



Towards Innovative Methods  
for Energy Performance Assessment and Certification of Buildings

Deliverable 3.4

# Report on improving building operation with enhanced EPCs

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Authors	Silvio De Nigris (RP), Iosifina Petri (CEA), Sara Mariza Vryonidi (CUT)
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## Executive Summary

This report provides a summary of the activities undertaken in Task 3.4 “Improving building operation with enhanced EPC ” of WP3 “Verification Scenarios”. The main goal of this work package is to validate the results of the [Transversal Deployment Scenarios \(TDSs\) developed in Work Package 2 \(WP2\)](#), with the involvement of local stakeholders engaged in building certification procedures.

The document provides an overview of the workshops conducted in five partner countries: Austria, Croatia, Cyprus, Italy, and Slovenia. Through these workshops, valuable insights were gathered, aiding in the identification of training requirements necessary for participants to actively contribute to the advancement of current certification practices.

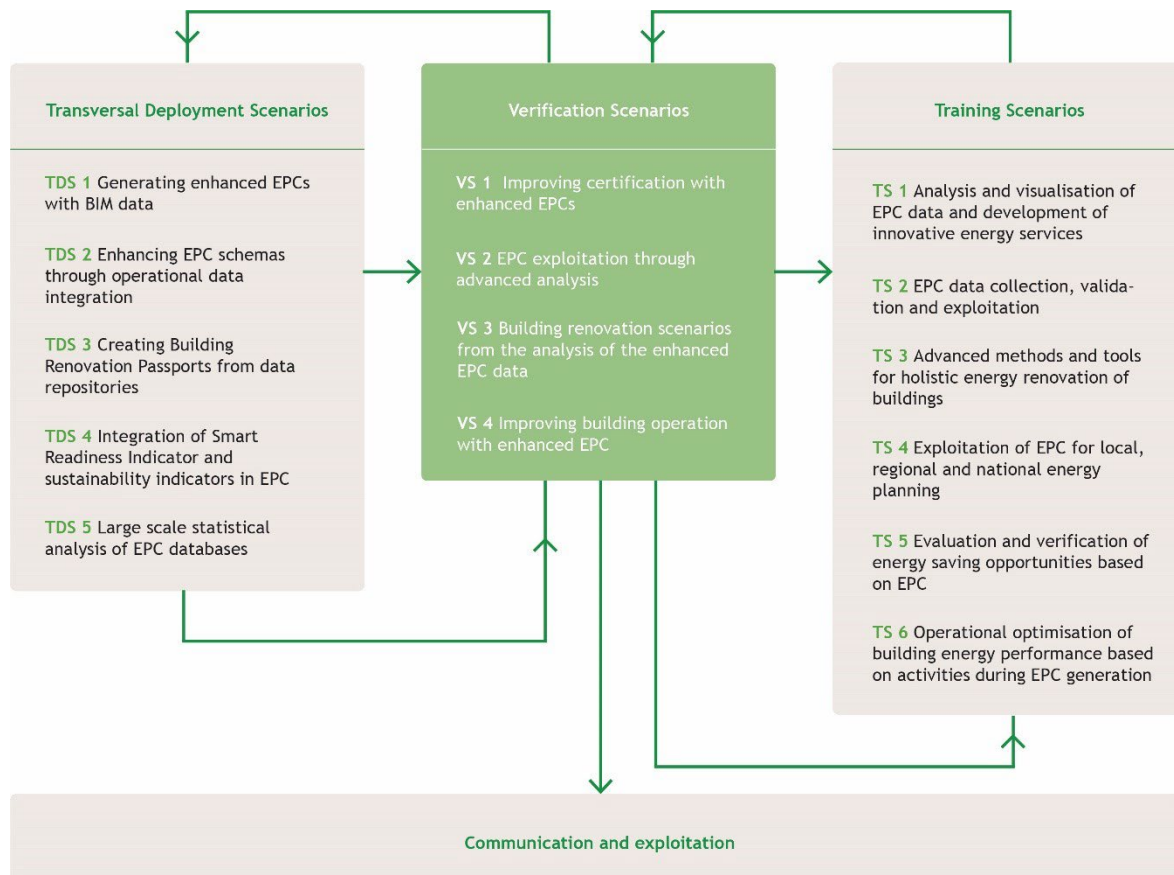
The findings from the workshops highlight the following key points:

- Integration of operational data in EPCs enhances their value for investment projects and brings them closer to energy audits, benefiting potential investors and promoting robust financing options such as Public Private Partnerships.
- Ensuring data accuracy is paramount for reliable energy auditing and EPC calculations, necessitating streamlined procedures in data collection and validation.
- Digitalization plays a crucial role in accessibility and effectiveness, allowing professionals and auditors to leverage energy models and ensuring interoperability of datasets for optimization.
- End-users priorities accurate building certificates that reflect property value, seek benchmarks for informed investment decisions, and recognize the importance of considering "hidden" benefits such as thermal comfort, ultimately valuing the enhanced benefits of their work or property.

The report concludes with a summary of the insights provided by stakeholders in the various workshops, highlighting the importance of integrating operational data in TIMEPAC, challenges faced, and recommendations for future enhancements.

