate with grid operators to ensure seamless integration when selling excess energy back to the grid as it may pose challenges to grid stability and reliability.

8.2. Trading with flexibility

EES providers can leverage the flexibility of energy consumption and production to participate in energy markets and trading activities. By optimizing energy consumption patterns and utilizing demand response strategies, EES providers can capitalize on fluctuations in energy prices and grid demand. This may involve adjusting energy consumption levels or providing ancillary services to grid operators, earning revenue through energy trading and market participation, such as:

Revenue Diversification: Participating in energy markets and trading activities diversifies revenue streams for EES providers and reduces reliance on traditional service offerings.

Profit from Market Opportunities: Flexibility in energy consumption and production allows EES providers to capitalize on market opportunities and maximize returns.

Grid Support Services: Providing support to stability services contributes to grid stability and reliability and enhance the overall resilience of the energy system.

Market Risks: Energy market volatility and price fluctuations pose risks to trading activities, requiring robust risk management strategies.

Technical Challenges: Ensuring the technical compatibility and interoperability of energy systems with market platforms and grid infrastructure is essential for successful energy trading.

Regulatory Complexity: Compliance with regulatory requirements and market rules governing energy trading may present challenges and administrative burdens for EES providers.

8.3. Further use of collected data

In addition to providing energy efficiency services, EES providers can monetize the data collected from energy management systems and IoT devices. Analysis of collected data allows identification of trends, optimize energy use and provide valuable insights to clients. EES providers can offer data analytics services, consultancy or subscription-based access to energy management platforms, generating revenue through data-driven solutions, which supports:

Data Monetization: Monetizing collected data through analytics services and consultancy generates additional revenue streams for EES providers.

Value-Added Services: Data-driven insights enable EES providers to offer value-added services such as predictive maintenance, energy optimization and personalized recommendations to clients.

Client Empowerment and Engagement: Providing clients with access to actionable data empowers and engages them to make informed decisions and optimize their energy usage effectively. EES providers need to pay special attention when dealing with collected data, particularly about:

Data Security: Ensuring the security and privacy of collected data is paramount to maintain client trust and comply with data protection regulations.

Data Quality: Ensuring the accuracy, reliability, and integrity of collected data is essential to deliver meaningful insights and recommendations to clients.

Competitive Pressures: The commoditization of data analytics services may lead to price pressures and increased competition among EES providers in the market.

8.4. Stability services

EES providers can offer stability services to enhance the reliability and resilience of the grid. This may include providing frequency regulation, voltage support or grid balancing services to utilities and grid operators. By leveraging energy storage systems, smart grid technologies and demand-side management strategies, EES providers can contribute to grid stability while earning revenue from providing essential grid services. The main characteristics of this model are:

- revenue stability;
- grid support;
- market differentiation;
- technical complexity;
- regulatory compliance;
- and market dependency.

Offering stability services provides a steady revenue stream for EES providers, as these services are essential for grid reliability and operation. Contributing to grid stability enhances the overall resilience of the energy system and supports the integration of renewable energy sources. Providing stability services distinguishes EES providers as valuable partners for utilities and grid operators, enhancing their market positioning and competitiveness. Providing stability services requires sophisticated energy management systems and expertise in grid operations, posing technical challenges for EES providers. Compliance with regulatory requirements and grid codes governing stability services is essential to ensure operational integrity and avoid penalties. Dependency on stability service contracts with utilities may expose EES providers to risks associated with changes in market dynamics and regulatory frameworks.

8.5. Energy savings as a service

Energy Savings as a Service (ESaaS) is a subscription-based model where customers pay for the energy according to actual savings achieved through energy efficiency measures. EES providers guarantee a certain level of energy savings and charge customers based on the actual savings realized. This model aligns the interests of EES providers with their clients, as providers are incentivized to deliver tangible energy savings while customers benefit from reduced energy costs without upfront investment. The main characteristics of this model are:

Risk Transfer: Energy savings as a service transfers the performance risk from clients to EES providers, aligning incentives and ensuring accountability for delivering guaranteed energy savings.

