

# DYNASTEE

NEWSLETTER

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## Foreword

After the retirement of Peter Wouters and Luk Vandaele from the DYNASTEE board last year, three new members have entered the board as of 1 October 2022. The new six-person board will continue with, and expand on, the activities that have been undertaken with the DYNASTEE network since 2005, such as training events and symposia. In fact, both a Spring School on Building Performance Measurement, and a European Building Performance Symposium, targeting the latest insights from research, industry and legislation, are announced in this newsletter.

Current high energy prices, as well as the climate goals set for 2030 and 2050, have accelerated innovations on construction and renovation products, methods and HVAC equipment. To assess the performance of such innovations, in-situ measurements are conducted in labs all over the world. This newsletter contains a brief overview of the past and present of building performance test sites.

For our next Newsletter, due in June, we welcome articles on research results of building performance measurements and simulations. Send us a message if you are interested.

Twan Rovers



Placement of renovation packages in the [INDU-ZERO project](#)

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## DYNASTEE

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## DYNASTEE adds new members to board

By Hans Bloem

It was in 1994 that the PASLINK EEIG was created with Peter Wouters, Luk Vandaele and Hans Bloem on board. In 2005 the PASLINK EEIG was converted to the informal DYNASTEE network, with the three board members still in place.

Early 2020 it was decided to look for two additional board members, and María-José Jiménez from CIEMAT-PSA, Spain and Richard Fitton from the University of Salford joined the board. In 2022, Peter Wouters and Luk Vandaele announced their retirement after so many years contributing to the European network on testing and analysis of building energy performance. Three more board members were found to join the DYNASTEE board: Aimee Byrne, from the Technological University Dublin, Ireland and Twan Rovers, Saxion University of Applied Sciences, the Netherlands. A partner from industry was found in the person of Luke Smith, from Build Test Solutions Ltd, UK.

The DYNASTEE network is pleased to continue their activities with the six person board as from 1st October 2022:

María-José Jiménez, CIEMAT-PSA, Spain. María-José will deal with: training, the Summer School and webinars

Aimee Byrne, Technological University Dublin, Ireland. Aimee will deal with: social media, industry and Open research policies.

Richard Fitton, University of Salford, Energy House 2.0, UK. Richard can be contacted for experimental and analysis work.

Luke Smith, Build Test Solutions Ltd, UK. Luke will deal with: strategic direction of the network and industrial direction.

Twan Rovers, Saxion University of Applied Sciences, the Netherlands. Twan can be contacted for dissemination, the DYNASTEE newsletter and the website.

Hans Bloem, DYNASTEE Chair. Hans was involved in the PASLINK EEIG and DYNASTEE networks as from 1994.

Maria Kapsalaki, INIVE vzw, will continue to assist the DYNASTEE network.

## DYNASTEE Building Physics Spring School

By Maria-Jose Jimenez

Following our recent board meeting, we are now launching the **DYNASTEE Building Performance Measurement Spring School**. The Spring school will take place over four days (**24<sup>th</sup> -27<sup>th</sup> of April 2023**), and will be held at the **University of Salford, Manchester, UK**.

The training event will be a condensed format of the Summer School, which has been organised for over a decade and which has attracted over 200 participants. Lectures will cover important aspects of dynamic data analysis applied to real data from in-situ measurements and energy metering for the energy performance assessment of buildings. About half of the time will be devoted to lectures and the other half to practical exercises using real data and available tools. This event will be suitable for industrial researchers, engineers, PhD students and other specialists in this area.

The provisional program over four days will contain about 12 lectures, covering about half of the available time. Five lecturers will present several aspects of dynamic mathematical techniques for the analysis of data that represents the thermal behaviour of buildings. Discussed will be discrete time as well as continuous time models and methods. The remaining 50% of the time is scheduled for exercises that the participants may devote to work with the software and experimental data that will be presented. The software tool LORD (Windows) will be distributed and CTSM-R can be downloaded also. Application examples of the distributed data will be discussed.

The preliminary program is as follows:

**Monday 9:00-17:15**

- Correlation and statistics from the available data for model development
- Dynamic versus static analysis and physical versus statistical perspective
- Data from outdoor tests; first steps for evaluation by plots, graphical examination, common sense, average method and final data selection

**Tuesday 9:00-17:15**

- Benchmark data-series; from real data for dynamic features of heat transfer
- General information on specific sensors and instruments; error evaluation

**Wednesday 9:00-17:15**

- Methods and models; Output error (OEM)

and Prediction error (PEM) methods

- LORD tool and CTSM-R routines in the R-environment

**Thursday 9:00-17:15**

- Residual analysis and feedback for model development

You are requested to pre-register and can contact María-José Jiménez (MJ), CIEMAT-PSA, Spain by e-mail: [mjose.jimenez@psa.es](mailto:mjose.jimenez@psa.es). Information about accommodation and payment of the participation fee will be made available after pre-registration.