# 1 Introduction

The purpose of WP3 “Verification Scenarios” was to share the visions of enhanced building performance developed in WP2 “Transversal Deployment Scenarios” (TDS) with local actors involved in building performance certification and to provide insights into the knowledge gaps to be fulfilled by the training scenarios to be conducted within WP4 “EPC Standardisation, Training and Capacity Building” (Figure 1).



**Figure 1.** Scheme showing the interactions between WP3, WP2 and WP4

The work of WP3 was organised around four themes, each one targeting specific audience groups:

- Task 3.1 “Improving certification with enhanced EPCs” - tailored for professional certifiers, energy agencies, and municipalities.
- Task 3.2 “EPC exploitation through advanced analysis” - for professional certifiers and energy agencies.
- Task 3.3 “Building Renovation Passports from the analysis of enhanced EPC data” - aimed at energy agencies and municipalities.
- Task 3.4 “Improving building operation with enhanced EPC” - intended for building managers and end-users.

Within each task, partner organisations arranged a series of workshops with local stakeholders in Austria, Croatia, Cyprus, Italy, Slovenia, and Spain. The purpose of these workshops was to present and discuss the enhanced building performance scenarios, gather feedback from participants, and identify areas requiring further skills development to finalise the programme of the TIMEPAC Academy carried out within WP4 “EPC Standardisation, Training and Capacity Building”.

This document serves as a report on the implementation of Task 3.4, “Improving building operation with enhanced EPC” which focuses on how building managers and end-users will be able to extract information from the enhanced EPCs.

## 1.1 Purpose and target groups

The aim of Task 3.4 was to verify the implementation of the procedures envisioned in TDS2 “Enhancing EPC schemas through operational data integration ” and TDS4 “Integration of Smart Readiness Indicators and sustainability indicators in EPC”. The primary goal of TDS2 was to incorporate operational data into EPCs to improve accuracy and timeliness in assessing building energy consumption and efficiency. This facilitates the identification of potential enhancements and the optimisation of building operations. On the other hand, TDS4 aimed to integrate Smart Readiness Indicators (SRI) and sustainability indicators into EPCs, providing stakeholders with a reliable framework for their integration. By incorporating SRI and sustainability indicators into enhanced EPCs, valuable insights into the building’s overall sustainability performance are offered. This information serves as a guide for identifying areas for improvement and implementing strategies to reduce the building’s environmental impact.

Participants in the workshops were carefully selected from the extensive network of partners involved in the TIMEPAC project, guaranteeing a diverse range of backgrounds and expertise. These workshops were conducted by partners across different locations. This document includes a report of the workshops and a summary of the collective findings. The summary assists in identifying both the differences between countries regarding their current certification procedures and the common barriers and obstacles they face in aligning with the TIMEPAC vision to improve them.

## 1.2 Deliverable structure

The remainder of this report is structured in the following sections:

- Section 2 “Verification Scenario” contains a detailed description of the scenario highlighting its components and illustrating its interconnection with WP2 and WP4.
- Section 3 “Workshops” is divided into six sub-sections, each containing descriptions of workshops conducted in the respective participating countries.
- Section 4 “Participants” includes participant numbers, organizational distribution based on target groups, and the extent of involvement with other concurrent national or European initiatives.
- Section 5 “Findings and conclusions” offers insights drawn from the experiences in the workshops in the various countries.

## 1.3 Contribution of partners

Project partners in Austria, Croatia, Cyprus, Italy and Slovenia organised the workshops in their respective regions and countries. Regione Piemonte, as WP3 leader, has been in charge of coordinating the Work Package, providing guidelines and monitoring the implementation of the tasks.

## 1.4 Relations to other project activities

The work carried out in Task 3.4 serves to interlink the Transversal Deployment Scenarios carried out in WP2 with the training programme to be carried out in WP4. The workshops were carried out in parallel with a [survey](#) organised as part of the exploitation plan conducted in WP5

“Communication, Dissemination and Exploitation”. The activities conducted within the workshops have been disseminated through the [project website](#) and social media channels.



## 2 Verification Scenario

Task 3.4 “Improving building operation with enhanced EPC” investigates how enhanced EPCs can incorporate sustainability indicators to provide insights into a building’s environmental footprint and overall sustainability performance. By integrating operational data into enhanced EPCs, users and building managers can gain valuable insights that facilitate informed decision-making and drive improvements in building operations and energy efficiency.

The aim of the Verification Scenario carried out as part of this task was to verify the procedures developed within Transversal Deployment Scenario [TDS2 “Enhancing EPC schemes through operational data integration”](#) and [TDS4 “Integration of Smart Readiness Indicator \(SRI\) and sustainability indicators in the EPC”](#).

The primary focus of TDS2 was to enhance existing certificates by incorporating new indicators from the economic domain in order to encourage the effective utilization of EPC-related data.

The objectives of TDS4 encompassed two key goals:

1. Integration of data from diverse sources to enhance the effectiveness of EPCs, considering the holistic view of the building.
2. Enhancement of EPCs through the incorporation of a Smart Readiness Indicator and sustainability indicators, aimed at facilitating the development of sustainable renovation plans.

