D5.5 – After-LIFE Conservation Plan v1

DELIVERABLE FACTSHEET

Deliverable no.	Deliverable D5.5
Responsible Partner	**ED**
WP and Task no. and title	**WP5 – Sustainability, replication, and exploitation of project results**
Version	**1.00**
Version Date	**06/10/2025**

Dissemination level	
X	PU = Public
	PP = Restricted to other programme participants (including the EC)
	RE = Restricted to a group specified by the consortium (including the EC)
	SEN = sensitive
	CO = Confidential, only for members of the consortium (including the EC)

Approvals	Company
Author/s	**ED**
Task Leader	**ED**
WP Leader	**EGC**
1st Reviewer	**Anna Boubouzioti, QUE**
2nd Reviewer	**Tibet Bashkaya, EUP**

ABREVIATIONS

API	Application Programming Interface
BIM	Building Information Modelling
CINEA	Climate, Infrastructure and Environment Executive Agency
EC	European Commission
EnPC	Energy Performance Contracting
EPB	Energy Performance of Buildings
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificates
ESCO	Energy Service Company
IFC	Environmental, Social, Governance
EU	European Union
GDPR	General Data Protection Regulation
HVAC	Heating, Ventilation, and Air Conditioning
IFC	Industry Foundation Classes
IP	Intellectual Property
KPI	Key Performance Indicator
MEPS	Minimum Energy Performance Standards
MS	Member State
PaaS	Platform-as-a-Service
SRI	Smart Readiness Indicator
SWOT	Strengths, Weaknesses, Opportunities, Threats
UI	User Interface
USP	Unique Selling Proposition

PARTNERS SHORT NAMES

Partner No.	Short Name	Full Name
1	**ED**	European Dynamics
2	**QUE**	QUE TECHNOLOGIES
3	**EUP**	EUPHYIA-TECH
4	**SBC**	SBCGR (Sustainable Buildings Council Greece)
5	**EPBC**	EPB CENTER
6	**ENERSAVE**	EnerSave Capital
7	**EU.BAC**	EU Building Automatization Controls Association
8	**EGC**	European Green Cities
9	**EFIEES**	European Federation of Intelligent Energy Efficiency Services

About openBEP4EU

*The **openBEP4EU** project is co-funded by the European Union under Grant Agreement No. 101167613 (Life Programme). The project started as of September 1st, 2024, and is anticipated to conclude in March 2027 (30 months duration).*

The building sector is recognised as one of the pillars for achieving the target of European climate neutrality by 2050. The EU is undergoing a twin transition, a digital and green transition as outlined in recent European directives. Buildings are a significant contributor of emissions, and they consume a sizeable portion of EU's energy consumption. Towards EU's direction of improving the performance of its building stock, Energy Performance Certificates (EPCs) have, among other initiatives and actions, been instrumental in achieving the set targets. EPCs have become a powerful tool for the end-users, such as service providers who can identify business opportunities, or policymakers who are empowered with better data on the building stock, enabling them to oversee the effects of policies and financial schemes.

A more harmonised European calculation methodology for the EPCs could, among others, increase comparability between regions, trust, and market uptake for features related to smart readiness, comfort, real energy consumption, and district energy. To this end, OpenBEP4EU aims to deliver an open-source, universal software implementation of the ISO 52000 standards family, namely the EU Kernel EPC Engine, to facilitate simultaneous and coordinated adoption of an innovative EPC calculation approach among all the Member States. This initiative aims to make building performance data easily accessible to various stakeholders like financial institutions, energy service providers, and building owners, fostering the development of financial products supporting sustainable renovation projects.

Core elements of openBEP4EU's activities also include the creation of an EPC Support Team to drive market adoption as well as a Sustainable Design Data Hub, aligned with the overarching goals of the European Bauhaus initiative, that not only serves as a data repository but also promotes collaboration and research for sustainable architecture and design. These activities will facilitate stakeholder engagement, contribute to improved EPC reliability, accuracy, accessibility, while paving the way for EPC market uptake across the EU Member States though well promotion strategies. All data sharing within this framework adheres to the principles of the Common European Energy Data Space, prioritizing sovereign data sharing and respecting data ownership among the involved stakeholders.

Executive summary

This deliverable presents the first After-LIFE Conservation Plan for the OpenBEP4EU project, outlining how its results will be maintained and exploited once the project is completed. OpenBEP4EU addresses a priority concern within the European building stock: the fragmentation of Energy Performance Certificate (EPC) methodologies and the lack of harmonisation between Member States. By making available an open-source, standards-based Digital Toolbox, the project enables harmonised energy performance and Smart Readiness Indicator (SRI) calculations, and supports comparability, trust, and interoperability, in line with the Energy Performance of Buildings Directive (EPBD) and the EU's Renovation Wave goals.

The conservation of OpenBEP4EU outcomes is founded on three underlying value propositions:

1. **Harmonised energy efficiency and SRI calculation** through the EPB and SRI Kernels, with ISO 52000 standards conformity and promoting the adoption of EPBD.
2. **Open, modular, and interoperable Digital Toolbox**, including APIs, BIM integration, and Bauhaus Design Data Hub for secure data sharing and collaboration.
3. **Enhanced EPC trust and transparency**, providing auditable, accurate and transparency-enhancing outputs to support policymaking, green finance, and renovation planning.

To ensure long-term sustainability, the approach combines open-source availability with value-added services such as managed hosting, premium APIs, consultancy, and training. The most significant exploitable outcomes are the Digital Toolbox components, including the EPB and SRI Kernels, audit tools, the Bauhaus Design Data Hub, and the Dataspaces interface, supported by comprehensive documentation and capacity-building activities. These components will enable multiple stakeholders, like national authorities, energy assessors, technology providers, and financial institutions, to integrate OpenBEP4EU solutions into their workflows and business models.

The initial market penetration strategy focuses on pilot demonstrations, dialogue with national authorities, cooperation with industry and finance, and activating the open-source community. Awareness and technical capacity will be established by dissemination and training activities, and policy relevance will be reinforced by alignment with EU initiatives such as the Renovation Wave and Next Gen EPC cluster. A preliminary revenue generation analysis anticipates income from consultancy, public sector contracts, Platform-as-a-Service solutions, premium APIs, and customised training, ensuring sustainability once the LIFE finance has ended.

This is the initial version of the After-LIFE conservation plan. A complete update will be delivered in month 24, drawing on experience from pilot implementations, feedback from stakeholders and dissemination outcomes. More elaborate business models, open-source community governance structures, and a roadmap towards large-scale adoption will be included, so that OpenBEP4EU becomes a reference solution for Europe's digital and green transition in the building sector.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1. Purpose of the document

The purpose of this document is to outline the business and exploitation strategy for sustaining the OpenBEP4EU results beyond the project lifetime. It aims to consolidate and elaborate on the value propositions, commercialisation potential, and long-term sustainability. It sets the foundation for market penetration and adoption by considering business and technical aspects into a coherent plan.

More specifically, key market drivers, market needs and strategic stakeholders are identified and mapped to the OpenBEP4EU value propositions. It defines the propositions' innovations in relation to existing solutions and proposes viable go-to-market pathways. Hence, it facilitates a shared understanding of the exploitation context among project partners and stakeholders, while supporting the development of exploitation models.

1.2. Structure of document

The structure of the document is the following:

Chapter 1 introduces the document.
Chapter 2 provides a general overview of the project background and the generated innovations.
Chapter 3 provides an analysis of the market.
Chapter 4 provides insights on the OpenBEP4EU value propositions.
Chapter 5 elaborates on the business model and business cases.
Chapter 6 concludes the document and provides a summary of the follow up actions.

