After the RISEnergy Transnational Access, Users are required to submit a User Report. This should be done within 4 weeks after the Access is completed unless otherwise agreed. The User Report will be given to the User(s) by the WP2 leader. The report contains sections related to the work performed, the main results and observations that were achieved.

This document should be completed, signed, and sent by e-mail to risenergy@for.kit.edu.

Summary questionnaire for Users who have been granted Transnational Access (TA) under the RISEnergy project Horizon Europe TA scheme. More information on RISEnergy TA can be found in "General Rules" and in "Access Policy" which can be found on the RISEnergy webpage.

Please complete, sign, and send this form, together with the Cost claim by e-mail to risenergy@for.kit.edu with title: RISEnergy APPXXX - reports.

General information about the project	
Project title (as used in Application)	An Intelligent Building Energy Management System in Lappeenranta
Project number (APPXXX) and acronym (max 15 characters)	APP242
RISEnergy RI(s) accessed	TA14 – AIT-Energy Labs (AIT SmartEST)
Keywords (up to five, free text)	Building data management
Arrival date (in town where RI is located)	2.2.2026 (start of physical TA – phase 2)
Departure date (from town where RI is located)	6.2.2026 (end of physical TA – phase 2)
Starting date of Access (first day at RI)	26.1.2026 (start of remote TA – phase 1)
Finishing date of Access (last day at RI)	16.3.2026 (end of remote TA – phase 3)
Number of days not using the RI (during the above period)	50
Reason for not using RI those days (describe)	Weekends, travel, remote access not every day
Number of days using the RI	10
Number of Users granted Access (group size)	3
Comments	The user project was divided into three phases, two remote TA phases (i.e., phase 1 & 3) and a physical phase (i.e., phase 2)
User	

User group leader or sole applicant (user group member 1)	
First name	
Last name	
Affiliation / Employer	
Country of Employer	
E-mail	
User travelling to RI?	
Comments	
User group member 2	
First name	
Last name	
Affiliation / Employer	
Country of Employer	
E-mail	
User travelling to RI?	
Comments	
User group member 3	
First name	
Last name	
Affiliation / Employer	
Country of Employer	
E-mail	
User travelling to RI?	
Comments	
User group member 4	
First name	
Last name	
Affiliation / Employer	
Country of Employer	
E-mail	
User travelling to RI?	
Comments	
Please insert more fields if your groups had more than four members.	
Access Summary Report - work performed and initial results	
Brief description of the objectives of your project (up to 200 words)	

Main goals of APP242 were:

- *collection and preparation of the data,*
- *initial analysis and data/AI tool selection and identification of practical applications for the data provider,*
- *specifying and agreeing on joint research topic and finding funding for it, and*
- *getting to know each other.*

Activities performed (up to 600 words)

During the Transnational Access (TA) period, LAB University of Applied Sciences and the AIT Austrian Institute of Technology collaborated to prepare and integrate a joint data and analytics environment for energy and building related research. The primary objective was to establish the technical prerequisites for safely connecting the LAB data platform to AIT's Rapid Deployment Platform (RDP), followed by initial analytical experimentation using real measurement data from Lappeenranta's service buildings. In addition to the LAB-derived dataset, AIT provisioned several relevant external datasets: multi source weather forecast and historical weather data, and ENTSO E electricity market data. Integrating these sources created a comprehensive basis for testing predictive modelling and correlation-based analytics.

1.Establishing technical and secure readiness for data transfer

The initial phase focused on defining the data flows, interfaces, and protection requirements necessary for secure remote collaboration between LAB and AIT. Joint sessions were held to examine the structure, quantity, and quality of the datasets hosted on LAB's data platform, which aggregates measurements from approximately 80 service buildings in Lappeenranta. These discussions also covered potential research questions, thematic directions, and the suitability of different data subsets for AI driven energy analytics.

A secure communication channel was then successfully established between LAB and AIT's infrastructure. This enabled controlled transfer of selected datasets from LAB's InfluxDB platform to an SQL based instance of the AIT RDP via secure VPN-connections and API-tokens, ensuring that all exchanges complied with the cybersecurity policies of both organisations.