The topics discussed in the workshops were closely related to the training activities to be conducted in WP4 “EPC Standardisation, Training and Capacity Building”, in particular Training Scenario (TS) 6 “Operational optimisation of building energy performance based on activities during EPC generation”.

### Methodology of the workshops

The workshops in each country lasted between two and three hours and were conducted in person. A maximum of 20 attendees per workshop was enforced to ensure maximum efficiency and interactivity. The aim was to gather diverse perspectives from stakeholders representing various sectors to enrich the future scenarios envisioned by TIMEPAC.

Each workshop’s programme was tailored to the specific context in each country. Topics were selected from the Transversal Deployment Scenarios and customized to suit each context. The workshops were conducted in local languages to make them more accessible to target groups, broadening the audience and increasing their overall impact and reach.

To evaluate the efficacy of the workshops, organizers distributed post-event surveys among participants to gather their feedback. Additionally, the insights gleaned from all participating countries were leveraged to shape the training activities conducted within the TIMEPAC Academy.

Some of the key issues driving the discussions with stakeholders in the workshops were the following:

- Which specific indicators of smart readiness would be most relevant to your operational context?
- What specific characteristics would you, as building managers and end-users, like to see incorporated into an enhanced EPC?
- How do enhanced EPCs provide information about a building’s energy use profiles and help make the building’s operation more efficient?
- What are some possible ways in which enhanced EPCs can improve indoor environmental quality?
- What impact do you foresee on building operation after implementing the suggestions discussed?

### TIMEPAC D3.4- Verification Scenario

- How would the inclusion of Smart Readiness Indicators (SRI) and environmental sustainability indicators in enhanced EPCs help building managers and end-users make informed decisions to improve building operation and sustainability?

The following section provides information about the workshop implementation in the six participating countries.

### 3 Workshops

The goal of the workshops was to explain the outcomes of WP2 “Transversal Deployment Scenarios” to interested stakeholders, inviting them to engage in active discussion and debate. The participants were asked to identify barriers related to the implementation of new procedures and to provide insights to overcome these obstacles.

The format and content of the workshops was structured in a highly flexible manner, allowing for the adaptation of contents to the local context and the invited stakeholders. This flexibility allowed for the combination of various topics into a single workshop or to divide the content into multiple workshops.

In the following table, the workshops carried in each country are listed.

Table 1. Timeline for the implementation of the workshops of the Task 3.4

Country	Dates
Austria (Salzburg)	04.10.2023
Austria (Vienna)	10.10.2023
Austria (Graz)	13.10.2023
Austria (Klagenfurt)	22.01.2024
Cyprus	29.11.2023
Croatia	11.08.2023
Italy	21.07.2023
Slovenia	20.12.2023

## 3.1 Austria

### Dates and locations

Because of Austria's federal system, the SERA Institute, as the host, chose to conduct the workshops in various federal states, with each being held in its respective capital city, in order to gather a diverse range of feedback on TIMEPAC results in the most effective manner possible.

SERA facilitated four workshops to examine the challenges for the practical implementation of a Renovation Passport, including the renovation roadmap and the enhanced EPC with links to data repositories and BIM. All topics included in the Verification Scenarios were addressed in these workshops, albeit with varying depth, depending on the professional background and interests of the audience. At the conclusion of the workshop series, a joint report was produced and made available to all participants.

The workshops were as follows:

- October 4th 2023, Department of Energy Management and Consultancy of the administration of the Province of Salzburg, Günter-Bauer-Straße 1, 5071 Wals-Siezenheim.
- October 10th 2023, at the IG Architektur (architecture collective), Gumpendorferstraße 63B, 1060 Vienna.
- October 13th 2023, Cowork zu Geidorf, Vilefortgasse 11, 8010 Graz (Styria).
- January 22nd 2024, Kärntner Landesfeuerwehrverband Rosenegger Straße 20, 9020 Klagenfurt (Carinthia), organized with the collaboration of klimaaktiv, the Austrian climate protection initiative, and DI Gerhard Kopeinig (ARCH+MORE ZT GmbH) (Figure 2).

In Graz and Salzburg, participant pictures are unavailable due to privacy policies.



Figure 2. Snapshot of the workshop in Klagenfurt/Carinthia

### Topics addressed

The discussions centred around the challenges associated with the practical implementation of the Renovation Passport and Renovation Roadmap, as well as the extended Energy Performance Certificate (EPC) with a strong emphasis on operating data. The Smart Readiness Indicator (SRI) and its application in Austria were touched on briefly but given that this topic is dealt with more thoroughly the [Austrian SRI test phase](#), it was not fully addressed at these workshops.

### Stakeholders

The stakeholders participating in the Austrian workshops and their profiles are shown in Table 2.

Table 2. Stakeholders that attended the workshops in Austria

Stakeholder	Category
Manager of the Independent Control System of EPC of the Province of Salzburg	Public authority
Managing director of the Energy Advice Centre of the Province of Salzburg	Energy agency
Energy consultant of the Energy Advice Centre of the Province of Salzburg	Energy agency
Architektur Wildner	Architect
Institute for Sustainable Technologies (AEE - Institut für Nachhaltige Technologien)	Designer, consultant, researcher (company)
Kommunalkredit Public Consulting (KPC)	Financing, public authority
University for Continuing Education (Universität für Weiterbildung KREMS)	Property manager, researcher
University for Continuing Education (Universität für Weiterbildung KREMS)	Designer, researcher
Real estate management / University of Applied Sciences FH Wien der WKO	Real estate, researcher
AH3 Architekten ZT GmbH	Designer and professional certifier
Austrian Federal Climate Protection Initiative (klimaaktiv)	Governmental climate initiative
Austrian Institute of Constructional Engineering (OIB)	Public authority
Austrian Society for Environment and Technology (ÖGUT)	NGO and Agency
Renowave cooperative	Cooperative companies in the building refurbishment sector, agency
RM Regionalmanagement Mittelkärnten GmbH	Public authority
Ressourcen Management Agentur GmbH	Partner of Governmental climate initiative

Stakeholder	Category
Puterrot GmbH	Consulting company
e+msa EnergieBeratungs GmbH	Consulting company
Peak energy GmbH	Consulting company
Builders	Designer and Professional certifier (company)
AEE Energy services	Professional certifier
Property management	Property manager, end user
Municipality Arnoldstein	Public authority
Carinthian Provincial Government, Departments 11 and 15	Public authority
Engineering offices, technical experts	Professional certifiers and energy advisors
Housing associations	Property manager, end user
Architectural office RESCHETAR e.U.	Designer and Professional certifier (company)
ARCH+MORE ZT GmbH	Architectural firm
SERA global GmbH	Project partner

### Outcomes

The regional EPC database environment ZEUS is used by seven out of nine provinces, although at different stages of development. In the province of Salzburg, with the most advanced version, it is possible to record energy consumption data per energy source for each building unit with an energy performance certificate. However, the corresponding meters have to be created in the system. Usually, this has only been done when subsidies have been involved and for large buildings managed by a property administrator; in other words, only very rarely. Therefore, until now, there was no great interest of other provinces to introduce this function.

The Renovation Passport has the potential to drive the utilization of operational data, particularly for detached and semi-detached houses, which represent approximately 70 percent of Austria's building stock. However, relying solely on the energy performance certificate (EPC) as the foundation for the Renovation Passport is met with scepticism due to concerns regarding the quality of such EPCs. Issues arise from methodological changes introduced over the years, leading to inconsistencies.

As a more feasible approach, it is suggested that an inventory be conducted as part of the energy advisory service. This inventory would offer a robust basis for both the current state EPC and the renovation roadmap. Moreover, the energy advisory service is interconnected with the EPC database environment. Hence, a reconsideration of the collection of operational data is proposed. This could be initiated during the energy advisory process and would furnish valuable insights during the execution of renovation measures outlined in the renovation roadmap.

## 3.2 Croatia

### Date and location

The workshop took place on August 11th, 2023. It was conducted online to ensure the participation of stakeholders who were not physically located in Zagreb and may have faced challenges in attending otherwise (Figure 3).

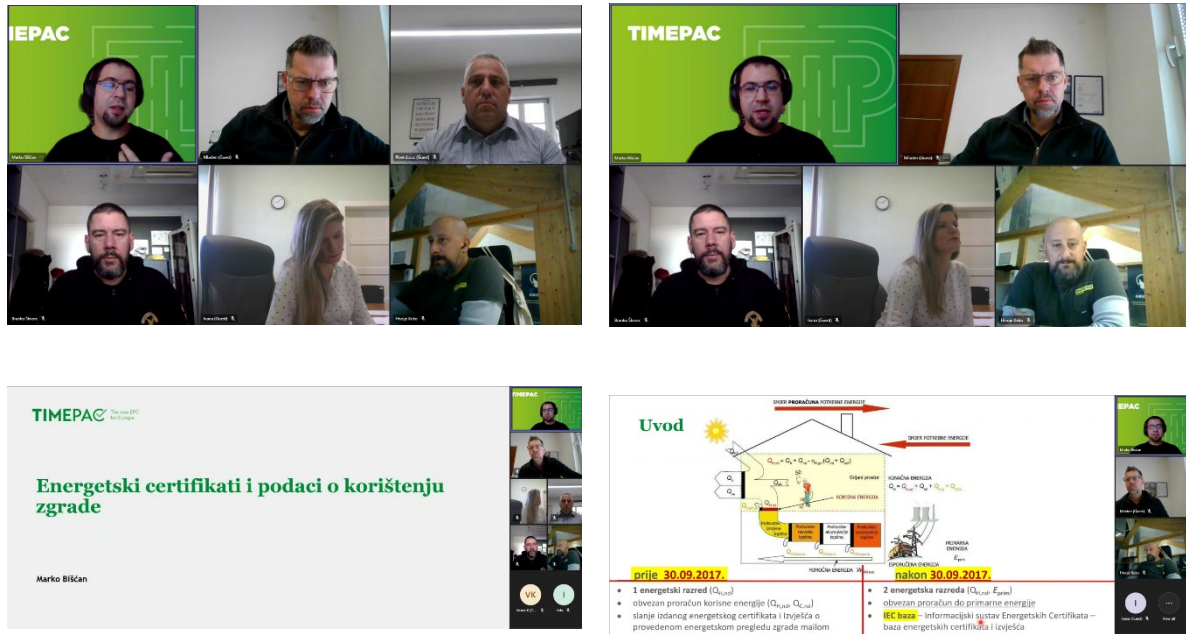


Figure 3. Snapshots of the online session

### Topics addressed

The presentations focused on the following aspects:

- Energy performance certificates and data on the usage of the buildings
- Smart Readiness Indicator (SRI) and sustainability Indicators
- Discussion and analysis

The presentation about operational data in the enhancement of the EPC focused on the following aspects:

- Standard vs tailored assessment of the energy performance of the building.
- Data calibration and its interpretation against monitored real data.
- Economic assessment of energy efficiency measures.
- Assessment of indoor environmental quality.
- Building Automation and Control System energy efficiency classes.

### Stakeholders

The stakeholders participating in the workshop and their profiles are shown in Table 3.

Table 3. Stakeholders attending online workshop

Stakeholder	Category
BMD-upravitelj	Building manager
Branko Škvorc	Building manager
Denis Dergestin	Project partner
Gridone	Energy-related product company
Gradsko Gospodarstvo Vinkovci	Building manager
Plzet - upravljanje nekretninama	Building manager
Rijeka stan	Building manager
Milan Josić	Building manager
Megamont	Building manager

### Outcomes

The input received from stakeholders can be summarised in the following points:

- The utilization of operational data was viewed as highly valuable. Integrating operational data with an enhanced Energy Performance Certificate (EPC) and a calibrated energy model can provide invaluable insights for investment projects.
- The proposed enhancement involving operational data brings the EPC closer to resembling an energy audit, thereby increasing its usefulness for potential investors.
- Implementing more robust and solid investments, such as project financing operations through Public Private Partnerships (PPPs), is deemed essential for achieving an enhanced EPC.
- Input data accuracy is crucial, as discrepancies can lead to results that deviate from the actual situation. Establishing procedures for data collection and validation can streamline the process and enhance reliability.
- Highlighting the importance of the digitalization process, to make the energy model of the building easily accessible to professionals and energy auditors. This accessibility ensures that the EPC can build on previous information and remains cost-effective for the client. Interoperability of datasets emerged as a crucial point requiring focused efforts.



### 3.3 Cyprus

#### Date and location

The workshop took place at the Oikodomos Education Centre in Nisou Area, Cyprus (Figures 4 and 5), on November 30th, 2023, and was organised by representatives from the Cyprus Energy Agency (CEA) and the Cyprus University of Technology (CUT). This centre provides high-quality education and training programmes specifically designed for professionals in the construction industry. Its goal is to equip participants with the essential skills for career advancement and success. Moreover, the centre is dedicated to certifying workers in Standard Occupational Qualifications.



Figure 4. View of the Oikodomos Education Centre



Figure 5. Snapshots of the workshop in Cyprus

#### Topics addressed

The issues addressed in this workshop in relation to this Verification Scenario include:

- Which specific indicators of smart readiness would be most relevant to your operational context?
- What specific characteristics would you, as building managers and end-users, like to see incorporated in an enhanced EPC?
- How do enhanced EPCs provide information about a building's energy use profiles and help make the building's operation more efficient?
- What are some possible ways in which enhanced EPCs can improve indoor environmental quality?
- What impact will the aforementioned suggestions have on building operations?

- How would the inclusion of the Smart Readiness Indicator (SRI) and environmental sustainability indicators in enhanced EPCs help building managers and end-users make informed choices to improve building operation and sustainability?

**Stakeholders**

The stakeholders participating in the workshop and their profiles are shown in Table 4.

**Table 4.** Stakeholders attending the workshop in Cyprus

Stakeholder	Category
Cyprus Scientific and Technical Chamber (EOTEK)	Professional association
The Human Resource Development Authority of Cyprus (HRDA)	Human resources
KNAUF (and other companies/material manufacturers related to energy efficiency upgrades)	Building material producer
Universities in Cyprus (UCY, Frederick etc.)	Academia
VET providers (KES college, Intercollege, UCLAN)	Academia
PASEKSEE (Association of Energy Efficiency Businesses)	Professional association
OEB - Employers and Industrialists Federation	Professional association
KEPA	Productivity centres
ACEEME - Mechanical Engineers	Professional certifiers
SPOLMIK - Civil Engineers	Professional certifiers
Cyprus Architects Association	Professional certifiers
Cyprus University of Technology	Project partner (Academia)
Cyprus Energy Agency	Project partner (Energy agency)

**Outcomes:**

The discussion primarily revolved around two key perspectives: those of professionals and end users.

Energy experts, who provide Energy Performance Certificates (EPCs), expressed a keen interest in integrating Smart Readiness Indicators (SRI) into their assessments. They viewed this integration as a means to enhance evaluations of building performance, providing clients with clear techno-economic reasons for implementing energy efficiency measures. This eagerness was seen as potentially boosting the market for smart readiness products and services, thereby enriching the overall energy market.

On the other hand, end users emphasized the importance of obtaining accurate and reliable building certificates that genuinely reflected the value of their properties. They also sought benchmarks to guide targeted energy upgrades, with the goal of making informed investments. Additionally, they

acknowledged the significance of considering "hidden" benefits such as thermal comfort when making investment decisions.

Ultimately, both professionals and end users prioritized the added value of their work or property, as well as the assurance of potential investment benefits.

## 3.4 Italy

### Date and location

The workshop took place on July 21st, 2023, at the premises of INRIM, a National Research Institute (Figure 6). The decision to host the meeting at this location stemmed from the recent renovation of the venue through an Energy Performance Contract (EPC). The intention was to showcase this experience as a case study during the workshop.

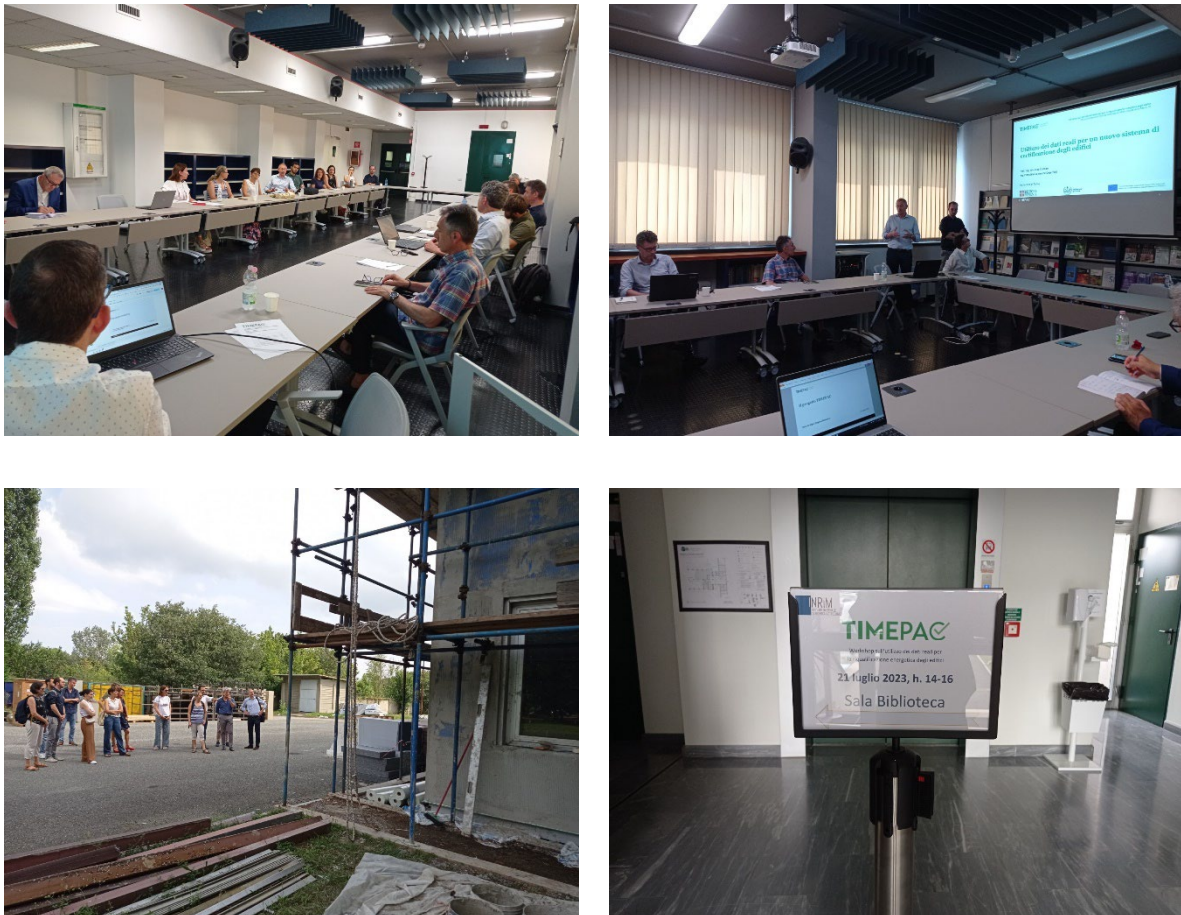


Figure 6. Snapshots of the workshop in Italy

### Topics addressed

The workshop was designed as a platform to discuss operational data for an enhanced Energy Performance Certificate (EPC), beginning with the Verification and Measurement Protocol adopted by INRIM and the findings of the TIMEPAC project. The goal was to explore how the developments from TIMEPAC could align with the objectives of future Energy Performance Contracts or similar initiatives.

The Energy Performance Contract utilized for implementing the energy efficiency measures was presented by INRIM, whereas Environment Park provided insights into the adopted Verification and Measurement Protocol. The TIMEPAC project was introduced by Regione Piemonte, while Politecnico di Torino shared the assessment and conclusions of TIMEPAC, integrating operational data with EPCs. The session concluded with an open discussion involving the ESCO overseeing the contract and a Training Centre (ITS Energia Piemonte), which is considering establishing premises in the area and potentially cooperating as an Energy Community with the INRIM campsite.

