

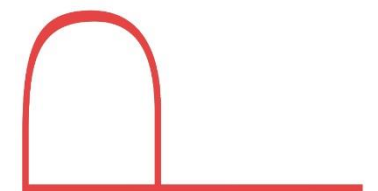
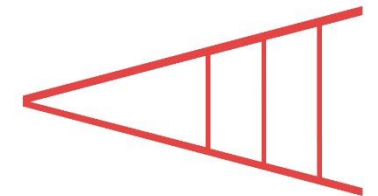
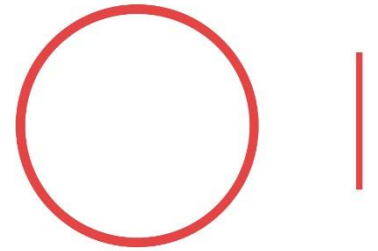
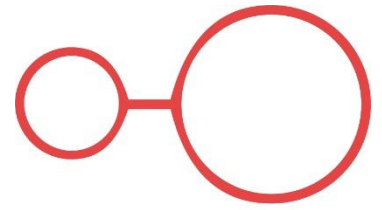
VOLUME 3

34th International Conference on
Passive and Low Energy Architecture

Smart and Healthy
Within the Two-Degree Limit

Edited by:

Edward Ng, Square Fong, Chao Ren



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PLEA 2018

PLEA stands for Passive and Low Energy Architecture. It is an organisation engaged in a worldwide discourse on sustainable architecture and urban design through its annual international conference, workshops and publications. It commits to the development, documentation and diffusion of the principles of bioclimatic design and the application of natural and innovative techniques for sustainable architecture and urban design.

PLEA is an autonomous, non-profit association of individuals sharing the art, science, planning and design of the built environment. PLEA pursues its objectives through international conferences and workshops; expert group meetings and consultancies; scientific and technical publications; and architectural competitions and exhibitions. Since 1982, PLEA has organised conferences and events across the globe. The annual conference of PLEA is regarded, attracting academics and practicing architects in equal numbers. Past conferences have taken place in United States, Europe, South America, Asia, Africa and Australia.

It is the first time that the PLEA conference comes to Hong Kong in 2018. The juxtaposition of Hong Kong's compact and high-density living and scenic countryside makes it an intriguing case of urban sustainability and climate resilience. The urban and built environment represents both challenges and opportunities amid climate change. As the world approaches the 2-degree limit, living smart and healthy has become a priority in urban development. Smart cities are driven by science and technology but are meaningless without consideration for the people and community. Design and practice are essential in implementation, while education and training stimulate innovation and empower professionals and laymen alike.

With the theme "**Smart and Healthy within the 2-degree Limit**", the conference strives to address the different facets of smart and healthy living and aims to bring together designers, academics, researchers, students, and professionals in the building industry in the pursuit of a better and more sustainable urban and built environment.

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Expert in Energy Design and BIM Energy Analysis Tools: A New Core Module for the ABITA Master Postgraduate Training Course

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ABSTRACT: Building energy performance optimization requires an integrated design approach to explore and evaluate alternative strategies for energy saving and to improve construction process management. Energy efficiency education into architecture and engineering curriculum should address economic, social and environmental issues arising from the technology as well, training professionals and technicians who wish to be able to develop core skills in those subject areas according to a multidisciplinary educational approach. This paper presents the experience of a Postgraduate Master Degree Program at University of Florence, Master ABITA, that includes studies on low energy architecture and energy efficiency measures, integration of renewable energies in buildings, Building Information Modelling and Energy Simulation Analysis tools.

KEYWORDS: Buildings Energy Efficiency, Postgraduate Education, Energy Management, BIM, Energy Design Tools.

1. INTRODUCTION

In recent year several education initiatives focusing on buildings energy saving have been carried out to attempt the needs of professionals with specific skills in technology or policy areas, architecture, engineering, economics, management and environmental science to enable them to plan, design, evaluate or research energy supply and design strategies to reduce energy consumption according to an economic sustainable development. [1]

The existing renewable-energy education and university training programs need to overcome many challenges that include first of all the unavailability of well-structured curricula on renewable-energy education [2].

Moreover, several international standards like ISO 14001 (ISO, 2004) or ISO 50001 (ISO, 2011) introduce the role of energy managers both in industrial companies and in the building sector [3]. Well-designed training programs for energy managers and AEC curriculum's customization are also required to meet the growing needs of energy experts from building industry.

The future challenges of the education and training program are related to follow-up activities, the development of interactive tools and the curriculum's customization to meet the constantly growing needs of energy experts from industry. New technologies and tools for a sustainable architecture design have to be included into an integrated process, as well as renewable resources, innovative systems design, industry structures and policies, economic, social and environmental issues.

