WEPOP Project – International Dissemination Activity within PRIN 2022

The **WEPOP – WEarable Platform for Optimised Personal Comfort** project (Prot. 2022RKLB3J), funded by the **European Union – Next Generation EU**, under **Mission 1 "Digitalisation, Innovation, Competitiveness and Culture", Component 2**, within the **PRIN 2022 Programme**, continues to strengthen its international positioning through high-level scientific dissemination activities.

Within this framework, **Prof. Anna Laura Pisello** and **Dr. Veronica Martins Gnecco** participated in the **IEA EBC Annex 87 meeting**, held on **3–4 April 2025** at the **Fraunhofer Institute for Solar Energy Systems (ISE)** in **Stuttgart, Germany**, after a first fruitful meeting still of the Annex 87 partnership in Tokyo (University of Tokyo and Tokyo Conference Centre for the IAQVEC conference) where prof. Pisello and the WEPOP coordinator **prof. Marco Arnesano** also contributed.
The participation represents a strategic dissemination action fully aligned with the scientific objectives, methodological framework, and expected impacts of the WEPOP project.

Scientific Contribution of WEPOP within the framework of Annex 87 (IEA EBC - Annex 87 - Energy and Indoor Environmental Quality Performance of Personalised Environmental Control Systems)

Recent research has highlighted the limitations of traditional indoor environmental comfort assessment methods, which often fail to capture the **subjective, multidomain, and dynamic nature of human comfort perception**. In response, **personal comfort approaches** have emerged as one of the most promising paradigms, enabling the integration of **physiological, environmental, and personal data** to improve comfort prediction, building control strategies, and energy efficiency.

The WEPOP project directly addresses these challenges by developing a **novel edge-computing platform** for **real-time personal comfort measurement and control**, exploiting the convergence of:

- wearable physiological sensors,
- environmental IoT sensing systems,
- artificial intelligence–based Personal Comfort Models (PCMs).

Despite recent technological progress, existing studies remain limited to small sample sizes, single comfort domains (thermal or visual), and highly controlled laboratory conditions, preventing large-scale real-life applications. WEPOP responds to this gap by targeting **multidomain comfort**, **intra- and inter-subject variability**, and **real operational contexts**, providing evidence of:

- enhanced occupants' comfort (dissatisfaction reduction > 5%);

- improved building energy efficiency (minimum −10%).

Figura 1 - Foto di gruppo presso l'istituto che ha ospitato il meeting scientifico con la prof. Pisello e la dott.ssa Martins Gnecco

Figura 2 Foto del meeting presso il Fraunhofer ISE

Alignment with Annex 87 Objectives

The scope and objectives of **IEA EBC Annex 87 – Personalised Environmental Control Systems (PECS)** are strongly aligned with WEPOP's research vision. Annex 87 focuses on the development of **design criteria, control strategies, and operational guidelines** for PECS, aiming to enhance:

- personal comfort and health,

- energy efficiency,
- resilience of buildings, including post-pandemic scenarios.

Annex 87 explicitly includes **wearable systems** for heating, cooling, ventilation, lighting, and acoustics—precisely the technological and conceptual core of the WEPOP platform. The discussions held during the Stuttgart meeting on:

- multidomain comfort integration,
- interaction between general HVAC systems and PECS,
- control strategies and long-term performance in real buildings,

directly support the WEPOP ambition to bridge the gap between theoretical personal comfort models and real-life implementation.

WEPOP Work Plan and Contribution

The WEPOP project is structured into **six Work Packages**, involving **four Research Units** with complementary expertise:

- **WP1 – Project Management** (Leader: ECAMPUS)
- **WP2 – Physiological Sensing System** (Leader: UNIPA)
- **WP3 – Environmental Sensing System** (Leader: UNIVPM)
- **WP4 – PCM Platform Development** (Leader: ECAMPUS)
- **WP5 – Platform Validation and Control System Interface** (Leader: UNIPG)
- **WP6 – Dissemination and Exploitation** (Leader: UNIVPM)

The participation in Annex 87 directly contributes to **WP2-3-6**, reinforcing international networking, knowledge exchange, and scientific impact, while also feeding back into **WP4 and WP5** through shared methodologies, validation strategies, and control concepts.

Impact and Dissemination Value

The engagement of WEPOP researchers in Annex 87 (more than 50 participants actively engaged into the network) strengthens the project's role within the international research community working on **personalised comfort, PECS, and human-centric building control systems**. It also supports the broader objectives of the **PNRR and PRIN 2022 programmes**, fostering scientific excellence, international collaboration, technology transfer towards more sustainable, energy-efficient, and user-centred buildings.

Through this mission, WEPOP confirms its contribution to advancing **next-generation indoor environmental comfort paradigms**, where human well-being, digital innovation, and energy sustainability are fully integrated.

Partners:

The research has been founded by European Union, next Generation EU, Mission 1 Component 2, through the WEPOP (Prot.2022RKLB3J) ''WEarable Platform for OptImised Personal comfort'' project, within the PRIN 2022 program.