

Towards a Digital Twin-based conceptual framework for Green Building Neighbourhoods

N. Kampelis^{1*}, F. Lygerakis¹, D. Kolokotsa¹

¹School of Chemical and Environmental Engineering, Technical University of Crete, Chania, Greece
(*nkampelis@tuc.gr)

ABSTRACT

In the context of this paper, a neighborhood is defined as a set of buildings in the urban environment, together with the artificial and the natural surroundings which extend in an area smaller than that of a district. A neighborhood is considered to be “green”, in the case that environmentally friendly technologies and sustainable development planning arrangements, practices and behaviors co-exist to a significant degree. In this regard, it is crucial that in a Green Building Neighborhood (GBN) a just energy transition is aligned with inclusive economic activity to enable key social benefits for the neighborhood community as a whole.

On the other hand, a Digital Twin (DT) is defined as a promising technological paradigm comprised by components for the digital representation of its physical counterpart (i.e. digital models, data connections and the data management infrastructure, sensors etc.) oriented to providing digital services through visualization, real-time monitoring, data analytics, simulation and advanced control ^[1].

The scope of the conceptual framework presented hereafter is to provide critical considerations on the basic principles, components and features of DT models essential for a GBN as seen from a life cycle perspective i.e. including the various stages of design, construction, operation and end-of-life. In this direction, key advances are addressed and the potential developments in this field are discussed.

KEYWORDS: digital twin, life cycle assessment, green building / neighborhood

REFERENCES

[1] Tao, F., Zhang, H., Liu, A., & Nee, A. (2019). Digital Twin in Industry: State-of-the-Art. IEEE Transactions on Industrial Informatics.