Predictable Revenue: Subscription-based revenue models provide a predictable stream of income for EES providers, enhancing financial stability and planning.

Customer Value: Offering energy savings as a service enhances the value proposition for clients by enabling them to realize cost savings without upfront investment or performance risks.

Performance Guarantees: Fulfilling performance guarantees and delivering promised energy savings may pose challenges, requiring accurate measurement and verification processes.

Customer Expectations: Managing customer expectations and addressing potential discrepancies between projected and actual energy savings is essential to maintain client satisfaction and trust.

Financial Viability: Ensuring the financial viability and profitability of energy savings as a service requires careful pricing strategies and risk management to mitigate potential losses.

8.6. Selling technology and materials

EES providers can generate revenue by selling energy-efficient technologies, equipment and materials to clients. This may include supplying energy-efficient appliances, lighting fixtures, HVAC systems, insulation materials and renewable energy technologies. By acting as a reseller or distributor of energy-efficient products, EES providers can capture additional value and expand their product portfolio to meet the diverse needs of clients. Concerning this model, the main characteristics are:

Revenue Diversification: Selling energy-efficient technologies and materials diversifies revenue streams for EES providers, tapping into the growing market for sustainable solutions.

Value-Added Services: Providing equipment sales and installation services enhances the value proposition for clients by offering a one-stop-shop for energy efficiency solutions.

Market Expansion: Selling technology and materials enables EES providers to expand their market reach and penetrate new customer segments, driving business growth and profitability.

Supply Chain Risks: Dependency on suppliers and manufacturers for technology and materials may expose EES providers to risks such as supply chain disruptions, quality issues and price fluctuations.

Technical Compatibility: Ensuring the compatibility and interoperability of sold technologies with existing infrastructure and client requirements is essential to deliver effective solutions.

Competitive Pressures: Intense competition in the market for energy-efficient technologies and materials may lead to price pressures and margin erosion for EES providers, necessitating differentiation strategies and value-added services.

9. Cost structure

Cost structure is a crucial component of the Business Model Canvas for Energy Efficiency Service (EES) providers, as it defines the expenditures incurred in delivering energy efficiency solutions and managing business operations. Understanding the cost structure is essential for optimizing resource allocation, pricing strategies, and profitability in the competitive energy efficiency market.

9.1. Direct Costs

Materials and Equipment

Direct costs include expenditures related to procurement of energy-efficient materials, technologies and equipment used for the implementation of energy efficiency projects. This encompasses a wide range of products such as:

- Energy-efficient appliances (e.g. refrigerators, HVAC systems, heat pumps, lighting fixtures).
- Renewable energy technologies (e.g. solar PV panels, wind turbines, geothermal systems).
- Building materials (e.g. insulation, energy-efficient windows, roofing materials).
- Smart devices and sensors (e.g. smart thermostats, occupancy sensors, energy meters).

Labor Costs

Labor costs encompass the wages, salaries and benefits of the staff involved in delivering energy efficiency services. This includes:

- Engineers: Responsible for conducting energy audits, designing energy-efficient solutions and overseeing project implementation.
- Technicians: Tasked with the installation of energy-efficient equipment, conducting retrofits and performing system commissioning.

- Project Managers: Coordination of all project activities, resources management and are responsible for ensuring that the project milestones are met on time and within budget.
- Support Staff: Provide administrative support, customer services/support and logistics coordination throughout the project lifecycle.

Equipment and Tooling Costs

Investment in Tools and Equipment: Direct costs may include expenditures related to acquiring and maintaining specialized tools and equipment necessary for project implementation, such as:

- Construction equipment (e.g. scaffolding, ladders, power tools, tec.).
- Testing and diagnostic equipment (e.g. energy meters, power quality analyzers/loggers, thermal imaging cameras, sensors, etc.).
- Safety gear and Personal Protective Equipment (PPE) required for onsite work (e.g. hard hats, safety goggles, harnesses, life lines, etc.).

