DYNASTEE

NEWSLETTER ISSUE 2025/24

Foreword

After two preparation meetings, the ExCo has approved the working phase of IEA-EBC Annex 94: Validation and Verification of In-situ Building Energy Performance Measurement Techniques.

The First Working Meeting has taken place at TU Wien on 1 – 3 October 2025, where the progress and next steps on the five subtasks were discussed. During the meeting, a stakeholder survey was launched to strengthen our understanding of how building energy performance measurements are being deployed in industry. You'll find a call to complete this survey in this Newsletter; please take a moment to do so.

As in previous Annexes 58 and 71, DYNASTEE will support the Annex 94 through dissemination and the organisation of training events, such as the annual Summer School. The 11th DYNASTEE Summer School is planned for 7-11 September 2026; you'll find information on the training event in this Newsletter.

Twan Rovers

IEA-EBC Annex 94 2nd preparation meeting at Saxion UAS, Netherlands

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Newsletter Editors

Hans Bloem, INIVE

Twan Rovers, Saxion University of Applied Sciences

Announcement of the DYNASTEE Summer School 2026, 7-11 September 2026, Almería, Spain

By Hans Bloem and María-José Jiménez

For the 11th time, DYNASTEE will organise a Summer School on the application of analysis techniques towards whole building energy performance assessment from in-situ measurements and metering data. The Summer School (SS26) is organised in the framework of the IEA-EBC Annex 94: Validation and verification of in-situ building energy performance measurement techniques. The focus of SS26 will be on the assessment of the HTC (Heat Transfer Coefficient) using real data from experiments.

The 5-day Summer School will take place at the University of Almería, in collaboration with the Spanish Centre for Energy, Environmental and Technological Research (CIEMAT). The course concept will remain the same as in previous years, which means that during the week about half of the time is devoted to lectures and the other half to performing exercises using benchmark data.

Several lecturers from different universities will present specific information on measurement conditions, equipment, standards, etc. In addition, several methods will be explained and, by using high quality data series,, the practical side of the analysis will be demonstrated. Depending on the experimental conditions and data, the used methods will range from steady state methods based on average techniques or linear regression, to dynamic models.

For pre-registration please contact Marta Ruiz e-mail: mruiz.serviciosexternos@psa.es

Deadline for registration: 15 June 2026

Feel free to contact mjose.jimenez@psa.es to be placed on the mail-list and you will receive updates of the announcement.

Information on payment, travelling and accommodation will be provided upon registration.

Dates: 7 – 11 September 2026.

Venue: University of Almería (Spain) - CIESOL building.

Registration fee: €500. Pre-registration is €150.

Sunset in Almería

Aggregate Heat Loss Test

By Hans Bloem

The Summer School, as organised by DYNASTEE for more than 12 years, focuses on the assessment of the heat transfer of building components and whole buildings. Using measurement data from dedicated experiments (such as the Aggregate Heat Loss test), but also monitoring data from test houses, case studies and large-scale measurement campaigns, the thermal performance of the building fabric can be determined. The **Heat Transfer Coefficient** (HTC) is a measure of the heat loss rate per degree temperature difference between inside and out. It is expressed in units of Watts/Kelvin (or Celsius), so that if a building has a HTC of 150 it would require a constant power input of 150W to keep it one degree warmer inside than out.

The IEA-EBC Annex 94 project focuses on validation and verification of in-situ building energy performance measurement techniques. The benchmark against which new techniques to determine the HTC are evaluated, is typically the Aggregate Heat Loss Test result. The standards EN 17887-1 and -2 prescribe the measurement methods and analysis techniques to be used for these experiments.

The test comprises a quasi steady-state method of measuring the in-situ aggregate heat loss (both thermal envelope and air in- and exfiltration) in an unoccupied building. It involves the use of electric heaters to reach an elevated mean internal setpoint temperature over a specified period of time (typically a minimum of 15 days), while external climate conditions are also recorded.

Test method

By measuring the internal and external conditions as well as the amount of electric energy that is required to maintain the mean internal setpoint temperature, the daily heat input (in Watts) to the building can be determined. Specifically, the **aggregate heat transfer coefficient**, Hagg (in W/K), for the building can be determined for a set of quasi steady-state conditions by plotting the heat input against the difference between of the measured inside and outside temperatures.

