ENERGETICS

EURAC - Assessing the impact of AI-based intelligent services for enhancing the smartness of next generation grid-interactive buildings

Funded By	ACCADEMIA EUROPEA BOLZANO - EURAC Research [P.iva/CF:01659400210]
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Context of the research activity	Intelligent buildings will support the digitalisation and decarbonisation transition to the benefit of building occupants, owners and the energy system. The main objective of the PhD position will be to investigate, develop and demonstrate technologies (building services) to predict, assess, monitor and control in real time the energy performance of buildings, renewable sources, storage and their optimization, on a variety of building typologies, smart readiness levels and real-life use cases.
	The EPBD recast highlights buildings' central role in the energy transition towards an integrated and renewable energy-based EU energy system. Smarter buildings will support the digitalisation and decarbonisation transition to the benefit of building occupants, owners and the energy system. Improving energy performance and reducing energy demand are even more relevant in the context of the REPowerEU Plan to rapidly reduce dependence on fossil fuels and accelerate the green transition. Highly replicable, generalized solutions are needed in order to deliver intelligent building services and facilitate the integration of heterogeneous systems and technologies. The research proposal aims to investigate the potentialities of Artificial Intelligence (AI) – based services for enhancing the smartness of grid-interactive buildings and supporting the process of green and digital transition according to new EPBD. In this context, the spread of automation and control systems, Information and Communication Technologies (ICT), and IoT sensors is contributing to an unprecedent availability of long-term monitoring data related to the energy performance and indoor environmental quality of buildings. Thanks to a robust coupling of AI algorithms and energy domain knowledge, this massive amount of data can be effectively analysed and translated into ready-to-implement intelligent services for optimizing the building performance during operation.

Objectives	The main objective of the PhD position will be to investigate, develop and demonstrate technologies (building services) to predict, assess, monitor and control in real time the energy performance of buildings, including energy efficiency, renewables, storage and their optimization, on a variety of building typologies, smart readiness levels and real-life use cases. A particular focus will be on: • the evaluation of the potential for energy savings from energy management solutions based on smart technical building systems, products and services (predictive controllers, smart thermostats, active sensors, smart lighting, etc.) to support smartness upgrade planning and decisions (considering energy consumption and flexibility, environmental, economic and social impacts, IEQ, thermal and visual comfort, smart readiness) • the investigation of smart automation and control KPIs being calculated and benchmarked for the building manager, providing monitoring overview before control strategies implementation. • Development and verification of energy and non-energy related KPIs including the smart readiness indicator for a number of building typologies and real-life use cases. The position is funded by EU within Horizon Europe Programme under the project BuildON (GAP 101104141) - CUP D53C22004410006 by means of EURAC Research. The PhD fellowship recipient will spend an adequate amount of time at the EURAC Research office, to fruitful develop the collaborative research activities.

Skills and competencies for the development of the activity	Building physics; Smart readiness indicator; Data driven modeling; ; HVAC systems; Building energy modeling; Key energy performance indicators; Smart buildings