



**POLITECNICO**  
MILANO 1863

**ABC<sup>PhD</sup> DOCTORAL PROGRAM**  
IN ARCHITECTURE BUILT ENVIRONMENT  
AND CONSTRUCTION ENGINEERING

**ABC<sup>PhD</sup> CALL4SCHOLARSHIP 32b**  
Research topic T3: ENERGY FLEXIBLE BUILDINGS  
**(32b-T3 Energy Flexible Buildings)**

# ABC PhD Programme – CALL 4 SCHOLARSHIPS 32b

Thematic Scholarship 32b-T3 “Energy Flexible Buildings”



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**EURAC**  
research

## Funding and management of the thematic scholarships

- Number of scholarships: 1 (one)
- Monthly net income: €. 1.400,00 (max 36 months)  
[In case of a change of the welfare rates during the three-year period, the amount could be slightly modified]
- Additional support: Funding for educational activities<sup>(\*)</sup> : €. 1.370 per student [for the 2<sup>nd</sup> and 3<sup>rd</sup> year]
- Starting of PhD activity: 1/11/2016
- Deadline for application to the call: 9/09/2016
- Research Director: prof. Gabriele Masera
- Research Group: proff. Gabriele Masera, Niccolò Aste, Roberto Lollini (EURAC).
- Funding and cooperating Institutions: the scholarship is co-funded by Politecnico di Milano, Department ABC and EURAC, *European Academy of Bozen/Bolzano*.

(\*) (purchase of study books and material, funding for participation in courses, summer schools, workshops, conferences)

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## Thematic Scholarship 32b-T3 “Energy Flexible Buildings”

### **Context of the research activity**

The foreseen large deployment of renewable energy sources may seriously affect the stability of energy grids. It will be necessary to control energy consumption to match instantaneous energy production. The built-in Energy Flexibility in buildings may be utilized for stabilizing the energy grids, allowing for a larger roll out of renewable technologies.

The Energy Flexibility of a building is the ability to manage its energy demand and generation according to local climate conditions, user needs and grid requirements. This can be done by several means i.e. thermal mass, charging of electrical cars and use of appliances. Energy Flexibility of buildings will thus allow for demand side management and load control and thereby demand response based on the requirements of the surrounding grids. .

Currently there is, however, no overview or insight into how much Energy Flexibility different building types and their usage may be able to offer to future energy systems. To fulfil this gap, in October 2015, it started the IEA EBC ANNEX67 “Energy Flexible Buildings”. The scope of the ANNEX is to increase knowledge on and demonstrate the Energy Flexibility that buildings can provide.

In-depth knowledge of the Energy Flexibility that buildings may provide is important for the design of future Smart Energy systems and buildings. The knowledge is, however, not only important for the utilities it is also necessary for companies when developing business cases for products and services supporting the roll out of Smart Energy networks. Furthermore, it is important information for policy makers and government entities involved in the shaping of future energy systems.

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## Thematic Scholarship 32b-T3 “Energy Flexible Buildings”

### **Motivation and objectives of the research**

The objective of this PhD position is to deepen the knowledge in the new and complex topic of building energy flexibility. The PhD candidate will develop a line of research that investigate the different aspects of flexibility in buildings:

- Formal (what energy flexibility is and why is it needed)
- Technical (studying technologies to implement flexibility without negatively impact indoor environmental quality).
- Economical (what the economic advantage of flexibility is).

### **Educational objectives**

At the end of the doctorate-training period, the candidate will know in deep the topic of energy flexibility in buildings: modelling, simulation, definition of technology solutions at building and building cluster scale.

### **Methods and techniques that will be used to carry out the research**

The Candidate is expected to complete his/her skills following a series of courses to be planned as soon as possible after the selection process and to gain research experience taking part to activities of the IEA EBC ANNEX67, to which Candidate’s research will be closely related:

It is expected that the candidate will develop a publication record in recognized international journals and conferences, contributing to the ANNEX implementation.

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## Skills of the candidate

At the end of the research project the candidate will have acquired skills and expertise to operate in the fields of:

- Knowledge of building physics
- Knowledge of RES integrated in building system, mainly PV and solar thermal
- Energy storage systems and control
- Building modelling, energy dynamic simulation, optimization strategies
- Energy economics

## Job opportunities

This research offers to young graduated as well as to professionals, an indepth knowledge in the field of energy efficient buildings, energy storage and optimization strategies, that can be used afterwards in academia or in the professional market.