Training and Certification Expenses

Direct costs may be allocated for training and certification programs to ensure the competence and qualifications of the workforce. Providing employees with specialized training in energy efficiency technologies, installation techniques and safety protocols. Supporting employees in obtaining industry-recognized certifications such as LEED (Leadership in Energy and Environmental Design) accreditation, BPI certification (Building Performance Institute certification which monitors the quality of home performance contractors) and HVAC technician licenses. Investing in ongoing education and skill development to keep pace with technological advancements, industry best practices and regulatory requirements is essential for any EES provider.

Transportation and Logistics

Direct costs may include expenditures associated with transportation, logistics and vehicle operations required for project deployment, operating and maintaining a fleet of vehicles for transporting staff, equipment and materials to project sites are also included within this category. Additional EES providers need also to cover expenditures related to fuel costs, vehicle maintenance, repairs and insurance for company-owned or leased vehicles used for business operations. Managing logistics, scheduling and route planning to optimize resource allocation, minimize downtime and ensure timely project execution is also crucial.

Permitting and Regulatory Compliance

Direct costs may be allocated for obtaining permits, licenses and regulatory approvals required for conducting energy efficiency projects. Paying fees for building permits, environmental permits, zoning permits and other regulatory approvals necessary for project commencement are also include in this category. Additionally, ensuring compliance with building codes, safety regulations, environmental regulations, and industry standards applicable to energy efficiency projects are essential for the success of any project.

Subcontractor Costs

EES providers may incur costs associated with subcontracting specialized services, such as energy audits, engineering design, construction, and commissioning. Outsourcing certain tasks allows EES providers to access specialized expertise and resources while managing project scalability and operational flexibility.

9.2. Indirect Costs

Overhead Expenses

Indirect costs includes overhead expenditures associated with running the business, such as office rent, utilities, insurance, office supplies, marketing, advertising and administrative costs. These costs are essential for maintaining day-to-day operations and supporting business functions.

Technology and Infrastructure

Investment in technology infrastructure, software systems, data analytics platforms and energy management tools incurs indirect costs. These technological investments enable EES providers to streamline operations, enhance service delivery and leverage data-driven insights for optimizing energy efficiency solutions.

Investment in hardware, software, networks, servers and telecommunications infrastructure to support business operations, data management and communication. Costs associated with purchasing, licensing and maintaining software applications, enterprise resource planning (ERP) systems, customer relationship management (CRM) software and project management tools. Expenses related to data storage solutions, cloud storage services and backup systems for storing and securing business data, project documentation and customer information. Investment in cybersecurity measures, firewalls, antivirus software, encryption tools and security protocols to protect against data breaches, cyber-attacks and information security threats.

Compliance and Regulatory Costs

Compliance with regulatory requirements, standards, permits and certifications may entail indirect costs for EES providers. This includes costs associated with obtaining licenses, conducting environmental assessments, complying with building codes and adhering to safety regulations.

Marketing and Advertising

Budget allocation for marketing and advertising campaigns, promotional activities, branding initiatives and customer acquisition/search strategies to promote EES offerings and attract clients. Expenditures on advertising placements, media buying, online advertising platforms, print media, digital marketing channels and advertising agencies to reach target audiences and generate leads. Design, production and distribution costs for marketing collateral such as brochures, flyers, business cards, presentations and promotional materials.

9.3. Variable Costs

Energy Consumption

Variable costs include expenditures related to energy consumption during the delivery of energy efficiency services, such as electricity, fuel and water usage. EES providers may need to account for variable energy costs incurred during equipment testing, commissioning and ongoing monitoring of energy performance.

Maintenance and Support

Variable costs also encompass expenditures associated with maintenance, repair and support services provided to clients' post-installation. This includes routine maintenance checks, equipment servicing, troubleshooting, and addressing customer inquiries or complaints.

9.4. Project-Specific Costs

Project Management

EES providers may allocate costs for project management activities, including project planning, coordination, scheduling and supervision. Project-specific costs cover the time and resources dedicated to managing project scope, timeline, budget and stakeholder communication.

Quality Assurance

Ensuring the quality and performance of energy efficiency projects incurs in project-specific costs for quality assurance and control measures. This includes conducting performance testing, commissioning activities and post-installation inspections to verify compliance with project specifications and client requirements. A IPMVP (International Performance Measurement & Verification Protocol) methodology maybe used to ensure the project quality, as well as the achievement of any potential energy efficiency targets (if applicable).

9.5. Risk Management Costs

Contingency Reserves

EES providers allocate funds for contingency reserves to mitigate project risks and unforeseen circumstances. Contingency reserves serve as a buffer against cost overruns, delays, scope changes, regulatory changes, supply chain disruptions and other project-related risks.

Insurance Premiums

EES providers may invest in insurance policies to mitigate potential liabilities and risks associated with project execution, such as liability insurance, professional indemnity insurance and workers' compensation insurance. Insurance premiums contribute to the overall cost structure and risk management strategy of EES providers.

10. Marketing and communication

By implementing a comprehensive marketing and communication strategy and focusing on informing the public about the benefits of energy efficiency services for small and medium-sized enterprises, it helps to position itself as a trusted partner and leader in the energy efficiency sector. Through targeted outreach, strategic partnerships and informational content, the goal is to attract customers, increase demand for our services and contribute to a more sustainable future.

10.1. Marketing and Communication Strategy

The first step in terms of marketing strategy is to identify and understand the target audience. This includes businesses, homeowners, public institutions and other entities interested in improving energy efficiency. The target group is segmented on different factors, such as industry type, size, location and energy consumption patterns. Messages and offers can be tailored to meet their specific requirements by understanding the unique needs and challenges of each segment.

To effectively reach primary target audiences, a multi-channel approach must be used in marketing efforts. This includes digital channels such as social media, email communications and search engine optimization, as well as traditional channels such as print advertising, direct mail and other events. The goal is to create high-quality content that educates, informs and engages the audience on energy efficiency solutions. This can include blog posts, white papers, case studies, infographics, videos and webinars that highlight the benefits of energy savings and showcase successful projects, as well as example of good practices in energy efficiency.

Collaboration with industry partners, associations, facilitators and influencers will be instrumental in expanding our reach and credibility within the energy efficiency ecosystem. By partnering with like-minded organizations, it is possible to amplify the message and leverage existing networks to attract customers.

Implementing a robust Customer Relationship Management (CRM) system will enable to manage customer interactions, track leads and nurture relationships effectively. By personalizing communications and providing excellent customer service, it is likely to enhance customer satisfaction and loyalty.

10.2. Channels

Following channels will facilitate communication, education and promotion of EES effectively. They will be used to disseminate information and engage with the target audience regarding EES.

10.2.1. Workshops and seminars

Organization of workshops and seminars aimed at businesses, homeowners and other stakeholders to provide them with valuable insights into energy efficiency solutions and best practices.

These events will serve as platforms for interactive discussions, knowledge sharing and hands-on learning experiences, allowing participants to gain practical skills and actionable strategies for improving energy efficiency.

10.2.2. The Prosumer Platform

Establish a dedicated prosumer platform that integrates existing platforms and resources related to energy efficiency. This platform will serve as a centralized hub for accessing information, resources, tools and services related to energy efficiency, catering to the diverse needs of our target audience.

10.2.3. Information Days

Host information days targeted at specific industries, sectors or communities to raise awareness and provide tailored information about energy efficiency services and solutions. These events will feature presentations, demonstrations and Q&A (Questions & Answers) sessions, allowing attendees to interact with experts and learn about the benefits and opportunities of implementing energy efficiency measures.

10.2.4. Partners' and project's websites, publications and meetings

Websites will serve as valuable online resources for disseminating information, sharing updates and promoting energy efficiency services. These websites will feature dedicated sections highlighting the services, case studies, testimonials and resources to educate visitors and encourage engagement.

