

**Title:** Call for Expressions of Interest for the submission of MSCA-IF projects in the Thermal Energy and Building Performance Group

### **Job Description**

IREC, in Barcelona, Spain, is interested in receiving Expressions of Interest of potential candidates for the Marie Skłodowska-Curie Actions – Individual Fellowship (MSCA-IF) 2020 call.

Our group aims to investigate and develop an integrated and systemic approach towards **positive energy buildings and communities**. Globally speaking, the building sector is responsible for 40% of primary energy consumption. Our vision is to investigate in solutions and strategies that accelerates the reduction of greenhouse gas emissions in the building sector through human-centred design, **energy efficiency** measures, **integration and management of energy systems**, particularly **distributed renewable sources** in the built environment as part of urban communities.

In order to develop solutions for reducing energy consumption, we take an approach that is not only technological, but also holistic in that it considers aspects that are crucial for buildings, offices and cities, such as **air quality, indoor environment and socio-economic impacts**, including benefits on occupants' health. Buildings should be considered as nodes of the overall energy system in our society that must contribute to the objective of being climate neutral in 2050, being so important to consider the **integration with the energy infrastructures**: the electrical grid and district heating and cooling networks.

The driving research subject of the Thermal Energy and Building Performance Group is the integrated and systemic approach for Low to Plus Energy Communities, including both analysis at building / urban level and at system level.

The research group is also managing **the Semi-Virtual Energy Integration Laboratory (SEILAB)** which provides advanced expertise to assess the development and integration of renewable energy solutions and innovative thermal and electrical equipment that are designed to improve energy efficiency in buildings and energy systems. The laboratory is provided with cutting-edge technology comprising systems for energy generation, heat and cool storage and state-of-the-art facilities for testing HVAC equipment and the interaction of energy systems with the grid. The laboratory operation is based on a semi-virtual testing approach, which allows for real equipment to be operated as a function of the behaviour of a dynamic virtual model. The laboratory is pioneer in addressing the smart integration of electrical and thermal components and aims to become a leading experimental facility for improving the development of Net Zero Energy Buildings.

We're looking for potential candidates in the following areas:

### **Positive and flexible energy buildings and communities**

From the existing background, the activity of the group is focused on expand the developed methodologies and tools oriented to Net Zero Energy Buildings and energy flexibility from buildings to communities.

Then, the research challenges are connected to develop in-depth knowledge, tools and assessment methodologies for Positive Energy Communities and flexibility energy services that buildings and clusters of buildings may deliver to different types of energy networks. Technical challenges are related to the development of new simulation modules to be integrated in existing or new urban simulation tools to assess the benefits of concepts and operational strategies in clusters of buildings. Identified challenges that are the core work of the group are the following:

- ✓ development and computation of Key Performance Indicators (KPIs) at district level;
- ✓ control and management strategies at building and district level;
- ✓ simultaneous simulation of the short-term interaction with energy grids;
- ✓ reduced order building models for integration in simulation tools, model predictive control strategies
- ✓ stochastic human behaviour modelling
- ✓ co-benefits analysis for smart retrofitting and construction of buildings
- ✓ business models for new energy services and large-scale retrofitting actions

### **Energy infrastructures for low energy cities and Green IT**

Activity in this field is built over previous results on integration of district heating and cooling (DHC) networks and energy concepts for Data Centres which are both strongly related to the previous described research line. Work on simulation models integrating energy infrastructures (thermal and electrical networks) with building stochastic loads is a research activity supported partially by the GrowSmarter and GEIDI projects. Specific work on DHC integrating renewables has been done in the framework of past EU SmartReFlex project. In the recent years, the group led the EU RenewIT project ([www.renewit-project.eu](http://www.renewit-project.eu)) whose main outcome was a web-based planning tool, the RenewIT tool ([www.renewit-tool.eu](http://www.renewit-tool.eu)), to help organisations understand the costs and benefits – in economic, environmental and sustainability terms – of designing and operating a Data Centre to use a high proportion of on-site or grid-based renewable energy. DHC networks are considered key elements to provide energy flexibility to buildings and districts and heat reuse from IT Data Centres to buildings or DHC networks is one of the identified and promising concepts to research in. Then, research activities of Energy Systems Integration in Data Centres and DHC networks will follow in the next years as a complementary and synergic activity with the main driving objective of the group.

We are looking for excellent and highly motivated candidates with a MSc degree in Mechanical / Electrical Engineering and/or Energy systems, with some experience in HVAC, thermal renewable systems and generally speaking energy systems in buildings and/or cities. Knowledge in renewable energy technologies and experience in computational energy systems and simulation tools (especially TRNSYS) is highly valuable. In addition, it is necessary to have some experience in programming tools and/or packages as Python, Matlab, C++ or R.

We are looking for a methodical and rigorous person with a scientific spirit and results oriented. Teamwork and communication and management skills will also be a requirement. Mastery of English on all levels will be essential. Knowledge of other languages will be desirable.

## Benefits

The annual budget includes funding for salary, research costs and a contribution to the management and overheads of the project. The salary will be in accordance with the H2020 Marie Skłodowska-Curie rates.

Fellows will be based at the IREC headquarters in Barcelona.

## Elegibility criteria:

According to the MSCA-IF-2020 call, the fellows, at the deadline for the submission of the proposals:

- Must be experienced researchers, i.e., e in possession of a doctoral degree or have at least four years of full-time equivalent research experience.
- May not have resided or carried out their main activity (work, studies, etc.) in Spain for more than 12 months in the three years immediately before September 9<sup>th</sup> 2020.

## Application:

Researchers willing to apply should check that they meet the eligibility requirements and send the expression of interest, including:

- Their CV
- A motivation letter
- A summary of their research proposal

Expressions of interest should be sent by email directly to the KTT Office ([ktt@irec.cat](mailto:ktt@irec.cat)) indicating "Call for Expressions of Interest for the submission of MSCA-IF projects in the Thermal Energy and Building Performance Group" in the subject.

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Nr of positions available: 3

## Research Fields

- ✓ Positive and flexible energy buildings and communities
- ✓ Energy infrastructures for low energy cities and Green IT
- ✓ Faut Detection & Diagnosis in HVAC systems

**Researcher Profiles**

Recognised Researcher (R2)

Established Researcher (R3)

Application Deadline: 15/07/2020