1.3. Target Audience

The target audience of this document includes a broad spectrum of stakeholders who are directly or indirectly involved in the implementation, adoption, and exploitation of the OpenBEP4EU results. This encompasses:

- The EC, as a funding authority and enabler of the project's alignment with the EU policies.
- Member state authorities and national agencies, as responsible for the deployment of EPC frameworks, as key adopted and beneficiaries of the project's harmonised and standards-based tools.
- Policymakers, expecting harmonised calculations for comparability across the EU.
- Technology providers and third-party developers, which need access to the digital toolbox and documentation to provide consulting and implementation services.
- Energy assessors and experts (e.g. SRI evaluators, digital logbook managers), as responsible for evaluating the performance, compliance, and quality of buildings.
- Building material manufactures and construction companies, with involvement in the maintenance, operation, efficiency, and energy performance of the relevant buildings.
- ESCOs, financial and insurance institutions, interested in having access to energy performance data.
- Project partners, implementing tools compliant with EU directives.

1.4. Disclaimer

OpenBEP4EU is Co-funded by the European Union under Grant Agreement No. 101167613. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

2. Project and Innovation overview

2.1. Background and innovations

The building sector represents one of the most significant contributors to energy consumption and greenhouse gas emissions in the European Union. In response to this challenge, the EU has introduced an ambitious legislative framework, including among others the EPBD, the Renovation Wave strategy and the introduction of SRIs, all aimed at decarbonising the building stock and improving indoor comfort and conditions. EPCs play a central role within this framework, but their implementation across the Member States remains fragmented, with diverse methodologies, tools and levels of digital maturity. This fragmentation hampers comparability weakens market trust and limits the effectiveness of the EPCs in supporting green policies and transition.

To address these challenges, the OpenBEP4EU introduces a set of tangible and methodological results, designed to harmonise the energy performance calculations across the EU. The innovations delivered within the OpenBEP4EU project include:

- The EU Kernel EPC Engine, a universal, harmonised and coordinated implementation of next-generation Energy Performance Certificate (EPC) systems, based on the CEN/ISO 52000 standards family, ensuring uniform adoption of the common calculation framework across EU Member States.
- The EPB Kernel, a common, centralised software to calculate energy performance KPIs for buildings, enabling transparent, standardised, and harmonised energy performance assessments.
- The SRI Kernel, a universal implementation for SRIs calculation, bridging the gap between energy performance and smart technology integration.
- The Bauhaus Design Data Hub, a central repository for reference data, best practices, and results, effectively serving as the project's implementation of a digital building logbook concept.
- Dataspaces interface, provision of tools which manage secure sharing of data to external entities.
- Audit tools and methodologies for handling and getting the data from the building model and user related to the building audit.
- EPC Support Team creation to increase the adoption of EPCs in the market, with emphasis in enhancing the valuation of building portfolios.

The above innovations altogether aim to reduce market fragmentation, enhance the comparability and impact of EPCs, and provide the foundation of data-driven policy decision making, ultimately supporting the EU's green transition.

2.2. IP status

The IP holders of individual innovations are summarised in the following table. Expected outcomes and results are the project's main exploitable results, including knowledge generated and published, the framework of technical features and services released, as well as strategic relationships among key stakeholders. These outcomes with specific methods of exploitation, are gathered.

Table 1: Exploitable outcomes

Outcome	Partners	Exploitation methods	Indicative beneficiaries
Methodology to manage integration of multiple components for OpenBEP4EU Digital Toolbox	QUE, EUP, ED, SBC	• Consultancy and training service • Technical support and implementation activities	• Technology providers • Third-party developers • National authorities • EPC platform operators
EPB Kernel	QUE	• Implementation and support activities for calculation of energy performance KPIs for buildings and integration with SRI Kernel.	• National authorities • Energy assessors • Policy-makers • Software developers
SRI Kernel	EUP	• Implementation and support activities for SRIs calculation and integration with EPB Kernel.	• Smart building technology providers • Energy assessors • Policy-makers • Building owners
Bauhaus Design Data Hub	SBC	• Provision of repository for building model reference data, best practices.	• Architects • Designers • Researchers • Policy-makers • Renovation planners
Building Performance Application and Dataspaces interfaces	ED	• Implementation of interfaces and provision of tools which manage secure sharing of data to external entities.	• Building owners • Energy assessors • Public authorities • Data managers
Audit tools and methodologies	EUP	• Implementation and support activities for handling and getting the data from the building model and user related to the building audit.	• Energy assessors • EPC auditors • Building owners • Compliance officers
EPC Support Team	EPBC, QUE, EUP, SBC EUBAC, EFFIES, ENERSAVE	• Support activities to increase the adoption of EPCs in the market. Provision of comprehensive technical expertise, data analysis capabilities, and engagement of relevant stakeholders, including national public authorities and other end-users of OpenBEP4EU Digital Toolbox components.	• National authorities • Energy assessors • Building owners • Financial institutions
Training programs and documentation provision	QUE, EUP, ED, SBC	• Comprehensive Open-Source Documentation and Training Kit. • Programs and upskilling initiatives for construction professionals and auditors.	• Construction professionals • Energy auditors • Developers • Public authorities
Approaches to organise efficient dissemination related to energy sector	EGC, EPB	• Reusable for other projects	• Policy makers • Energy sector stakeholders • Project partners • Communication teams

3. Market overview

3.1. Target market needs

The EU, through the EPBD, aims to achieve a highly energy efficient and decarbonised building stock by 2050, and compels Member States to develop respective roadmaps, guidelines, and measurable, targeted actions. However, experts agree that ambitious policies on their own are insufficient. [1] EPCs, although mandated across Member States, are often regarded as an administrative requirement, rather than strategically valuable. Their implementation varies significantly across the member states with limited market penetration and acceptance by the users due to low reliability and lack of user-friendliness, resulting in a low diffusion of EPCs [2] [3].

A key factor contributing to the above is the lack of harmonisation in EPC calculation methodologies across the Member States. There is a need for further enforcement and harmonisation of the EPCs quality and centralised EPC registries that will facilitate comparability and will enable the exchange of best practices and methods. [4] The current fragmentation weakens confidence among building constructors and owners, institutions, and policy makers. It hampers the design of incentive schemes and the alignment of efforts at national and EU level.

The demand for automated, BIM-integrated energy assessment tools is increasing, driven by the need for efficiency, accuracy, and compliance. BIM is recognised as a foundational element in the digital transformation of construction, offering structured digitised information on building assets [5]. Most current EPC calculation tools operate in isolation from BIM representations, requiring redundant data entry and manual extraction of building parameters, introducing inefficiencies and errors. The market needs a seamless integration between BIM and EPC tools, to leverage existing digital models and ensure consistency between design, operation, and reporting [6]. This integration can also support more advanced use cases, including renovation planning, and A/B testing, further reinforcing the strategic importance of BIM-enabled EPC tools in achieving climate and digitalisation objectives.

There is also a growing interest among stakeholders in integrating SRI capabilities and comfort metrics into energy performance assessments to reflect the evolving expectations of building users, service providers, and policymakers. Traditional EPCs are typically based on static asset-level calculations and therefore fall short in capturing how building can potentially perform in real-world situations and adapt to occupant needs. The SRI addresses this gap by evaluating the building's capacity for automation, responsiveness and occupant-centric services, such as thermal comfort, air quality and smart controls [7]. By utilising SRIs, energy performance assessment tools can provide a richer, multi-dimensional perspective of building performance, facilitating data-driven decision-making.

Concluding the above, the target market needs can be summarised as follows:

- Reliable and valuable energy performance calculations that can be leveraged for EPCs,
- Harmonisation of EPC calculation methodologies,
- Centralised and accessible data, usable for energy performance assessment and EPCs,
- Integration of SRIs.

3.2. Market size and trends

EU Renovation Wave, a flagship initiative launched in 2020 under the European Green Deal, aims to renovate 35 million buildings by 2030 and double the annual energy renovation rate across the EU [8]. It addresses the urgent need to improve the energy performance of Europe's aging building stock, which accounts for 40% of energy consumption and 36% of greenhouse gas emissions in the EU [8].