In particular, the presentation about operational data in the enhancement of the EPC focused on the following aspects:

- Standard vs. tailored assessment of building energy performance
- Data calibration and its interpretation against monitored real data
- Economic assessment of energy efficiency measures
- Assessment of indoor environmental quality

**Stakeholders**

The stakeholders participating in the workshop and their profiles are shown in Table 5.

**Table 5.** Stakeholders attending the workshop in Italy

Stakeholder	Category
Environment Park	Energy auditor
INRIM (Facility Management Structure)	Building manager
Iren Smart Solutions	Energy service company
ITS Energia Piemonte	Training centre
Politecnico di Torino	Project partner
EdilClima	Project partner
Regione Piemonte	Project partner

**Outcomes**

These are some of the insights derived from the discussions:

- The use of operational data in TIMEPAC enhances EPCs, providing valuable insights for investments. However, challenges persist, such as unreliable or absent EPCs, leading to significant issues like tender cancellations- For instance, a stakeholder cited the example of a large tender being cancelled due to unrealistic or missing data in the EPC.
- Integrating operational data with EPCs aligns them closer with energy audits, offering more accurate energy models. This alignment is especially crucial for robust financing operations such as Public Private Partnerships.
- Despite calibration efforts, understanding end-user behaviours remains challenging, impacting energy consumption, particularly during ownership changes, although it offers benchmarking opportunities for homeowners.
- Expanding EPCs to encompass surrounding environments uncovers additional community-level potentials. Additionally, integrating broader sustainability aspects, such as material quality, enhances value for ESCOs aiming for improved results.
- Incorporating data on indoor quality and comfort into EPCs represents an innovative and worthwhile endeavor. Emphasis on digitalization ensures accessibility of energy models to professionals, thereby promoting cost-effective solutions for clients.

## 3.5 Slovenia

### Date and location

The workshop was held on 20<sup>th</sup> December 2023, at the Slovene Ethnographic Museum, situated in the heart of Ljubljana in a late 19<sup>th</sup> century renovated building (Figures 7 and 8). The energy renovation of this building was carried out by the renowned Slovenian architect Dr. Aleš Krainer. As a result of the renovation, the annual gross energy demand for heating has been significantly reduced by 67%, from 156 kWh/m<sup>2</sup> to 50 kWh/m<sup>2</sup>.



Figure 7. Slovene Ethnographic Museum



Figure 8. Snapshots of the workshop in Slovenia

### Topics addressed

The Local Energy Concept was introduced by the representatives from Ministry of the Environment, Climate and Energy. The main focus was on proper integration of data from diverse sources to enable the implementation of advanced energy efficiency projects and optimise the operation of existing buildings. The TIMEPAC project was presented by Jure Čižman from JSI and Boštjan Mljač from GOLEA. Other speakers also highlighted the necessity of using operational data. The workshop was organised in cooperation with the LIFE IP Care4Climate project, specifically within its activity C4.3, Upgrading local energy concepts.

### Stakeholders

The stakeholders participating in the workshop and their profiles are shown in Table 6.

Table 6. Stakeholders attending the workshop in Slovenia

Stakeholder	Category
FOCUS	NGO - facilitator of advanced energy projects at the municipality level (deep energy renovation, energy communities, etc.)
Jožef Stefan Institute	Project partner and training Provider
GOLEA (Goriška Local Energy Agency)	Project Partner and acting as energy manager responsible for several municipalities in the Primorska region
Ministry of the Environment, Climate and Energy	Project Partner and ministry responsible for energy efficiency
ENERGAP (Podravje Energy and Climate Agency )	Energy manager responsible for several municipalities in the Podravje region
KSSENA (Energy Agency of Savinjska, Šaleška and Koroška region)	Energy manager responsible for several municipalities in the Savinjska, Šaleška and Koroška region
LEA Pomurje (Pomurje Local Energy Agency )	Energy manager responsible for several municipalities in the Pomurje region
LEAG (Gorenjska Local Energy Agency )	Energy manager responsible for several municipalities in the Gorenjska region
LEAD (Dolenjska-Posavje-Bela krajina Local Energy Agency )	Energy manager responsible for several municipalities in the Dolenjska-Posavje-Bela Krajina region
Energetika Celje	Energy provider
Alpe Adria Green	NGO - promotor of advanced energy projects at the municipality level
Locus d.o.o.	SME - experts in spatial planning and utilisation of different data sources for providing efficient solutions
Municipality of Radovljica	Local administration - final user of advanced energy services

Stakeholder	Category
Municipality of Tolmin	Local administration - final user of advanced energy services

### Outcomes

These are some of the conclusions derived from the discussions.

With regard to EPC data collection, validation and exploitation:

- SRI has great potential to become a valuable tool in the identification and evaluation of local energy efficiency and flexibility projects.
- Energy communities are key stakeholders for regional and local energy policies. Proper evaluation of potentials is essential, with operational data playing a pivotal role in this process.
- The incorporation of data related to indoor quality and comfort is also very interesting and could serve as a trigger for implementing advanced services, especially in buildings with relatively low indoor air quality.