Tests are conducted in the heating season, such that a minimum temperature difference (ΔT) of 10K is achieved over at least 10 days (typically 15 days). The internal temperature is set at a constant value (typically 25°C) for the entire duration of the test. Overheating (> 30°C) is to be avoided.

All appliances in the building must be switched off; the heat input should only include the heaters and fans (low power versions, used for avoiding stratification) and measurement equipment (sensors, data-acquisition equipment, etc.).

All internal doors are opened to create a one-zone indoor environment. Mechanical ventilation must be switched off, and occupancy is not allowed. All temperature sensors must be shielded to avoid radiation from solar and electric heaters. External temperature sensors should be shielded and ventilated and minimum one sensor is placed North of the building. Preferably the South-facing vertical global solar radiation is measured on site.

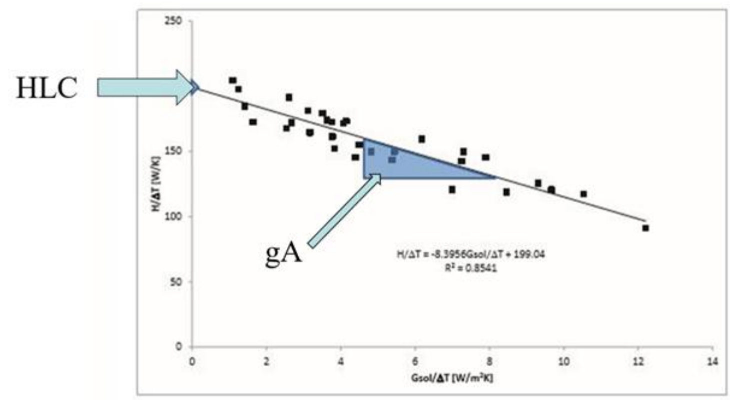
The standard does not set specific conditions related to moisture, as moisture is a natural variant of weather and conditions of use. However, internal and external humidity levels are to be recorded during the test, and summary values detailed in the report.

Analysis

At the minimum, daily average values for the internal temperature (one-zone), the representative external temperature, the global solar radiation (preferably measured nearby in a vertical plane towards South) and the daily averaged power measurement (W) for at least 10 days are required. More detailed measurements could include hourly measurements (or more frequent) of all variables, additional in- and outdoor temperature sensors, global horizontal solar radiation, wind velocity and direction and Air Changes per Hour of the air infiltration rate by means of blowerdoor test measurements prior and after the aggregate heat loss test.

Initial analyses are done by using the period average method, linear regression techniques and Siviour method. The application of dynamic analysis methods requires measurements data with a higher temporal resolution. Error analyses can provide information about the uncertainty of the assessed HTC value(s).

A clear **documentation** should detail information about the object, the test period, the applied sensors, orientation and position, and any event that should be considered important for analysis. Photos are much welcome.



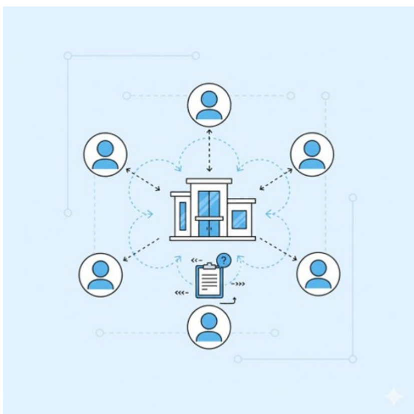
Example of Siviour Analysis. The intercept of the regression line with the vertical axis is the whole house heat transfer coefficient (HTC) and the slope multiplied by -1 is the solar gain factor (gA)

IEA-EBC Annex 94 Stakeholder Survey

By Mark Collett

IEA-EBC Annex 94 has launched a stakeholder survey to understand the requirements and challenges for measuring the actual energy performance of buildings. We want to hear from those working in architecture, housing, construction, or energy policy to provide critical insights that can shape the future of building energy performance evaluations. By giving 15 minutes, you can contribute to international research and help bridge the gap between designed and real-world energy performance.

You'll find the survey here.

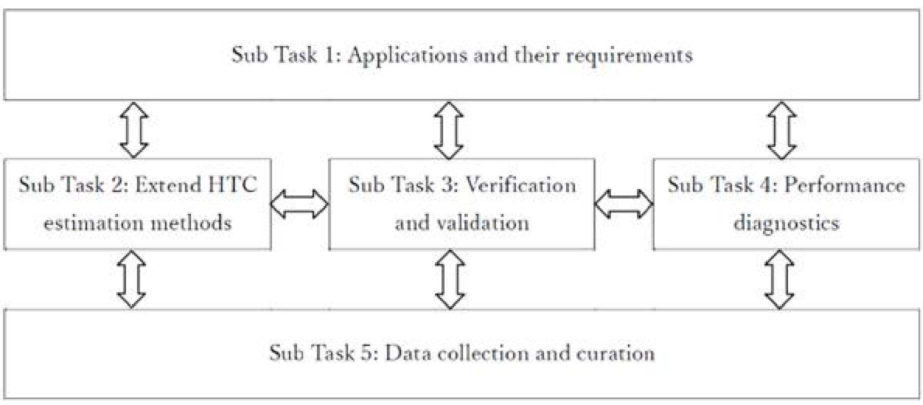


IEA-EBC Annex 94 has entered its working phase

After two preparation meetings at KU Leuven (BE, November 2024) and Saxion UAS (NL, April 2025), the ExCo has approved the working phase of IEA-EBC Annex 94: Validation and Verification of In-situ Building Energy Performance Measurement Techniques. We aim for a paradigm shift: from estimates and lookup tables for theoretical building performance, to in-situ measurements of actual building performance.

Five subtaks have been defined to deliver on the aims of the Annex project.

The first Working Meeting of IEA-EBC Annex 94 has taken place at TU Wien (AUT) on 1 – 3 October 2025, where the progress and next steps on the five subtasks were discussed. The next Working Meeting will take place in Paris in the spring of 2026. Visit https://annex94.iea-ebc.org/ for more information.



IEA EBC Annex 94 Subtasks

ABOUT DYNASTEE

By Hans Bloem

The objective of the DYNASTEE network is to be a global network of excellence on dynamic testing and evaluation of Energy Performance of Buildings. We aim to bring together academic, industry and governmental experts having knowledge on the **test environment and experimental setup** as well as on **data analysis** and **performance prediction** to consolidate, disseminate and further develop the knowledge that has been developed in this field in the past decades.

We make sure that the expertise developed in European research projects over a long period (1986-2004), and more recently the IEA-EBC Annexes 58 and 71 (2010-2022), remains available to the community of builders, designers, industrial developers, scientists and public authorities. The DYNASTEE platform continues to act as an information exchange medium and focuses on training exercises and events (such as the annual Summer School on **Dynamic Methods For Whole Building Energy Assessment**), the development of analysis software and the collection of high quality data.

IEA-EBC Annex 94

The aim of the Annex 94 project is a global collaboration in the EBC-context to develop the necessary knowledge and tools to achieve reliable *in-situ* **dynamic testing** and **data analysis methods** that can be used to characterize and label the effective **energy performance** of building components and whole buildings. DYNASTEE has been working on these topics for over 30 years and has been training numerous people during workshops, the system identification competition and training events (summer schools).

Summer Schools

In the annual DYNASTEE Summer School, participants are trained in the use of dynamic methodologies to assess thermal characteristics of building components and assess whole building energy performance. The approach is dealing with building physics as well as applied mathematics and statistics. Experience in the past has shown that knowledge of both disciplines is a must in order to be successful for making decisions in the analysis process. In the past 12 years, around 250 people have participated in DYNASTEE Summer Schools.

Datasets

Over the past decades, the network has collected high quality measurement and simulation data. These datasets are used in training exercises and events. The available benchmark high quality data contains:

- Simulated data homogenous wall
- Simulated data from homogenous wall
- In-situ data from homogenous wall
- In-situ data from composition wall
- Data from Round Robin box (research project)
- In-situ data from an air gap building envelope
- Data from a whole building
- Data from a co-heating test experiment

Two tools are promoted by DYNASTEE that will be trained and applied using the aforementioned benchmark data. These are LORD; lumped parameter model and CTSM-R; continuous time model.

See for an extended description on the Dynastee website the document Software techniques applied to thermal performance characteristics.

Summer School 2026

In support of the IEA-EBC Annex 94, DYNASTEE is looking forward to organize a next (11th) physical Summer School in 2026.

Support 2022 – 2026

Industry could be interested in qualified people and support our network. Please contact Aimee.Byrne@TUDublin.ie for more information how to help us further.

1994 Creation of the **PASLINK** EEIG network

2005 Conversion into **DYNASTEE** the informal network

2019 Future of the **DYNASTEE** network defined

2024 **30 YEARS ANNIVERSARY**