



POLITECNICO
MILANO 1863

Supervisor Expression of Interest MSCA - Marie Sklodowska Curie Action - (PF) Postdoctoral Fellowship 2024

Supervisor name: Francesco Causone

Email address: francesco.causone@polimi.it

Link “Pagina docente”:

https://www4.ceda.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?EVN_PRODOTTI=evento&k_doc=455200&lang=EN&aa=2023&tab_ricerca=1

Department Name: Department of Energy (DENG)

Research topic: Energy Efficiency and Sustainability for the Built Environment

MSCA-PF Research Area Panels:

- ECO_Economic Sciences
- X ENG_Information Science and Engineering
- ENV_Environmental and Geosciences
- LIF_Life Sciences
- MAT_Mathematics
- PHY_Physics
- SOC_Social Sciences and Humanities
- CHE_Chemistry

Brief description of the Department and Research Group (including URL if applicable):

The Department of Energy of the Politecnico di Milano, is leading several research projects focused on technologies relating to the production, conversion, transport and use of energy, in terms of a complete social and environmental sustainability. Thanks to the range of skills offered by the Department of Energy, the Politecnico di Milano can boast one of the most influential structures in Italy: a reference point for its high teaching level, a primary research partner, an active partner of enterprises, bodies and institutions, both nationally and internationally.

Francesco Causone is part of the BEES (Buildings' Environment and Energy Systems) Research Group and Head of the CRANES Lab (City Research for Architectural aNd Energy Systems). The Lab's expertise includes energy and indoor environmental quality assessment



POLITECNICO
MILANO 1863

in the built environment, and buildings sustainable design. In these fields activities are focused on UBEM (Urban Building Energy Modelling) and data analysis.

<https://www.energia.polimi.it/en/energy-department/research/research-groups/environment-and-energy-systems-bees/#c1920>

https://www.urbem.polimi.it/en/dt_team/francesco-causone/

TITLE of the project: Data analysis for energy management at building and urban scale

Brief project description:

The project will be focused on the application of advanced data analytics to provide innovative methodologies and tools for energy management at building and urban scale.

Advanced analytics may be applied to the scale of building to improve building envelope components and building systems control with the aim to reduce energy use while increasing indoor environmental quality (IEQ). Advanced controlling may also be applied to the urban scale providing optimization strategies for energy systems serving districts and renewable energy communities (REC).

Moreover, advanced analytics may be employed on existing database to generate information useful to inform energy related policies. Applications may include archetypes (or reference buildings) generation to inform future Energy Performance of Building Directives both at national and EU scale; synthetic data generation to overcome limitations due to data-privacy legislation; database clustering to determine energy efficiency strategies in accordance with climate mitigation, climate adaptation or other energy, environmental and economic constrains; geodata exploitation to improve energy efficiency and comfort at urban level, etc.

Advanced analytics may embrace several approaches in the filed of Artificial Intelligence (AI), including but not limited to: Machine Learning (ML), Deep Learning (DL), Reinforcement Learning (RL), etc. The project may also be focused on the exploitation of existing algorithms in innovative and unprecedented ways, for instance for the exploitation of geodata or GIS.