2. Data enrichment

One step in preparing the data for analytical use was geolocating the Lappeenranta building dataset. Building level metadata retrieval was validated by examining the Finnish open RYHTI dataset using the QGIS geospatial platform. This confirmed that external authoritative datasets can enrich the existing building information with attributes such as footprint geometry, construction era, and building function. These methods also supported the development of future semantic data models.

3. Development of a test real-time analytics tool

As part of the TA activities, a small Python based analytics utility was developed to ensure operational connectivity and validate data interoperability. The tool established a real time data pull mechanism from the AIT RDP to a LAB workstations via secure connections. It synchronized datapoints originating from different sources (building data, weather data, and electricity prices) and allowed retrieval of datasets for any desired time window for example. This prototype demonstrated that the data exchange layer operates reliably, with appropriately aligned timestamps and consistent value ranges.

4. Implementation of a prototype analytics dashboard as a minimum viable product

The main experimental component took the form of a Python notebook functioning as a preliminary analytics dashboard. Its analytical features included:

- *a correlation matrix examining relationships between variables,*
- *exploratory graphs for data validation,*
- *summary tables describing data completeness and distributions,*
- *an ARIMA based time series analysis,*
- *autocorrelation and lag analysis tools, and*
- *an ARIMA forecasting model for short term prediction.*

The MVP utilised as an example three representative datapoints from a single building: water-based underfloor heating water temperature, outdoor air temperature, and the electricity market price. These variables enabled controlled testing of thermal dynamics and price linked behaviour.

5. Expert discussions and future collaboration

In addition to the technical work, several meetings were held with various AIT experts to explore opportunities for international project collaboration. These discussions covered potential joint research themes, concrete upcoming funding calls, and strategic alignment between LAB's and AIT's competencies. Both parties identified multiple promising directions for future proposals. It was mutually agreed that follow up meetings will be arranged to develop these project ideas further and coordinate upcoming submissions.

Scientific results (up to 800 words)

During the research visit, an in-depth technical discussion was conducted focusing on the integration of advanced weather forecasting, intelligent HVAC control strategies, and ontology-based data structuring in the application of energy system. The findings of the visit are summarized in the following aspects:

1. Weather forecast for building energy management

The discussions highlighted the increasing reliance of modern building energy management systems on weather forecasts as well as the importance of their availability inaccuracy. For example, the outdoor air temperature, solar radiation, wind speed and humidity that directly affect heating and cooling loads. The weather forecast products and services typically exhibit varying degree of uncertainty, particularly for solar irradiance and rapid weather transitions. Therefore, it is necessary to employ the forecast methods aided by predictive control algorithms to realize efficient and effective building energy management strategies. The research team reviewed the current wide use of weather service data and commercially supplied high-resolution forecasts. In particular, the potential of neural network based 'forecast correction' models were discussed. It is agreed that the integration of local microclimate data in building energy management systems is essential for improving forecast accuracy and operational performance. The visit revealed strong opportunities for combing multi-scale forecast datasets into building platforms to support more robust control framework.

2. Predictive HVAC control and dynamic adjustment

An important topic of the visit concerned the advancement of real-time HVAC control. Through joint analysis, the participants examined the functional requirements of controllers that must simultaneously manage thermal comfort, indoor air quality and energy consumption while responding to dynamic outdoor conditions and occupant behaviour. The research team reviewed the performance of existing implementations in laboratory and real-

world environments. In the discussion, two key limitations of current systems were identified: challenges in modelling the nonlinear behaviour of building envelopes and HVAC systems, and the insufficiency of standardized interfaces to connect predictive controllers with diverse building management systems and IoT sensors. The participants evaluated how forecast-driven strategies can be utilized to support renewable energy integration, reduce the energy cost and improve indoor comfort.