The Renovation Wave is closely tied to the revised Energy Performance of Buildings Directive (EPBD) and supports the rollout of digital Energy Performance Certificates (EPCs), Smart Readiness Indicators (SRIs), and digital building logbooks. The Renovation Wave sets the ambition to decarbonise the EU building stock by 2050, and the EPBD provides the regulatory framework to achieve this. The EPBD recast (Directive 2024/1275) introduces mandatory digital EPCs with harmonised formats and scales, Minimum Energy Performance Standards (MEPS) to trigger renovations, as well as a framework for digital building logbooks to centralise and track building-related data. These tools are essential for monitoring renovation progress and ensuring that energy upgrades contribute meaningfully to EU climate goals.

The EPC market is growing rapidly, driven by increased demand for energy-efficient buildings, rising property values linked to better EPC ratings and the EU-wide push for zero-emission buildings by 2050. EPCs are central to identifying worst-performing buildings, which are the primary targets of the Renovation Wave. EPCs are now mandatory across the EU for selling, renting, or constructing buildings, and their role is expanding under the revised EPBD (EU/2024/1275). Harmonised digital EPCs are to improve comparability and usability across Member States [8]. Also, they are used to trigger minimum energy performance standards, which are key instruments for enforcing renovation [9]. The new harmonised rating scale (A to G) and digital format are expected to boost market transparency and comparability, encouraging investment in energy-efficient buildings [10]. EPCs are becoming a key driver in the real estate market, with high-performance buildings commanding higher sale and rental prices, creating a virtuous investment cycle. Although precise EU-wide market size figures are limited, the EPC ecosystem includes thousands of certified assessors. a growing number of digital platforms, as well as increasing demand for data integration and analytics services.

Digital EPCs are advanced versions of traditional energy certificates that use tools like BIM and renovation passports to provide dynamic, real-time insights into a building's energy performance. Unlike static, paper-based EPCs, they are continuously updated, interoperable with EU platforms, and support smarter renovation planning and policy integration. Under the recast of the Energy Performance of Buildings Directive (EPBD) adopted in April 2024, digital EPCs will become mandatory starting in 2025. Specifically, all energy performance certificates must be issued in digital format, use a harmonised scale of energy performance classes and follow the template defined in the directive. This shift aims to improve comparability, interoperability, and data accessibility across Member States, supporting broader goals like smart building integration and renovation tracking.

The Renovation Wave promotes smart and digital-friendly renovations, which aligns with the EPBD's push for Smart Readiness Indicators (SRIs). SRIs assess a building's capacity to adapt to occupant needs, interact with the energy grid and use smart technologies for energy efficiency, comfort. Integrating SRIs into EPCs and digital logbooks enhances the digital ecosystem, making it easier to plan and monitor smart renovations. As of now, across the European Union the SRI remains a voluntary scheme under the current implementation of the EPBD. However, by June 2026, the European Commission must deliver a report on the testing and implementation of the SRI. Starting from mid-2027, the SRI will become mandatory for large non-residential buildings, supporting deeper and smarter renovations [8], while remaining optional for others unless further legislation expands its scope. The SRI framework supports technological innovation in the construction sector and is expected to drive demand for smart building technologies (e.g., automation, monitoring), assessment tools and services. training and certification programs. The EU is developing a common technical framework and national catalogues of smart-ready services to support market uptake.

Comprehensive building data concerning EPC ratings and updates, SRI assessments. renovation history and technical specifications can be stored in digital building logbooks. They constitute repositories that have been designed to serve as centralised platforms. They support long-term renovation planning and improve data transparency for owners and authorities. The Renovation Wave encourages their adoption to improve transparency, owner engagement and facilitates access to financing. The EPBD mandates Member States to implement digital building logbooks by May 2026 [11], making them a cornerstone of the Renovation Wave's digital infrastructure [12]. The EU Digital Building Logbook Study [11] has developed a semantic data model, technical guidelines for implementation, and use cases for data sharing, compliance tracking, and renovation planning. Digital building logbooks are creating market needs for digital infrastructure and platforms, data governance and cybersecurity services. As well as consulting and integration support for public and private stakeholders.

Significant market openings are being created for energy service companies (ESCOs). They are positioned to play a central role in delivering energy efficiency improvements through Energy Performance Contracting (EnPCs). These contracts allow building owners to pay for renovations through the energy savings generated, reducing upfront costs [13]. ESCOs can undertake public sector renovations by aggregating projects for schools, hospitals, and municipal buildings. Concerning Residential sector, technical assistance is being developed to help ESCOs bundle and manage residential renovations. Additionally, demand for smart-ready renovation services is created and smart building upgrades are supported through digital EPCs and their integration with SRIs. The development of ESCO market is further encouraged and supported through National Recovery and Resilience Plans which allocate funding [13].

The Renovation Wave is backed by a robust financing strategy, combining EU-level funding with private capital to close an estimated €165 billion annual investment gap for building renovations [14]. There is also significant market opening created for green finance providers. Performance-based financing is possible since EPCs and SRIs provide measurable metrics for green loans and ESG investments. Banks and investors require reliable EPC and SRI data to assess renovation risks and returns. Incentives, such as tax reductions, grants, or preferential loan terms can be offered to building owners or developers, whose properties achieve high energy performance ratings on their EPCs, thereby encouraging deeper renovations and smarter energy upgrades. Renovation-linked mortgages also arise where the relevant financial products are tied to building performance improvements. Digital building logbooks enable performance-based financing models and transparent tracking of renovation impacts, supporting risk assessment and compliance.

There can also be synergies between ESCOs and green finance. ESCOs can leverage green finance to scale up operations and offer possibly offer zero or reduced upfront cost renovation packages, with guaranteed energy/CO_2 performance over time that noticeably strengthen the economic and financial robustness of renovation projects. Financial institutions rely on rely on standardised digital EPCs and SRIs to assess project viability and monitor outcomes. The digital building logbooks serve as a data backbone for both service delivery and financial reporting.

3.3. Customer segments

The stakeholders of the EU Kernel EPC Engine and their expectations have been analysed in the deliverable D2.1. By explicitly identifying them, the OpenBEP4EU digital toolbox features can address and support relevant real-world needs for the relevant end-users.

The EPC market is expanding rapidly due to mandatory issuance for building sales, rentals, and renovations. We need to mention that the push for digital EPCs under the EPBD recast is creating demand for relevant digital platforms and software tools, qualified assessors and auditors, as well as data integration services [15]. Also, the SRI market is emerging, with mandatory implementation for non-residential buildings (with HVAC systems >290 kW) by 2027. This creates opportunities for smart building technology providers, SRI assessment tools and services. Digital building logbooks, which are expected to become standard by 2026, drive demand for data management platforms, interoperable frameworks, consulting and implementation services [16]. **Technology providers** and third-party developers need open APIs and documentation to build custom applications, which can be used by other end-users. The EU Kernel EPC Engine has been designed to serve such needs.

There is increased need for certified energy assessors, SRI evaluators, and digital logbook managers. **Energy assessors** (companies and individuals) are responsible for evaluating the performance, compliance, and quality of buildings or systems against predefined standards or benchmarks. Therefore, they require a user-friendly auditing tool to improve EPC reliability and compliance. Policymakers expect harmonised calculations for comparability across the EU. Public and energy authorities expect tools to support convergence with national EPC schemes and EU standards. Governments need centralised data platforms to monitor compliance with EPBD and Renovation Wave targets. Municipalities require tools to prioritise renovations and track progress on climate goals. Public procurement increasingly demands digital documentation of building performance.

EPCs constitute a key driver in the real estate market since high-performance buildings entails higher sale and rental prices, creating a virtuous investment cycle. This produces added value for the **building owners/ managers** who seek clear renovation guidance and trust in EPC recommendation. They prioritize actionable and comprehensible outputs (like tailored renovation roadmaps and improved comfort indicators), and assessors look for reduced administrative burden (through automation and data import from BIM models). Based on the renovations recommended, building material manufactures and construction companies will be involved and play a crucial role in the maintenance, operation, efficiency and energy performance of the relevant buildings. **ESCOs**, **financial** (e.g. banks) and **insurance institutions** constitute stakeholders that want insight to energy performance data. They anticipate access to reliable building performance data so that they can develop financing products for renovations. Thus, energy solutions and retrofitting are provided, with improved efficiency, performance-based energy savings and reduced costs.