Concerning the evaluation and verification of energy saving opportunities based on EPC:

- The importance of the digitalization process was highlighted. The energy model of the building should be readily available to professionals and energy auditors in such a way that the EPC can build on previous information, and it is cost effective for the client. Achieving interoperability of datasets is identified as a crucial aspect where efforts should be spent.

And about operational optimisation of building energy performance based on activities during EPC generation:

- Re-commissioning has a huge potential to generate sustainable energy savings but it has to be supported with comprehensive educational and training activities.



## 4 Participation

A total of 80 local stakeholders took part in the workshops organized in the five partner countries (Table 7).

It is worth highlighting that over a third of the total participants, comprising 31 out of 80 individuals, consisted of end users (18) and regional and local administrations (13). Furthermore, there were 9 professional certifiers and 6 consultant companies in attendance.

**Table 7.** Number of workshop participants per country

	Austria*	Croatia	Cyprus	Italy	Slovenia	Total
Professional certifiers	4	-	3	-	2	9
Energy agencies	1					1
Consulting companies	2	1	1	-	2	6
Construction companies	-	-	2	1	-	3
Regional / Local authorities	3	-	2	-	8	13
Research institutes	1	-	1	3	-	5
End users	2	7	2	4	3	18
Project partners	2	1	7	10	5	25
<b>Total</b>	<b>15</b>	<b>9</b>	<b>18</b>	<b>18</b>	<b>20</b>	<b>80</b>

\*The total number of external participants for the four Austrian workshops is 48 (excluding participating project partners), divided among the four Verification Scenarios for statistical purposes.

## 5 Findings and conclusions

The workshops conducted across Austria, Croatia, Cyprus, Italy and Slovenia have revealed several critical findings and outcomes pertinent to training activities that can be summarised in the following four turnkey messages:

**- Integration of operational data in EPCs through TIMEPAC enhances their value for investment projects and brings them closer to energy audits, benefiting potential investors and promoting robust financing options such as Public Private Partnerships.**

The integration of operational data with EPCs signifies a transformative leap forward which acquire a new relevance and effectiveness in the context of investment projects. By incorporating operational data, the content and depth of EPCs can be enriched, rendering them not merely as static documents but dynamic tools for informed decision-making. This infusion of operational data imbues EPCs with a newfound value proposition, positioning them as indispensable assets for stakeholders navigating the complex terrain of investment ventures.

Moreover, the inclusion of operational data with EPCs effectively bridges the gap between traditional EPCs and comprehensive energy audits. Energy audits, renowned for their meticulous scrutiny of energy performance metrics, provide investors with accurate insights into the operational efficiency of buildings. In this case, the integration of operational data enhances their utility for potential investors. This convergence underscores the evolving role of EPCs from mere regulatory compliance documents to strategic instruments for investment decision-making, offering stakeholders a holistic perspective on the energy performance of buildings.

Incorporating data on indoor quality and comfort into EPCs is innovative and worthwhile, and emphasis on digitalisation ensures accessibility of energy models to professionals, promoting cost-effective solutions for clients.

Expanding EPCs to include surrounding environments uncovers additional community-level potentialities, while integrating broader sustainability aspects, such as material quality, adds value for ESCOs striving for better results.

**- Ensuring data accuracy is paramount for reliable energy auditing and EPC calculations, necessitating streamlined procedures in data collection and validation.**

Data accuracy is crucial for energy auditing and EPC calculations, emphasising the need for streamlined procedures in data collection and validation to ensure reliability.

**- Digitalization plays a crucial role in accessibility and effectiveness, allowing professionals and auditors to leverage energy models and ensuring interoperability of datasets for optimization.**

- Digitalisation is vital, allowing energy models to be accessible to professionals and auditors, enhancing the EPC's effectiveness by leveraging previous information. Efforts should focus on ensuring interoperability of datasets to optimise this process.

**- End-users priorities accurate building certificates that reflect property value, seek benchmarks for informed investment decisions, and recognize the importance of considering "hidden" benefits such as thermal comfort, ultimately valuing the enhanced benefits of their work or property.**

End users were in search of accurate and reliable building certificates that accurately represented their property's value. They also sought benchmarks for targeted energy upgrades to make informed investment decisions. Additionally, they acknowledged the importance of considering "hidden" benefits such as thermal comfort when evaluating investments.

- Despite calibration efforts, understanding end-user behaviour remains challenging, affecting energy consumption, particularly during ownership changes, though it offers benchmarking opportunities for homeowners.

## TIMEPAC D3.4 - Findings and conclusions

- Energy experts were keen to integrate Smart Readiness Indicators (SRI) into their assessments. They viewed it as a means to improve building performance evaluations, providing clients with clear techno-economic justifications for energy efficiency measures. This enthusiasm would stimulate the market for smart readiness products and services, benefiting the overall energy sector.

Ultimately, both professionals and end users prioritised the enhanced value of their work or property, along with the assurance of potential investment benefits.

Crucially, the attainment of enhanced EPCs is contingent upon the facilitation of robust investments, with mechanisms such as Public Private Partnerships (PPPs) emerging as indispensable enablers. PPPs, characterised by their collaborative approach between public and private entities, offer a framework conducive to the realisation of enhanced EPCs.