

**Workshop on Energy Flexibility in Smart Buildings and
Smart Grids**

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Porto, Portugal



**Energy Flexibility
Smart Grid & Buildings**

**The contribution of artificial intelligence towards smart building
energy management**

Tiago Pinto

Research Group on Intelligent Engineering and Computing for Advanced Innovation
and Development (GECAD)

Type of talk: Invited talk

Abstract:

The increasing worldwide investment in renewable energy sources is leading to a large-scale adoption of renewable-based generation. Buildings, in particular, are one of the sectors in which the increase of renewable based generation has a large impact, benefiting from the installation of rooftop solar-based generation. Although such generation brings several benefits to its users, it also encompasses multiple challenges towards making the return of investment possible. In order to make use of the generation in an efficient way considering the limited time periods in which solar-based power is generated, significant adaptations need to be made on the consumption side, especially when avoiding additional significant investments in energy storage units. Changing consumption habits is, however, not easy. Thereby, novel Artificial Intelligence (AI) models are being used to support consumers in this endeavour. Machine learning based forecasting models are making it possible to achieve effective predictions of different energy resources, such as generation, consumption or electric vehicles trips. Meta-heuristic optimization models are surpassing the limitations imposed by the need for very fast response times for optimization models directed to energy resources scheduling. Simulation, e.g. multi-agent-based, is enabling experimentation of alternative actions and assessment of the potential impact of applying such actions in a real environment. Internet of Things (IoT) approaches combined with AI technologies are enabling the actual control of devices. Semantic-web technologies are endowing interoperability between different services, algorithms, systems and devices, enabling the creation of fully connected systems of systems. AI is thereby making it possible for consumers to reach informed and intelligent decision-support in suitable time frames, ultimately contributing to the efficient use of the available renewable-based generation.

Related References:

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- [3] European Commission, "On Artificial Intelligence-A European approach to excellence and trust White Paper on Artificial Intelligence A European approach to excellence and trust," p. 27, 2020

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- [5] Z. Vale, P. Faria, O. Abrishambaf, L. Gomes, and T. Pinto, "MARTINE—A Platform for Real-Time Energy Management in Smart Grids," *Energies*, vol. 14, no. 7. 2021.