4. Value proposition

The methodology of business model canvas was selected by the consortium as basis for the design of the OPENBEP4EU conservation plan. Multiple value propositions can be generated, both individually and in collaboration. As a first step, these main value propositions were defined. The relevant needs in the market at high level were mapped to value propositions through value proposition canvas.

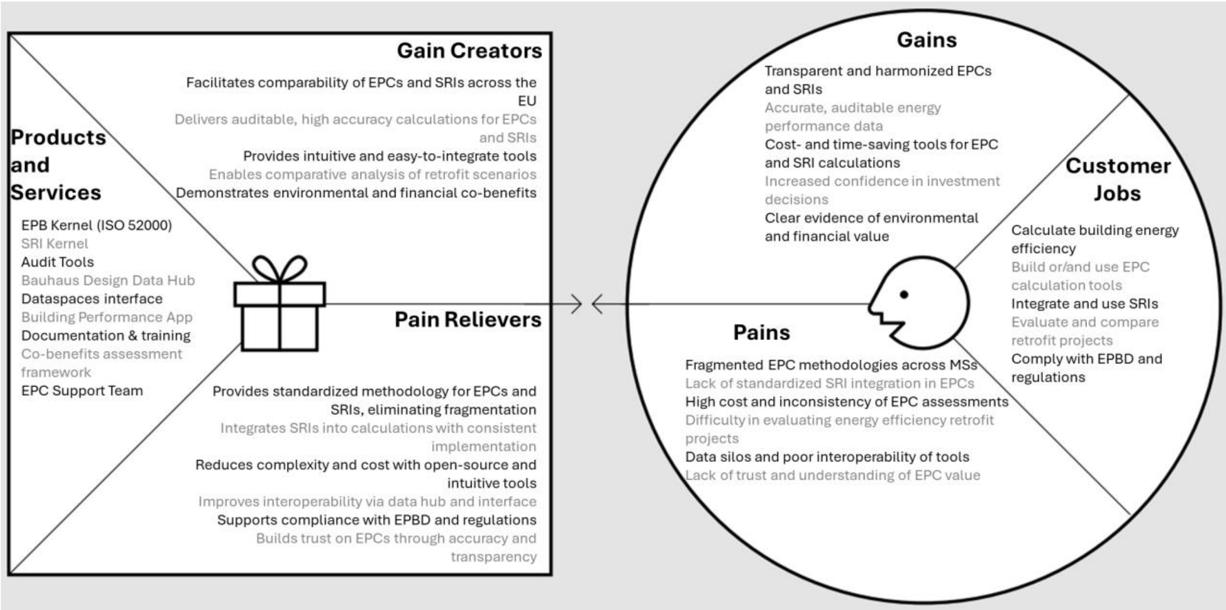

Figure 1: OpenBEP4EU Value Proposition Canvas

Customer needs:

- Calculate building energy efficiency: Users need accurate energy performance calculations to assess compliance, plan renovations, and benchmark performance. This is the core function of the EPB Kernel.
- Build or/and use EPC calculation tools: Stakeholders require tools that implement harmonised methodologies, reducing fragmentation and ensuring comparability across Member States.
- Integrate and use SRIs: Incorporating SRIs into EPCs adds value by reflecting smart technology capabilities, as mandated by EPBD.
- Evaluate and compare retrofit projects: Decision-makers need to simulate scenarios and compare options to optimize investments and energy savings.
- Comply with EPBD and regulations: Ensure outputs align with EU directives and standards, such as EPBD, ISO 52000.

Gains:

- Transparent and harmonised EPCs and SRIs: Build trust and comparability across the EU, supporting policy and market uptake.
- Accurate, auditable energy performance data: Enable reliable assessments and reduces uncertainty in decision-making.
- Cost- and time-saving tools for EPC and SRI calculations: Simplify complex processes, reducing administrative burden.
- Increased confidence in investment decisions: Reliable data and standardised outputs reduce financial risk for investors and banks.

- Clear evidence of environmental and financial value: Demonstrate co-benefits, supporting the EU goals and policy compliance.

Pains:

- Fragmented EPC methodologies across MSs: Leads to inconsistencies and lack of comparability, undermining trust.
- Lack of standardised SRI integration in EPCs: Makes it difficult to assess smart readiness uniformly across the EU.
- High cost and inconsistency of EPC assessments: Current tools are expensive and vary in quality, creating barriers for adoption.
- Difficulty in evaluating energy efficiency retrofit projects: Lack of standardised tools complicates scenario analysis and investment planning.
- Data silos and poor interoperability of tools: Hinders data sharing and integration with other systems.
- Lack of trust and understanding of EPC value: Users doubt EPC reliability, reducing their influence on renovation decisions.

Products and services:

- EPB Kernel (ISO 52000): Core engine for harmonised energy performance calculations.
- SRI Kernel: Adds smart readiness assessment to EPCs.
- Audit Tools: Facilitate data collection and validation for EPC/SRI calculations.
- Bauhaus Design Data Hub: Repository for EPC data, best practices, and design insights.
- Dataspaces interface: Enables secure, sovereign data sharing across stakeholders.
- Building Performance App: Reference UI for assessors and building owners.
- Documentation & training: Supports adoption and capacity building.
- Co-benefits assessment framework: Quantifies environmental and financial impacts.
- EPC Support Team: Provides expert guidance and promotion of EPCs, for implementation and compliance.

Gain creators (and linked gains):

- Facilitates comparability of EPCs and SRIs across the EU: Transparent and harmonised EPCs and SRIs.
- Delivers auditable, high accuracy calculations for EPCs and SRIs: Accurate, auditable energy performance data.
- Provides intuitive and easy-to-integrate tools: Cost- and time-saving tools.
- Enables comparative analysis of retrofit scenarios: Increased confidence in investment decisions.
- Demonstrates environmental and financial co-benefits: Clear evidence of environmental and financial value.

Pain relievers (and linked pains):

- Provides standardised methodology for EPCs and SRIs, eliminating fragmentation: Fragmented EPC methodologies.
- Integrates SRIs into calculations with consistent implementation: Lack of standardised SRI integration.
- Reduces complexity and cost with open-source and intuitive tools: High cost and inconsistency of EPC assessments.
- Improves interoperability via data hub and interface: Data silos and poor interoperability.
- Supports compliance with EPBD and regulations: Regulatory alignment.
- Builds trust in EPCs through accuracy and transparency: Lack of trust and understanding of EPC value.

4.1. Addressing market needs

The OpenBEP4EU project will solve the most important market needs stemming from the EU vision of achieving a decarbonised and energy-efficient building stock by 2050, in line with the EPBD and Renovation Wave. Among the most important needs is to possess solid and informative energy performance calculations that go beyond administrative fulfilment and to provide actionable information to aid renovation planning and investment choices. Modern-day EPCs are often not reliable, comparable or utilizable, and hence reach a low market penetration. OpenBEP4EU addresses this by offering a digital toolbox that is ISO-52000 compliant, integrating SRIs. The outcome is harmonised, transparent, and auditable calculations across the Member States. This is related also to the lack of standardised auditing procedures, tools and technologies. There are considerable differences in the way energy performance auditing is performed today, leading to different results, reduced comparability, and reduced confidence in EPCs. Providing a common standard method for auditing supported by compatible digital tools and the standardised calculation methods will ensure that EPCs are robust, trustworthy, and transparent. This harmonization would be required not only for the regulatory compliance within the EPBD but also for cross-border comparability, facilitation of green financing, and data-driven policy-making at the EU level.