At the end of that week, we will also host the first **European Building Performance Symposium** on the **28<sup>th</sup> April 2023**. This event will be organised by the University of Salford and the DYNASTEE network. This symposium will bring together research from Industry and Academia providing discussion and information on developing and innovate building performance measurement and what the DYNASTEE network can offer to them. In return, the network would like to get informed by these parties what their needs are.

Details of the programmes of these events will be published on the DYNASTEE website, [www.dynastee.info](http://www.dynastee.info).

## DYNASTEE European Building Performance Symposium

By Richard Fitton

Following a long break due to the global pandemic, DYNASTEE will be back this year with a new symposium. It will take place on **28<sup>th</sup> April 2023** at the **University of Salford, Manchester, UK**.

We will focus on novel building performance measurement with guest speakers from the EU and the UK to take us through the most innovate ways of analysing and measuring the energy performance of domestic and non-domestic buildings. The topics will include the following:

- Updates on latest EU and UK legislation around BPE
- Update on the available guidance and standards around BPE
- Novel measurement of whole house heat loss
- Digital twinning using measured data
- Measurement of occupancy

Details on the venue, programme and registration will be published on the DYNASTEE website, [www.dynastee.info](http://www.dynastee.info), in the next coming weeks.



DYNASTEE Summer School in Almería in 2018



# Past and present of building performance test sites

By Hans Bloem & Twan Rovers

## A brief history of the outdoor test cell

It was in 1984 that the DG XII (Research) of the European Commission decided to create a European-wide research activity on improving the energy performance of building construction elements. Note that at that time, the European Economic Community consisted of ten member states, but soon would extend with three more. Discussions on the single market would move into the direction of free transfer of goods, including construction products. After the oil crises of the 70s and 80s, there was a focus on the use of solar technologies, and hence the European project started with ambitious plans, with a large budget and a group of national experts. The aim was to perform testing, analysis and modelling work at European level. The project was called PASSYS: Passive Solar System testing.

The size of the test cell volume was defined, as well as the size of the façade or roof element that could be tested. Equipment for heating, cooling and ventilation were defined and harmonised. A common test programme was developed by the modelling- and analysis groups and harmonised experiments were carried out on all test sites.

The plan to create outdoor test sites with similar experimental devices as well as identical testing protocols resulted in the construction of 38 test cells in nine countries in the beginning of the 1990s. Some of them were equipped with a removable roof and some were able to rotate to perform specific tests involving solar radiation. It was decided to upgrade several of the test cells with heat flux tiles to improve the accuracy of the signals that measure the flow of heat through the walls.

Meanwhile, the developments in information technology allowed to conduct more detailed measurements and to improve analysis techniques. More countries and research institutes were interested to participate in the successful European projects, although some universities had to quit with as result that some of the original test cell moved to other sites or new test cells were built with identical dimensions and equipment. Through the years, several industries took part in the testing of windows, dynamic ventilated walls, green roofs, the integration of photovoltaic systems, etc.

The outcome of the workshop on [Full scale test facilities for hygrothermal analysis](#), March 30-31 2011 in Brussels, with the support of KU Leuven and UGent resulted in a colourful book on European outdoor test facilities.

Of the original 38 test cells, only a few are still operational, like in Bilbao, Almería, Innsbruck and Chambéry, but at the same time new test cells, often with similar dimensions and equipment, have become available for outdoor testing.

## Contemporary test facilities

The latest developments in building construction for increased energy performance and use of more energy efficient technologies ask for further realistic research. [Mohammadi et al. \(2022\)](#) provide an overview of contemporary test facilities for building energy and indoor climate performance assessment.

A distinction can be made between outdoor test facilities, such as [The Green Village](#) in Delft (NL), and more advanced test facilities which allow for full control of ambient climate conditions, such as the [Energy House Labs](#) at Salford University (UK). Some of the test facilities allow for twin measurements, which comprise (at least) two identical buildings or rooms, allowing for the measurement of relative differences between an intervention and reference building (or room). [Fraunhofer's Twin Houses](#) (DE) and [Saxion's Smart TinyLab](#) are examples of facilities allowing for twin measurements.



Rotatable test cell



Energy House 2.0 (Salford, UK)



Smart TinyLab (Saxion UAS, NL)

## Publication of European co-heating test standard

By Twan Rovers

Researchers have been interested in the as-built thermal performance of buildings for decades. In the late 1970s, the co-heating test methodology was developed, originally to determine the efficiency of heating and cooling systems, but since then primarily used to determine the in-situ Heat Transfer Coefficient (HTC) of buildings. Although the co-heating test methodology has been applied by researchers all over the world for decades now, there has not been an official standard describing the co-heating test until recently. Instead, many researchers have referred to the description of the methodology of the [Leeds Beckett University](#) in the past.