3. Ontology development for data interoperability

It was collectively recognized that future HVAC control research trends toward platforms that are semantically aware. In other words, the building component, control rules, and sensor data are structured in a machine interpretable format, which in turn motivates another important research topic: ontology design for building energy systems. The discussions emphasized the importance of semantic modelling for enabling 'plug-and-play' integration of weather forecasts, building sensor networks, equipment metadata, and control algorithms. The exchange highlighted that although existing ontologies are well-developed, there remain significant research potential in modelling temporal semantics, forecast horizons, and predictive control frameworks.

4. Integration into building data platform

The integration of weather data, predictive control methods, and semantic models into a building data platform is an important issue for this visit. The implementation of ontology directly into the platform data pipeline was identified as a strategic direction that would enhance interoperability. The visit concluded that the combination of weather-aware predictive control and ontology-driven data harmonization has substantial potential to improve building energy efficiency, indoor air quality management, and the operational reliability of digital building infrastructure. The collaborative discussions provided a strong foundation for future research, including joint development of semantic-enhanced predictive control frameworks and the deployment of pilot projects in real building environments.

Interpretation of the results (up to 400 words)

The TA period successfully established a secure and functional integration between the LAB data platform and AIT's RDP, validated by a working analytics pipeline and an initial dashboard for testing research readiness of the joint platform established. The results demonstrate that Lappeenranta's dynamic real world building level measurement data can be effectively combined with external weather and market datasets within AIT's infrastructure. Moreover, the extensive technical and strategic exchanges lay a solid foundation for deeper research collaboration and future joint project applications.

Main achievements during the TA related work (up to 250 words)

Main achievements were:

1. *integration of LAB building data to AIT RDP,*
2. *integration of weather and energy market data to the building data,*
3. *the development of a minimal viable prototype of a data driven application (energy related simulation of one building),*
4. *plans for development of semantic data models to describe the available data, and*
5. *initial possibilities for future RDI cooperation and identification of some RDI calls for consortium partnerships.*

Further, TA visit enabled informal discussions that provided new insights and possibilities for building personal contacts with research fellows.

[Describe the further usage and storage of project data. State where the data will be kept and name a person responsible for the data. Define data]

Difficulties during the TA related work (up to 250 words)

During the TA period, a few minor technical challenges were encountered while establishing a secure connection to AIT's Rapid Deployment Platform (RDP). The primary difficulties were related to configuring the VPN connection, specifically the required tunnel type (TAP vs. TUN), which was affected by operating system level restrictions and security rules on macOS devices. In addition, some limitations on local installation rights on team laptops caused delays in adjusting and testing VPN configurations.

These issues were resolved through effective collaboration and active communication between LAB and AIT, with significant support from AIT's technical experts. As a result, a fully functional and secure connection to the RDP was successfully established on one workstation during the visit, ensuring that the planned activities could proceed.

A further minor delay was caused by the need to whitelist specific IP addresses on the LAB IT side to enable access to a newly deployed AIT server. Once the necessary firewall adjustments were completed, all required systems became accessible.

Intended publications

Based on the discussion topics and future research perspectives, two peer-reviewed publications will be planned, focusing on AI prediction algorithm in data analysis. The targets venues are 5th Smart cities in smart regions 2026 conference, and journal Electronics.

Expected impact

The main impacts to be generated by research activities improving building data management:

- *Highly energy-efficient and climate neutral European building stock*

  1. *The energy performance of the European building stock is improved, contributing to the EU's energy security, while the buildings and the built environment have reduced climate and environmental impact.*
  2. *The buildings are increasingly interacting with the users, energy system and their environment.*

- *Improvement of digitalisation in the build environment:*

  1. *Demonstration of digital data exchange platforms for buildings to enable the development of building information tools, assessments and certificates.*
  2. *Development of advanced data analytics and exchange of data*
  3. *Development of interoperability with real-time digital twins and BIM-based models.*
  4. *Increased number of building information tools*
  5. *Improved data availability and interoperability*

The following Horizon calls have been identified for joint activities: HORIZON-CL5-2026-09-D4-01 and HORIZON-CL5-2026-09-D4-03

Conclusions / additional comments

The TA activities successfully established a secure and operational joint data and analytics environment between LAB University of Applied Sciences and AIT, demonstrating the feasibility of integrating real-world building data with external weather and energy market datasets. Initial analytical tools and prototypes confirmed data interoperability and research readiness, while expert discussions identified clear scientific and strategic opportunities for future collaboration. Overall, the visit laid a solid technical and organisational foundation for

continued joint research, funding applications, and pilot implementations in building energy analytics and predictive control.