Another pressing need is for shareable and usable data in the interests of interoperability and decision-making that is data-driven. Today's EPC tools operate in silos, resulting in inefficiencies and limiting the exchange of best practices. OpenBEP4EU bridges this through the Bauhaus Design Data Hub and Dataspaces interface to make secure, sovereign data sharing possible in line with EU data space principles. In addition, the sector needs to be integrated with BIM and advanced digital tools to enable efficient auditing and reduced redundant data entry. OpenBEP4EU's Building Performance App and Audit Tools use BIM models and stringent data processes, reducing costs while improving accuracy. Finally, growing interest in SRIs and comfort metrics reflects the need for multi-dimensional performance measurement. Through the incorporation of SRI calculations and co-benefits assessment frameworks, OpenBEP4EU allows stakeholders to consider not just energy efficiency but also smart performance and environmental performance, supporting the EU's transformation towards decarbonisation and digitalisation.

4.2. Differentiation and Unique Selling Proposition

OpenBEP4EU distinguishes by offering an entirely open-source, standards-based digital toolkit with EPC and SRI calculations integrated into a single harmonised framework, aligned with the CEN/ISO 52000 family and EPBD specifications. Unlike existing disjointed solutions, it incorporates a global calculation engine ensuring comparability among Member States, addressing one of the most critical market needs: harmonisation. This comes with BIM integration that can handle automatic data importation from IFC models, reduces manual labour, human error, and expense—an outright differentiator in a market where most EPC tools are still siloed from digital building models.

Aside from computation, OpenBEP4EU offers an end-to-end enabling ecosystem made up of the Bauhaus Design Data Hub for centrally offering access to data, a Dataspaces interface for sovereign and secure sharing of data, and open APIs for third-party developers. This kind of functionality makes the solution a future-proof platform that can ensure interoperability, innovation, as well as scalability. By integrating Smart Readiness Indicators and co-benefits analysis tools, the toolbox is greater than compliance-oriented to offer multi-faceted insights from energy efficiency through smartness and environmental impact, and allow stakeholders to make well-founded, data-driven decisions. This combination of openness, interoperability, and state-of-the-art functionality positions OpenBEP4EU particularly well to drive the EU's twin transition to digitalisation and decarbonisation.

4.3. Main value propositions

Considering the above value proposition analysis and the USP, the main value propositions of OpenBEP4EU can be encapsulated in the following 3 main value propositions:

1. Harmonised energy efficiency and SRI calculation
2. Open, interoperable and modular Digital Toolbox
3. Enhanced EPC trust and transparency

4.4. Traceability of value propositions

Table 2 explains how the 3 main value propositions are linked to the OpenBEP4EU exploitable outcomes, which are indicated in Table 1.

Table 2: Traceability of value propositions to exploitable outcomes

Outcome	Harmonised energy efficiency and SRI calculation	Open, interoperable and modular Digital Toolbox	Enhanced EPC trust and transparency
Methodology to manage integration of multiple components for Digital Toolbox	Ensures seamless deployment of EPB and SRI kernels within national systems and 3rd-party software	Provides the framework for modularity and interoperability of the Digital Toolbox	
EPB Kernel	Core engine for harmonised energy performance calculations		Deliver auditable, standards-based calculations that build trust in EPC outputs
SRI Kernel	Adds smart readiness assessment, ensuring uniform integration		Deliver auditable, standards-based calculations that build trust in EPC outputs
Bauhaus Design Data Hub		Central repository for datasets, best practices, and reference material, fostering openness and collaboration	Promotes transparency by providing access to reference data and best practices
Building Performance Application and Dataspaces	Enable the development of 3rd-party applications that guide users towards energy saving methods	Enable secure data sharing and integration with external systems, supporting interoperability	Ensure secure, GDPR-compliant data exchange, reinforcing trust
Audit tools and methodologies	Enable accurate data collection for EPC and SRI calculations		
EPC Support Team			Engages stakeholders, provides technical expertise, and drives adoption to increase confidence in EPC reliability
Training programs and documentation provision	Support adoption and correct implementation of harmonised methodologies	Facilitate third-party development and integration through open APIs and clear guidance	
Approaches to organise efficient dissemination related to energy sector			Ensure consistent communication and awareness across the energy sector

5. Go-to-market strategy

5.1. Commercialisation pathways

The OpenBEP4EU Digital Toolbox can exploit several channels for market uptake and long-term sustainability. One primary channel is **integration into national EPC systems** that could enable Member States to adopt the EPB and SRI calculation engine harmonised under their regulatory instruments. This approach reduces the cost and effort of establishing national tools and ensures compliance with the EPBD and makes it easier to deploy digital EPCs and SRIs. By providing a modular, open-source solution, the answer can be customised to suit national requirements but be interoperable across the EU.

The second significant path is licensing and customizing **APIs** and **support services** to third-party developers. The open API layer and large documentation facilitate energy service companies, technology suppliers, and software companies in developing customised applications on top of the EU Kernel EPC Engine. This allows for value-added services such as high-end analytics, renovation planning tools, and integration of digital building logbook. Furthermore, **public procurement** pathways can stimulate uptake through support for large-scale deployment of smart buildings over public building portfolios. These public procurement pathways, together with **partnerships** with ESCOs, finance institutions, and smart building technology providers, establish OpenBEP4EU as a keystone of the EU's green and digital transformation in the building sector.

5.2. Business models

The Business Model Canvas is utilised to intuitively illustrate the OpenBEP4EU business model. Details of the different building block elements are given below. The business model canvas is illustrated in Figure 2.

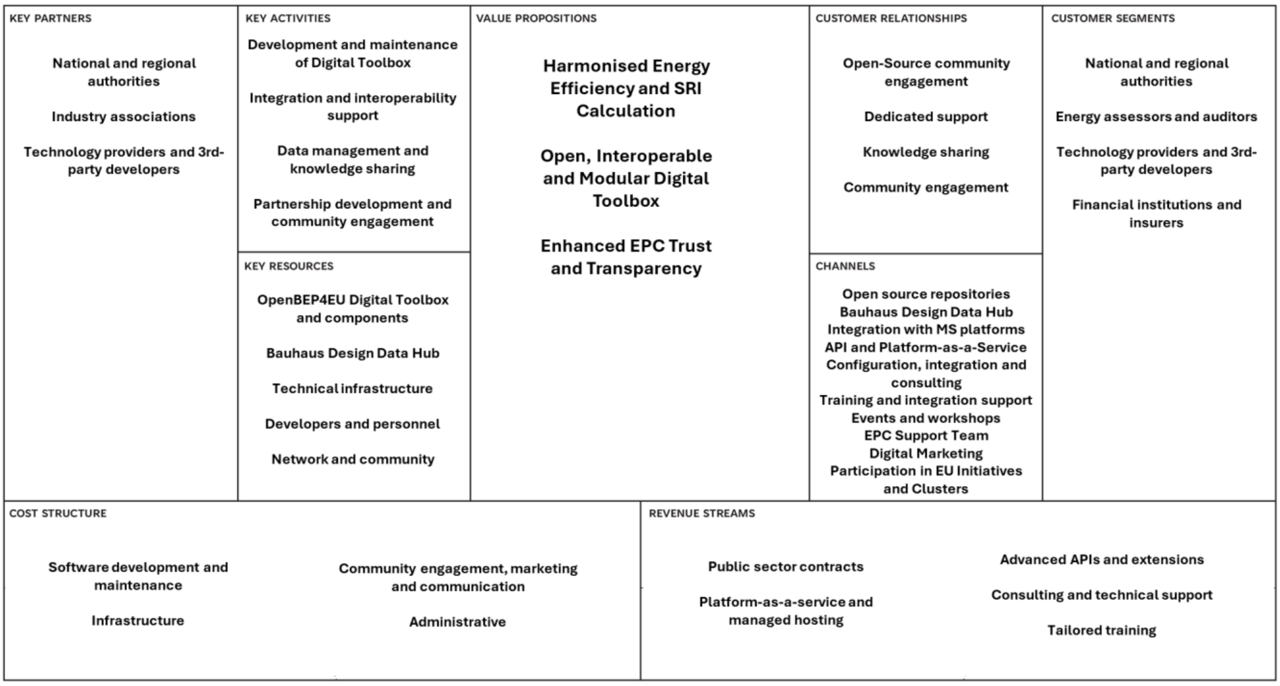

Figure 2: OpenBEP4EU Business Model Canvas

5.2.1. Value propositions

The previously consolidated value propositions are as follows:

- **Harmonised Energy Efficiency and SRI Calculation**: OpenBEP4EU provides a unified, open-source engine for EPC and Smart Readiness Indicator (SRI) calculations, fully aligned with ISO 52000 standards and the EPBD. This ensures comparability across MSs, reduces fragmentation, and supports regulatory compliance.
- **Open, Interoperable and Modular Digital Toolbox**: OpenBEP4EU offers an extensible tool ecosystem including APIs, BIM integration, and the Bauhaus Design Data Hub, enabling seamless data exchange, third-party application development, and integration with private and national EPC tools.
- **Enhanced EPC Trust and Transparency**: OpenBEP4EU delivers auditable, accurate, and transparent energy performance data, fostering confidence among users, policymakers, financial institutions, and building owners, while supporting green finance and renovation planning.

5.2.2. Key partners

The key partners that enable OpenBEP4EU to deliver its value propositions are the following:

- **National and regional authorities**: They integrate the OpenBEP4EU tools into the regional and national EPC systems, adhering to the EPBD, and supporting harmonisation across the EU.
- **Industry associations**: They promote adoption among building, automation and energy-related service providers.
- **Technology providers and 3rd-party developers**: They extend the toolbox through APIs and custom applications, as well as by integrating it with their own energy efficiency-related software suites.

5.2.3. Key activities

The main key activities to deliver, maintain and extend the OpenBEP4EU value propositions are as follows:

- **Development and maintenance of Digital Toolbox**: Continuous improvement of the digital tools, ensuring compliance with future standards, regulations and directives.
- **Integration and interoperability support**: Maintain and extend APIs, enabling integration with national and 3rd-party software, tools and databases.
- **Data management and knowledge sharing**: Operate the Bauhaus Design Data Hub for sharing knowledge (datasets, best practices, etc.) and share data, adhering to GDPR, with dataspaces-principles interface.
- **Partnership development and community engagement**: Collaborate with Key Partners to promote the OpenBEP4EU propositions and push adoption. Deliver tailored training and support.

5.2.4. Key resources

The main key resources for delivering the OpenBEP4EU value propositions are:

- **OpenBEP4EU Digital Toolbox and components**: The technical solutions developed in OpenBEP4EU and offered either as a package or individually, as well as the APIs.
- **Bauhaus Design Data Hub**: The central portal and repository for datasets, best practices and reference material.

- **Technical infrastructure**: Hosting and data management infrastructure for delivering managed and PaaS related solutions.
- **Developers and personnel**: Key personnel with relevant expertise for software development, administration and marketing.
- **Network and community**: Strategic relationships and engagement with key stakeholders to promote and push the OpenBEP4EU adoption.

5.2.5. Customer relationships

The types of customer relationships are given below:

- **Open-Source community engagement**: Maintain interaction with 3rd-party developers that promote open-source and encourage use and contributions.
- **Dedicated support**: Provide dedicated technical services and support, in a 1-to-1 customer interaction, including both users and 3rd-party developers.
- **Knowledge sharing**: Keep the Bauhaus Design Data Hub updated and promote the reuse of existing knowledge and datasets.
- **Community engagement**: Engage with the community in 1-to-many approach, promoting the OpenBEP4EU value propositions and adoption.

5.2.6. Channels

The distribution and sales strategy for OpenBEP4EU focuses on maximizing accessibility, fostering adoption across Member States, and enabling third-party innovation. Given the open-source nature of the Digital Toolbox and its alignment with EU policy frameworks (EPBD, Renovation Wave), the channels combine digital dissemination, capacity building, and institutional partnerships.

Main distribution channels

This paragraph describes the main distribution channels of the OpenBEP4EU products & services:

- **Open-source repositories**
  The core components of the OpenBEP4EU Digital Toolbox (EPB Kernel, SRI Kernel, APIs, documentation) will be distributed through a public repository (e.g., GitHub). This ensures transparency, ease of access, and community-driven improvements. The repository will include a) Source code and executable software packages, b) API documentation, c) Deployment guidelines, and d) Training material and tutorials
- **Bauhaus Design Data Hub**
  The Bauhaus Design Data Hub, apart from being a product itself, it also acts as a distribution channel for the OpenBEP4EU Digital Toolbox (e.g., via relevant section in the web portal), and other value propositions, such as datasets, training material, good practices, case studies and integration guides.
- **Integration with MS platforms**
  Collaboration with national digital building platforms and EPC registries will facilitate the integration of the OpenBEP4EU engine into existing infrastructures. This channel targets public authorities and regulatory bodies to ensure compliance with EPBD and harmonisation across Member States.

Revenue-generating channels

While the core engine remains open-source, revenue-generating channels will be utilised for sales.

- **API and Platform-as-a-Service (PaaS)**
  Hosted API and PaaS services for organisations requiring managed solutions.
- **Configuration, integration, and consulting**
  Customised configuration, integration, and consulting services for organisations that need technical services in deploying the OpenBEP4EU solutions.
- **Training and integration support**
  Tailored training and integration support for both users and developers in using, customizing and integrating the OpenBEP4EU solutions.

Capacity building and outreach channels

The channels indicated in this paragraph are utilised for capacity building and for further outreach.

- **Events and workshops**
  Organisation and participation in events, webinars and workshops with the OpenBEP4EU stakeholders.
- **EPC Support Team**
  The OpenBEP4EU dedicated team to promote and support the use of EPC, with a special focus on OpenBEP4EU solutions, to provide guidance on the EPBD implantation and to engage closely with the community.
- **Digital Marketing**
  Targeted marketing campaigns on the internet, social media and energy-specific online communities.
- **Participation in EU Initiatives and Clusters**
  Active involvement in the follow-up initiatives and clusters, related to the OpenBEP4EU objectives, to promote the project results.

5.2.7. Customer segments

The following are the main targeted customer segments:

- **National and regional authorities**: Primary adopters of the OpenBEP4EU solutions into national EPC systems, to ensure harmonisation and EPBD compliance.
- **Energy assessors and auditors**: Professionals and organisations using or integrating their own tools with the OpenBEP4EU Digital Toolbox.
- **Technology providers and 3rd-party developers**: They leverage the OpenBEP4EU solutions customising and integrating the OpenBEP4EU value propositions into their own tools, processes and services.
- **Financial institutions and insurers**: They leverage the solutions for green financing, risk assessment and renovation products and projects.

5.2.8. Cost structure

The main costs for delivering the OpenBEP4EU value propositions are:

- **Software development and maintenance**: Continuous maintenance, bug fixing, improvement and extension of the software tools.
- **Infrastructure**: Hosting and cloud services for PaaS, Bauhaus Design Data Hub and data management.
- **Community engagement, marketing and communication**: Costs for activities and design for engagement with the community and marketing.
- **Administrative**: Overall management of activities and other administrative tasks.

5.2.9. Revenue streams

The main revenue streams are:

- **Public sector contracts**: Customised integration with EPC platforms of national and regional authorities.
- **Platform-as-a-service and managed hosting**: Subscription-based access to hosted environment for instant and managed use of the OpenBEP4EU digital tools.
- **Advanced APIs and extensions**: Development of advanced and customised APIs, as well as customer-specific tool extensions.
- **Consulting and technical support**: Premium technical services to support integration and customisation of the tools.
- **Tailored training**: Paid training sessions, adapted to specific customer expertise and needs.

5.3. Business model implementation

To facilitate a better understanding of how the building model above is implemented and how the elements of the different building blocks of the Business Model Canvas are connected, indicative business cases implementing business model are given in this section.

