Press Release
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The role of energy models in the design phase of renovation projects

Nearly Zero-Energy Buildings (NZEB), are buildings that have a very high energy performance, while they require nearly zero or very low amount of energy, which is covered almost fully from renewable sources produced on-site or nearby. The refurbishment of existing buildings toward NZEB, while ensuring the residents' satisfaction and well-being is challenging. This is one of the challenges addressed in INPERSO, a project which will implement innovative solutions, flexible to adapt to the specific characteristics and needs of each building and user. **Industrialised and digitalised processes** will also be employed to improve retrofit works, reducing both time and disturbance. INPERSO aims to effectively address the end users' needs, enhance the habitability of buildings, and reduce energy costs associated with refurbishment and use of the implemented technologies.

The longevity of buildings means they 'lock-in' their performance for decades to come. Thus, renovations need to be designed to mitigate the possible negative impacts of a changing climate. Tasks aimed at addressing these challenges, included in the validation and demonstration work package (WP5) of INPERSO, have already been undertaken. Among others, dynamic simulation models of the current status of the three Demo Cases (DCs) have been created: DC1, a **multifamily building** located in Valencia (Spain) by ACCIONA; DC2, a **heritage monastery** complex in Velp (Netherlands) by Tampere University; and DC3, a **social shelter** in Vouliagmeni (Greece) by Advanced Management Solutions (AMS).

Why are dynamic simulations used? **Dynamic simulations** enable the accurate evaluation of all the aforementioned factors (i.e., thermal comfort, energy performance, etc.) at an early stage, but they need detailed input data for climatic conditions and building properties. In this respect, several steps have been followed to precisely define the dynamic models:

- Accurate survey of each building through field survey and visual inspection, considering material and composition of single and complex building components. This includes the entire building envelope, inner walls, and external and internal closings. Internal heat loads are also taken into account, positioned and defined.
- Geometrical building definition based on its real dimensions, distribution, openings, and details. Orientation and positioning are determined at the neighbourhood scale enabling lighting and shadowing study. Finally, zoning of interior spaces is defined according to its location in the building and use.

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- Data collection (i.e., geometry, material, zoning, uses, etc.) to create a digital model of the Demo Case in its current state using the selected simulation software. Figures generated by this simulation, as a result, characterise the initial energy state and performance of the building.

The construction of a **digital model** for the demo buildings responds, in general terms, to a double purpose:

- On the one hand, it will provide very useful information to choose and define the different measures that will be applied in each demo case, helping the decision-making process in the consortium.
- On the other hand, it will support an effective implementation of the selected measures, reducing the gap between actual and expected building performance.

Both purposes briefly summarise the role of energy models in the design phase of renovation projects, highlighting the need to include them from an early stage to avoid existing deficiencies of the current practices in this regard.

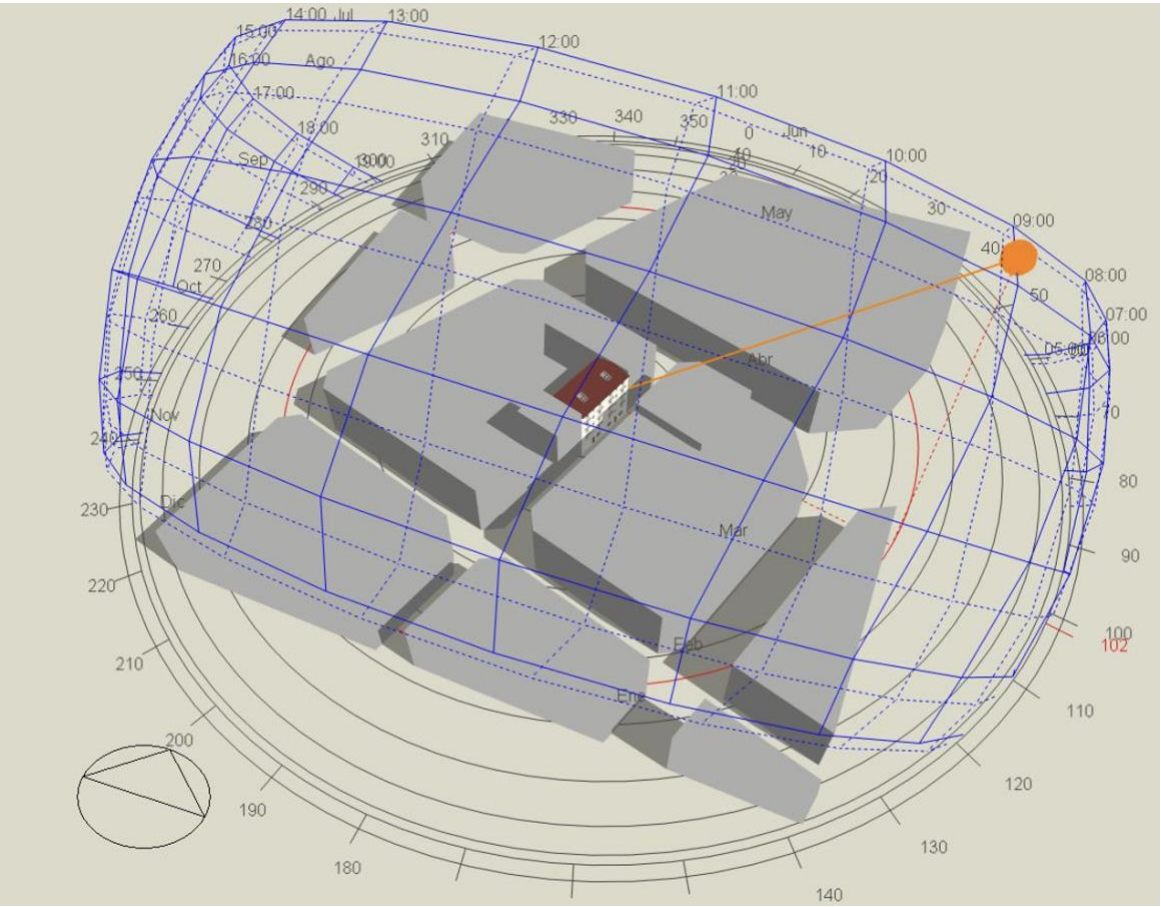

Figure 1: Digital model of DC1, multifamily building in Valencia, created by ACCIONA using Design Builder software in collaboration with the Spanish DC core group (AUMSA, IVE, UPV, TAU).

About the project

Project Title: INdustrialised and PErsonalised Renovation for Sustainable sOcieties

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Consortium

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