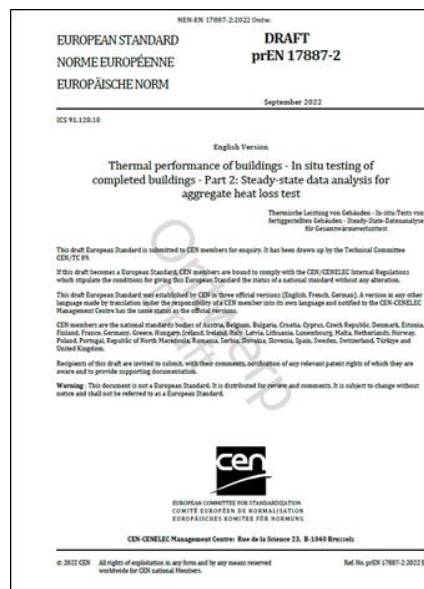
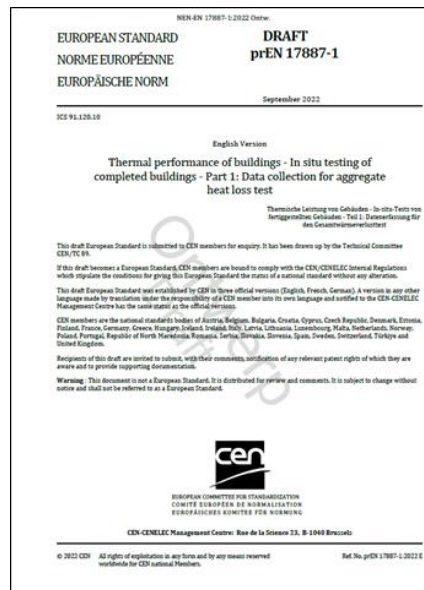
In September 2022, however, two (preliminary) European standards concerning the co-heating test have been published: EN 17887-1, which describes the methods for data collection, and EN 17887-2, which describes the methods for data analysis.

## Nordic Symposium on Building Physics 2023

The 13<sup>th</sup> Nordic Symposium on Building Physics will take place from 12 to 14 June 2023 in Aalborg, Denmark. The theme of the conference is Building physics as a key player for sustainable built environment, addressing findings and challenges in building a sustainable society with respect to building physics.

210 Full paper contributions have been received by the conference organisation, and the review process is currently taking place. Conference registration will open at the end of February. For registration, as well as details and updates on the program, please visit <https://www.en.build.aau.dk/web/nsb2023>.

The Nordic Symposium on Building Physics (NSB) has been arranged every third year since 1987 and is the largest international conference in Building Physics with longest timeline and traditions. NSB is organized in the Nordic countries but is not limited to cold climate and has now participants from all over the world.



### NSB conference series

- 2023: Aalborg (DK)
- 2020: Tallinn (EE)
- 2017: Trondheim (NO)
- 2014: Lund (SE)
- 2011: Tampere (FI)
- 2008: Copenhagen (DK)
- 2005: Reykjavik (IS)
- 2002: Trondheim (NO)
- 1999: Göteborg (SE)
- 1996: Espoo (FI)
- 1993: Copenhagen (DK)
- 1990: Trondheim (NO)
- 1987: Lund (SE)

## ABOUT DYNASTEE

DYNASTEE stands for: "DYnamic Analysis, Simulation and Testing applied to the Energy and Environmental performance of buildings". DYNASTEE is a platform for exchange of knowledge and information on the application of tools and methodologies for the assessment of the energy performance of buildings. DYNASTEE functions under the auspices of the INIVE EEIG and it is open to all researchers, industrial developers and designers, involved in these subjects.

The EU energy research projects PASSYS (1985-1992), COMPASS and PASLINK created the initial European network of outdoor test facilities, developed test methods, analysis methodologies and simulation techniques. It resulted eventually into the PASLINK EEIG network (1994). The network profiled itself as a scientific community of experts on Testing, Analysis and Modelling. In 1998, PASLINK EEIG started a new project: PVHYBRID-PAS, on the overall performance assessment of photovoltaic technologies integrated in the building envelope. The use of the outdoor test facilities in several member states situated in different climates, together with the available expertise on analysis and simulation techniques, offered the ingredients for more successful projects: IQ-TEST (2001), focusing on quality assurance in testing and analysis under outdoor test conditions, as well as evaluation techniques of collected in-situ data. The expertise of the network was also offered to other European projects, such as DAME-BC, ROOF SOL, PRESCRIPT, IMPACT and PV-ROOF.

In 2005, the EEIG was converted into an informal network that today is known as DYNASTEE. It is offering a network of excellence and should be considered as an open platform for sharing knowledge with industry, decision makers and researchers. It has been very active in supporting projects such as the IEA-EBC Annex 58 and more recently the IEA-EBC Annex 71 'Building energy performance assessment based on in-situ measurements'.