5.3.1. Business case 1: Harmonised energy efficiency and SRI calculation

Scenario: A national authority integrates the OpenBEP4EU Digital Toolbox into its national EPC system to promote harmonisation and meet EPBD compliance.

Value delivered: A universal, harmonised energy efficiency and SRI backbone that ensures harmonisation across regions and enables credible monitoring and transparent policymaking.

A national authority integrates the OpenBEP4EU Digital Toolbox into its national EPC system to gain EPBD compliance and harmonisation across regions. This integration provides a single standards-based calculation engine for EPC and SRI assessments in place of distinct national methods. The solution enables automated, accurate, and comparable results, reducing administrative expenses and increasing confidence in EPC assessments. Authorities gain from simplified regulatory procedures, simplified monitoring of renovation goals, and easy reporting for EU-level compliance. Using the open-source toolbox, MSs implement the solution on a national level while keeping it interoperable, allowing for long-term sustainability and cost-effectiveness.

OpenBEP4EU implements its business model through the combination of open-source availability and custom services to public authorities. The Digital Toolbox and its components are offered through open repositories and supported by comprehensive documentation, ensuring transparency and encouraging take-up. To ensure integration with national EPC systems, OpenBEP4EU offers consulting services, technical support, and training services, establishing a revenue stream without diverting from its open-source philosophy. Partnerships with national governments and industry associations deliver regulatory convergence and the Bauhaus Design Data Hub facilitates knowledge transfer and best practices. The strategy leverages strategic partnerships, technical infrastructure, and community creation to offer harmonisation at scale, while sustaining operations through premium services and managed hosting offerings.

5.3.2. Business case 2: Delivery of energy efficiency software suite by 3rd-party

Scenario: A technology provider launches an energy efficiency software suite that incorporates the OpenBEP4EU Digital Toolbox for harmonised calculations and BIM importing. They start on PaaS/managed hosting to develop and finalise the software and then move on to their own dedicated infrastructure.

Value delivered: An open, modular and interoperable digital toolbox that enables harmonised calculations and BIM import, enabling rapid suite development and market innovation.

A technology provider uses the OpenBEP4EU Digital Toolbox to develop a next-generation energy efficiency software suite. The provider leverages the harmonised EPB and SRI kernels, BIM integration, and open APIs to deliver advanced features such as BIM import automation, scenario simulation, and compliance-reporting-ready outputs. Using a starting point of managed hosting (PaaS) environment for accelerated prototyping, the provider reduces time-to-market and maintains infrastructure overhead low in development. When the product has matured, it moves to specialised infrastructure for scalability and performance. The model allows the provider to focus on value-added activities, such as analytics, dashboards, and renovation planning, while OpenBEP4EU deals with the essentials of compliance and interoperability. The result is a competitive, future-proofed solution that meets market demand for digital energy efficiency tools as well as innovation in the energy and building sectors.

In this case, OpenBEP4EU acts as an enabler of innovation by providing a modular, interoperable Digital Toolbox that can be integrated into third-party developer solutions. The open-source core, together with the documented APIs, lowers barriers of entry for technology providers. OpenBEP4EU monetises this activity by providing PaaS services, premium API access and customisation, and consultancy for further integration, while fostering a wider developer ecosystem through open collaboration and training initiatives. The Bauhaus Design Data Hub supports developers through datasets and reference materials, accelerating product development. The model encourages market uptake and interoperability across the energy efficiency software ecosystem by mixing openness with value-added services.

5.3.3. Business case 3: Enhanced trust and transparency in EPCs

Scenario: A financial institution launches a green mortgage and renovation loan product. Loan eligibility and conditions utilise auditable energy efficiency and SRI outputs generated by assessors.

Value delivered: Trustworthy and transparent energy efficiency and SRI evidence reduces financial risks, unlocks green finance and aligns with relevant public policies.

A financial institution introduces green mortgages and renovation loans supported by verifiable EPC and SRI outcomes. By utilizing open, standardised, and verifiable data offered by OpenBEP4EU, the institution reduces risks and ensures compliance with EU and national policies. This enables performance-based loaning schemes where conditions depend on measurable energy savings and makes it easier to produce renovation performance-linked financial products. Bauhaus Design Data Hub facilitates knowledge exchange and anonymised benchmarking, and dataspaces-compliant interfaces enable secure, GDPR-compliant data exchange between stakeholders.

For financial institutions, OpenBEP4EU offers trust and transparency through standardisation, auditability, transparency and compliance. The business model combines open access to the methods of calculation with value-added services such as customised APIs for portfolio analysis, consulting for integration, e.g. into risk workflow, and training of finance teams. It enables secure data sharing through dataspaces-compliant interfaces and GDPR-compliant practices, supported by Bauhaus Design Data Hub for anonymised best practice and benchmarking. The model creates a value chain linking technical compliance and green finance opportunities, generating revenues from value-added services while consolidating its position as a reference trusted solution.

5.4. SWOT analysis

Strengths	Weaknesses
EU Policy Alignment: Fully compliant with EPBD and ISO 52000 standards, ensuring relevance and regulatory acceptance. **Open-Source Framework**: Promotes transparency, adaptability, and cost-effectiveness. **Comprehensive Digital Toolbox**: Combines EPC and SRI Kernels, BIM integration, data hub, and APIs in a single interoperable ecosystem. **Future-Proof Design**: Modular architecture supports integration with digital building technologies, renovation passports, and emerging EU initiatives.	**Early TRL**: Requires further development, testing, and validation before large-scale deployment. **Dependency on Public Funding**: Financial sustainability beyond project duration is not yet secured. **Complex Stakeholder Coordination**: Multiple user groups (assessors, authorities, developers) require tailored engagement and training. **Limited Market Awareness**: EPC and SRI tools are still perceived as compliance-driven rather than value-adding.
Opportunities	**Threats**
EU Green Deal & Renovation Wave: Policy-driven demand for harmonised EPCs, SRIs, and digital building logbooks. **Mandatory Digital EPCs**: Creates a strong market pull for interoperable, standardised calculation engines. **Digital Twin & BIM Adoption**: Growing demand for automated, BIM-integrated energy assessment tools. **Smart Building & SRI Uptake**: Increasing interest in occupant-centric, smart-ready solutions for energy efficiency and comfort. **Green Finance and Investments**: Reliable EPC/SRI data enables performance-based financing and risk assessment for banks and investors.	**National Resistance to Harmonisation**: Member States may prefer existing national tools, slowing adoption. **Integration Complexity**: Interfacing with diverse national databases and legacy systems can be challenging. **Data Protection & GDPR Compliance**: Strict requirements for data sovereignty and security may delay implementation. **Market Competition**: Established commercial EPC software providers may accelerate innovation or lower costs to maintain market share.

5.4.1. Leveraging strengths and opportunities

OpenBEP4EU can capitalize on its alignment with EU policy and open-source design by positioning itself as the reference solution for harmonised EPC and SRI calculations in alignment with the EPBD. OpenBEP4EU should actively position itself in support of the Renovation Wave and Green Deal strategies, boasting its capability to drive mandatory digital EPCs and SRIs. With its emphasis on interoperability and BIM integration, OpenBEP4EU can ride the wave of digital twin adoption with a future-proof solution supporting complex use cases like renovation planning and performance-based financing. Furthermore, its data-sharing function and co-benefits analysis can be marketed to financial institutions and ESCOs in accordance with the growing demand for green finance and investments.

5.4.2. Mitigating Weaknesses and Threats

To offset its early TRL and dependence on grant funding from the public, OpenBEP4EU will need to concentrate on pilot rolls and demonstration programs that establish technical readiness and show real impact. Commercial sustainability roadmap development, involving partnering with national governments and private sector players, will reverse grant reliance. Integration complexity can be dealt with by having robust APIs, clear documentation, and modular building blocks that allow phased rollout without compromising existing systems. To gain national acceptance, the initiative needs to show its willingness to national contexts and offer support with tailoring. Finally, issues of data protection need to be actively tackled by GDPR-conformant design, open governance, and secure data-sharing practices, ensuring stakeholders' trust and continued regulatory compliance.

6. Conclusion

This deliverable gave insights on the initial After-LIFE conservation plan for OpenBEP4EU, defining the plans for keeping and enhancing project outcomes once its timeline ends. It synthesises the project value propositions, business model, and initial financial framework, and explores the commercialisation potential and stakeholders' targeted participation. Future updates will make clear these strategies and models, based on pilot outcomes, feedback from stakeholders, and dissemination outcomes, to maintain OpenBEP4EU as a reference solution for the digital and sustainable building sector transformation towards more green and efficient buildings.

6.1. Indicative strategy for market penetration

An indicative list of market penetration actions is briefed in this paragraph. To ensure the adoption and long-term sustainability of OpenBEP4EU results, a staged market penetration focused on early engagement, value demonstration, and synchronisation with EU policy drivers will be employed. The following actions are planned as follow-up towards commercialisation:

Short-term / in progress:

1. **Pilot Demonstrations and Reference Implementations**: Roll out the OpenBEP4EU Digital Toolbox across selected MSs via project pilots, integrating, where applicable, into national EPC schemes and exemplifying EPBD conformity. The pilots act as best practice reference and demonstration cases to other stakeholders.
2. **Targeted Engagement with National Authorities**: Engage in dialogue and communication with regulators, energy agencies, and public authorities to promote take-up of the harmonised EPB and SRI kernels. Provide tailored technical support and policy convergence expertise to assist integration into national frameworks.

Medium-term:

3. **Partnership with Industry and Finance**: Collaborate with technology providers, ESCOs, and financial institutions to create added-value services (such as energy efficiency tools, green finance products) based on OpenBEP4EU results. These partnerships will accelerate ecosystem growth and market trust.
4. **Capacity Building and Training Programs**: Offer training sessions for energy assessors, auditors, and developers to enable appropriate use of the Digital Toolbox and facilitate an efficient user base. Training will leverage Bauhaus Design Data Hub as a dissemination platform for best practices and benchmarking datasets.
5. **Open-Source Community Launch**: Promote and keep an open-source repository to recruit third-party developers and inventors. Encourage contributions, extensions, and interoperability with energy efficiency tools to speed up the solution's outreach.

Long-term:

6. **Communication and Dissemination campaign**: Launch targeted communication actions through social media, sector events, and EU-level platforms with the aim of raising awareness about OpenBEP4EU value propositions. Highlight pilot and early adopters' success cases for generating credibility and stimulating demand. The campaign indicated here concerns the ‘commercial launch’ stage of the project results, and is the continuation of the project continuation and dissemination that already runs within the duration of the project.

7. **Alignment with EU Initiatives and Financial Instruments**: Position OpenBEP4EU as the reference solution for the Renovation Wave, Green Deal and Next Gen EPC cluster. Explore synergies with EU funding initiatives and national initiatives to support large-scale roll-out.

6.2. Next steps on after-LIFE conservation planning

After-LIFE conservation plan will be updated with deliverable D5.9 and will be the strengthening of technical, business, and community foundations established in the project's first months and setting the stage for widespread take-up beyond the project's lifetime. In the follow up activities, the consortium will finish developing the OpenBEP4EU Digital Toolbox, validate its building blocks via pilot deployments, and stabilize the exploitation strategy from early adopters' input and dissemination measures. The updated plan will incorporate learning from pilot demonstrators, define concrete service offerings (e.g., managed hosting, premium APIs, and training courses), and define governance mechanisms for maintaining the open-source community and ensuring structured contribution processes.

A systematic integration of the pilots feedback will be utilised to proceed with the conservation plan refinements. These act as test-beds for the OpenBEP4EU value propositions and will generate insights into usability, operability and stakeholder engagement. This feedback will be used to:

- Refine and validate the Digital Toolbox components, ensuring they meet practical needs and regulatory requirements.
- Adjust exploitation strategies based on observed adoption patterns, barriers, and stakeholder preferences.
- Define concrete service offerings, including managed hosting, premium APIs, and tailored training programs, informed by pilot use cases.
- Strengthen governance mechanisms for the open-source community, ensuring inclusive contribution processes and long-term sustainability.
- Update financial projections and business models, incorporating lessons learned from pilot-based cost-benefit analyses and stakeholder value assessments.

In addition, detailed financial projections and quantitative analysis will be also included in the follow-up deliverable, along with long-term maintenance planning. Moreover, the consortium will step up cooperation with national governments, industry organisations, and financial institutions to secure post-project deployment commitments. A roadmap for long-term sustainability will be established, including elaborated and refined business models, sources of funding, and harmonisation with EU initiatives such as the Renovation Wave and Next Gen EPC cluster. This will guarantee that upon project completion, OpenBEP4EU will have a well-defined path to long-term operation, market entry, and impact outside the LIFE funding horizon.

7. References

[1] Buildings Performance Institute Europe, "Towards a decarbonised EU building stock: Experts views on the issures and challenges facing the transition," 2018.

[2] M. Fabbri, M. De Groote and O. Rapf, "Building Renovation Passports: Customised roadmaps towards deep renovation and better homes," Building Performance Institite Europe, 2016.

[3] Climate Action Network Europe, "Buildings key to achieving Europe's climate goals," 23 December 2021. [Online]. Available: https://caneurope.org/buildings-key-to-achieving-europes-climate-goals/.

[4] A. Arcipowska, F. Anagnostopoulos, F. Mariottini and S. Kunkel, "Energy Performance Certificates across the EU," Buildings Performance Institute Europe, 2014.

[5] R. Sacks, C. Eastman, G. Lee and P. Teicholz, BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers, John Wiley & Sons, Inc., 2018.

[6] F. M. Ugliotti and E. Stradiotto, "Integrating EPC Data into openBIM Workflows: A Methodological Approach for the Digital Building Logbook," Preprints.org, 2025.

[7] L. Martinez, T. Klitou, D. Olschewski, P. C. Melero and P. A. Fokaides, "Advancing building intelligence: Developing and implementing standardized Smart Readiness Indicator (SRI) on-site audit procedure," *Energy,* vol. 316, no. 134538, 1 February 2025.

[8] Directorate-General for Energy, "Renovation Wave," 2025. [Online]. Available: https://energy.ec.europa.eu/topics/energy-efficiency/energy-performance-buildings/renovation-wave_en.

[9] Buildings Performance Institute Europe, "Renovation Wave," 2020. [Online]. Available: https://www.bpie.eu/wp-content/uploads/2020/10/Renovation-Wave-briefing_04.pdf.

[10] "Energy Performance Certificates: boosting the market for energy efficient buildings," 2024. [Online]. Available: https://build-up.ec.europa.eu/en/resources-and-tools/articles/energy-performance-certificates-boosting-market-energy-efficient.

[11] "Insights from the Digital Building Logbook (DBL) Study," 2023. [Online]. Available: https://build-up.ec.europa.eu/en/resources-and-tools/publications/insights-digital-building-logbook-dbl-study..

[12] "EUR-Lex – Access to European Union law," 2020. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0662.

[13] Buildings Performance Institute Europe, "Energy Services and the Renovation Wave: Opportunities for a Green Economic Recovery in Europe," 2020. [Online]. Available: https://www.bpie.eu/publication/energy-services-and-the-renovation-wave.

[14] European Commission, "Financing for building renovations," [Online]. Available: https://energy.ec.europa.eu/topics/energy-efficiency/financing/financing-building-renovations_en.

[15] P.-Z. Morsink-Georgali and P. Fokaides, "D1.1 - Comparative assessment of current EPC schemes and," D^2EPC (grant agreement No. 892984), 2020.

[16] European Commission, "Study on the development of an EU framework for Digital Building Logbooks," 2020. [Online]. Available: https://ec.europa.eu/newsroom/growth/items/690184/en..