2. MASTER ABITA POSTGRADUATE TRAINING COURSE

2.1 Topic and Program

Since 2003 the University of Florence offers a Postgraduate Master Degree Program in Sustainable Architecture and energy efficiency in buildings, the Master ABITA, which aims at educate and train students in the use and development of competitive skills and tools for energy efficiency.

The Master ABITA consists of four modules:

- *M1-Sustainable architecture and building deep renovation*
- *M2-Integrated design process for Nearly Zero-energy buildings_Energy Manager core module*
- *M3-Building Energy Simulation and Analysis*
- *M4-Build the future: Smart Cities and nZEB*
- *ML- Professional project work*

The course runs over a year, and modules are scheduled based on 6 months with a 2-3 days class per week, mixing both theoretical lessons and workshop sessions. The Master ABITA addresses energy efficiency topics focusing on sustainable architecture and deep renovation, with reference to different Best Practices for Nearly Zero Energy Buildings and to the most innovative solutions for envelope technologies such as adaptive envelope, smart facades, high performance glass facades, integrated PV technologies, innovative shading systems, etc.

Master ABITA has been renewed over the time considering following aspects:

- industry involvement for learning integrated practices;
- project-based learning and on-the-job training experience.

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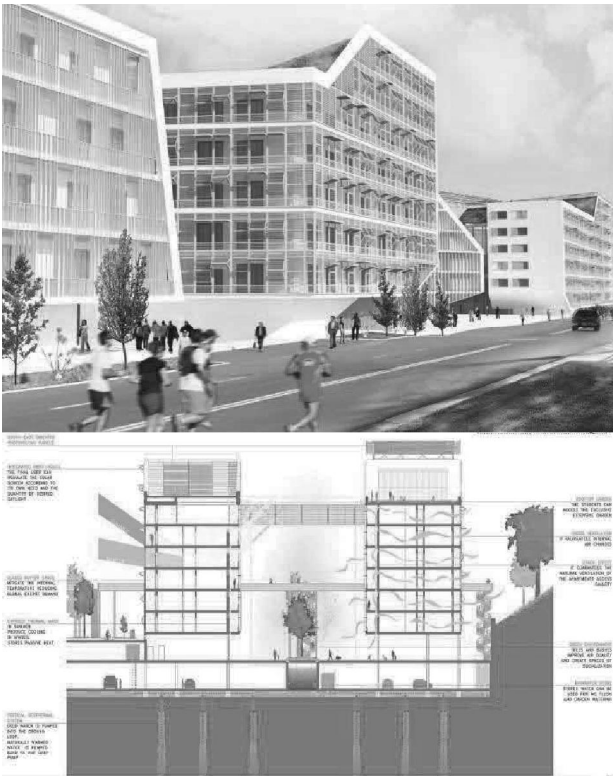


Figure 1: nZERO-Foundation, Arch. Danilo Rinaldi, Final Thesis Project, Master ABITA 2015/16.

Students learn about products technology innovation directly from partner companies involved into thematic workshops, guided tours to products manufacturing factories, exhibitions and expo dedicated to the Architecture and the Construction sectors. Industries partnership also allows students to establish professional relationships, internships and employment opportunities.

According to UNI EN ISO 50001 and international standardization of professional training, in the last year Master ABITA has introduced a new core module for the qualification of Energy Manager for industrial and civil sector (UNI CEI 11339:2009). Course topics include a technical overview of energy management, building monitoring and targeting, energy auditing, solution development, and regulations and standards. It provides participants with comprehensive knowledge and skills they need to energy saving design, to evaluate financial savings and reduce operational costs, achieving sustainable goals such as carbon emissions reduction.

At the end of the module participants meet the knowledge requirement to attend the exam for Energy Manager qualification, according to EGE TUV and UNI EN ISO 50001.

2.1 Methods

Training methods focus on an integrated design methodology throughout the building life cycle including design, operation, management and decommission

phase. Learning activities are designed to enable students to transfer knowledge into their future practice as professionals and building technicians.

Applicative methods and BIM tools are adopted according to European Directive 2014/24/EU that requires the use of BIM procedures and digital processes in public buildings construction.

The Master course includes a series of activities which consist of lectures, computer labs and workshops. Step-by-step coaching, handouts, video tutorials, classroom follow-up and interactive simulations are also implemented as software tutoring methods.

Students will be involved in an education process integrating BIM methodologies with energy simulation tools. By applying BEM methods to a project case study, students are able to perform a Model-Based project evaluation on building energy performance optimization (Fig.1-2), contributing to decision making at the early stages of design process and improving the whole building construction quality into an interdisciplinary perspective [4].

3. CONCLUSION

This paper showed a customized postgraduate educational program for training energy experts in the field of energy efficiency to meet the industrial needs for trained energy managers, closing the gap between theory and practice. The highly technological profile of the Master course trains specialists in sustainable strategies and innovative building technologies, who find professional opportunities at public or private institutions, national and international architecture and engineering studios, design companies related to product technology innovation.

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