The publication of scientific papers, research findings and technical reports in reputable journals and publications will enable to contribute to the body of knowledge in the field of energy efficiency. These publications will showcase the expertise, methodologies and findings, positioning us as thought leaders and experts in the energy efficiency domain.

Schedule face-to-face meetings with competent authorities, regulators and policymakers to discuss energy efficiency policies, regulations and initiatives. These meetings will provide an opportunity to advocate for supportive policies, address regulatory challenges and foster collaboration towards advancing energy efficiency goals.

10.3. Customer Relationships

Within the Business Model Canvas, Customer Relationship is one of the nine key areas describing the business model. This area focuses on how the company builds and maintains relationships with its

customers. It encompasses strategies used by the company to interact with customers from the first contact to long-term relationships and loyalty.

Specifically, Customer Relationship may include various elements such as:

- **Personal interactions:** For some types of businesses, building personal relationships with customers through sales representatives, customer support, or other personal contacts may be crucial;
- **Self-service:** Other companies may prefer a self-service model, where customers serve their own needs through websites, applications, or automated systems;
- **Community interactions:** Building community environments where customers can share experiences, advice, and support each other can also play a role in Customer Relationship;
- **Service personalization:** Providing personalized products or services based on specific customer needs can lead to deeper and more long-lasting relationships;
- **Customer support:** Providing quick and effective support, answering questions, and solving problems can create positive customer experiences and strengthen their relationship with the company.

Customer

Delivery of services: this element focuses on the strategies a company uses to deliver services to its customers. This includes not only the process of service delivery itself, but also the ways in which these services are designed, adapted and presented to customers. For example, it may be important to consider whether services will be delivered online, through face-to-face interactions or a combination of both.

Management of service delivery: an important part of effective service delivery is the management of the processes involved. This includes planning service delivery, allocating resources, monitoring performance and ensuring that services are delivered in accordance with agreed quality standards and time constraints. Managing service delivery can also include managing risk and addressing any problems that may arise during the delivery process.

Partner

Partnership is not only about providing products and services, but also about actively exchanging useful information, experience and monitoring new trends within the industry. This dialogue between business partners can lead to innovation and a better understanding of the market and customer needs. Companies share knowledge and perspectives with each other, which can contribute to the creation of new products and services or to the optimization of existing processes. Partnerships allow both parties to benefit from diverse experiences and perspectives, which can lead to long-term sustainable relationships and competitive advantage in the marketplace.

11. Implementation plan

The implementation plan serves as a framework for the implementation and management of the EES service and can be adapted and supplemented according to the specific needs and conditions of the project.

Analysis and Planning

Setting specific objectives and expected outcomes, such as reducing energy consumption, optimizing energy utilization, etc. Market and target segment analysis: Understanding customer needs and preferences, identifying key competitors and market trends. Resource and budget determination: Defining the required financial, human, and material resources for project implementation.

Design and Development of EES Service

Creating a detailed design of the EES service in line with identified customer needs and business strategy. Technical development: Implementing technological solutions and systems necessary for providing the EES service, such as sensors, software platforms, etc. Testing and validation: Verifying the functionality and effectiveness of the service through pilot projects and feedback from users.

Implementation and Deployment

Training employees for proper provision and support of the EES service. Service deployment: Gradual introduction of the service to the market according to a predetermined plan and schedule. Marketing and promotion: Promoting the service and raising public awareness of its benefits and value.

Monitoring and Optimization

Regular monitoring of key performance indicators of the service, such as energy savings, customer satisfaction, etc. Feedback and iteration: Incorporating feedback from customers and continuous optimization of the service based on acquired insights. Development and innovation: Identifying opportunities for the development and innovation of the EES service to maintain competitiveness and meet changing market needs.

Evaluation and Assessment

Analyzing achieved results and comparing them with initial goals and expectations. Identification of benefits and potential shortcomings: Assessing how the service contributes to achieving business goals and identifying any potential shortcomings or areas for improvement. Next steps plan: Determining additional steps and measures based on evaluation results to optimize and expand the EES service.

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