Did you complete the European Commission User questionnaire https://ec.europa.eu/eusurvey/runner/RIsurveyUSERS?

☐ *Yes* x *No*

Please rate on a scale from 1 (excellent) to 5 (poor). Feel free to provide additional comments

	1 (excellent)	2	3 (neutral)	4	5 (poor)
Practical information on how to apply for Transnational Access and the overall application process	☐	☐	☐	x	☐

Comment
Agreement process too heavy for the TA activity

	1 (excellent)	2	3 (neutral)	4	5 (poor)
Information provided, once your project was accepted, on how to proceed	x	☐	☐	☐	☐

Comment

Support received at the site(s) regarding technical/scientific matters and logistics	Have you got sufficient support from the RI staff during the project? If not, please, specify the problems. x *Yes* ☐ *No*

Please specify any problems

RI extension / upgrades required	In your opinion, is the RI needed to be upgraded? If yes, please give an explanation. ☐ *Yes* x *No*

Please specify

Problems with local regulations	Have you had any problems with regulations of the visited RI owner (HSE, lab working hours, etc.)? If yes, please, specify ☐ *Yes* x *No*

Please specify

Health and safety issues	Did you encounter any health or safety issue during your research? Please provide details. ☐ *Yes* x *No*

Please provide details

Environment & Ethics	Did your research involve the use of elements that may cause harm to the environment, to animals or plants? Please provide details. ☐ *Yes* x *No*

Please provide details ---	
Environment & Ethics	Did your research deal with endangered fauna and/or flora and/or protected areas? Please provide details. ☐ *Yes* x *No*
Please provide details ---	
Environment & Ethics	Did your research involve the use of elements that may cause harm to humans, including research staff? Please provide details. ☐ *Yes* x *No*
Please provide details ---	
Environment & Ethics – Dual use	Does your research have the potential for military applications? Please provide details. ☐ *Yes* x *No*
Please provide details ---	
Environment & Ethics – Misuse	Does your research have the potential for malevolent /criminal/terrorist abuse? Please provide details. ☐ *Yes* x *No*
Please provide details ---	
Environmental issues	Were any potentially dangerous substances (materials / gases etc.) released into the environment (atmosphere, water, or land)? Please provide details. ☐ *Yes* x *No*
Please provide details ---	
Ethics issues	Are there any other ethics issues that should be taken into consideration? Please specify ☐ *Yes* x *No*
Please provide details ---	
Overall impression of communication and interaction after finishing your TA and related work	1 (excellent) / 2 / 3 (neutral) / 4 / 5 (poor) x / ☐ / ☐ / ☐ / ☐
Comment ---	
Suggestions for facilities not included in RISEnergy which you would use for your research	

Suggestions how RISEnergy can improve future TA programme, how to make the TA more impactful and how to enable the achievement of high TRL levels	

Feedback – Pro-active Innovation Support	
Awareness	Did you know about the pro-active innovation support of RISEnergy? ☐ Yes ☒ No
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Personal experience	Have you taken advantage of or benefited from the pro-active innovation support? ☐ Yes ☒ No
---	
Information/service provided by the pro-active innovation support?	1 (excellent) ☐ | 2 ☐ | 3 (neutral) ☐ | 4 ☐ | 5 (poor) ☐

I declare that the above provided information and especially that information on the number of days visited the RI is correct.

☒ *I have read the RISEnergy privacy policy for participation in the RISEnergy TA and consent to participation and the associated data processing.*

Your full name:

Your signature: