Abstract / Initial Proposal Form:

1. Paper / Proposal Title:

Green Walls an Efficient Solution for Hygrothermal, Noise and Air Pollution Control in the Buildings

2. Format:

Written paper / verbal presentation

3. Author(s) Name:

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5. Abstract

A building façade is considered to form the first line of protection against adverse climate and environmental conditions in an urban area, such as wind and rain, leading it to be affected and eventually damaged by continued and direct interaction.

Furthermore, the increasing ecological and environmental concerns, due to the global warming associated with air and noise pollution, is proved to be linked to the small quantity of vegetation and green areas in urban environments and to technological development. Depending on that, new approaches to improve the environment quality in urban areas started to be developed. One of these approaches is Vertical and Horizontal Gardens, which are taking increasing roles in the recent years.

Historically, vertical gardens were the starting point for considering the possibility of growing plants on vertical surfaces and some examples are dated back to 2000 years in Mediterranean regions. Green walls were first used in buildings for simply decorative purposes in many cities of Europe and north America in the 19th century. However, the environmental control value of the green walls in Europe was not noticed until 1980s, where a lot of programs and studies recognized their ability to mitigate particulate

matter, reduce noise and provide cooling effects leading to the development of a lot of projects that promoted the usages of green walls.

The aim of this paper is to evaluate the efficiency of green walls regarding their ability to mitigate environmental conflicts, taking in consideration the different methods of implementation and their respective advantages and disadvantages.

This study systemically reviews recent researches on nature-based solutions namely green walls. Followed by an analysis of the environmental properties of different models of solutions, and an analysis of the costs and the average payback periods. The results of the review can provide a feedback of the most efficient green solutions that could offer good environmental quality with economic advantages.

The first part of the paper provides an overall introduction considering the green walls and their implementing methodologies. While the second part presents the environmental and economic effects of the different vertical greening systems on the envelope of the building compared to common building materials. The final results prove that each system of vertical greening varies depending on the levels of environmental benefits and costs, where some systems are proved to be economically sustainable with good environmental properties while others offer a wider range of plants with several implementation methods making them easier to implement, affecting the favorability of a green system on one another.

6. Author(s) Biography

Paulo Menodnça: was born in Porto in June 10, 1969. He received his PhD in Civil Engineering from the university of Minho, with the thesis: "living under a second skin". With a PhD fellowship from FCT (Portuguese foundation for science and Technology). He got the "advanced studies diplomaⅠ" in Barcelona on the Technical Superior School of Architecture (ETSAB). He was a JNICT (former FCT) fellowship student in the Textile Engineer Department of the University of Minho, where he obtained the master degree defending a thesis about "Intelligent textiles in architecture" (1997). He is an associate professor in the Architecture School of the University of Minho, Portugal (EAUM) and the coordinator of the research group DeTech of the Lab2PT Centre. He was the president of EAUM (2011-2012) and the vice-president (2010-2011). He is the author of three patents of invention. The main research subjects include lightweight and mixed weight buildings, low-cost housing etc.

Ligia Torres Silva: is an Assistant Professor in the Department of Civil Engineering at the Engineering School of the University of Minho, started working in 2002 as Professor and Researcher. Her activity in R & D is in the field of Environmental Management Urban as Regional Centre's Doctor, Environment and Construction. She is the author and co-author of over 50 scientific articles in journals and conferences regarding the evaluation, modeling and control of the quality of the urban environment. Coordinated the Municipal Plan VC Noise Reduction, senior consultant of SMARBraga and coordinated

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Lujain Hadba: was born in Lattakia in September 2, 1989. She received her bachelor in Architecture from the university of Damascus, then received her Master degree in Urban Engineering with the university of Minho, with the thesis: "Noise mapping of an urban Area: case study old city of Damascus, Syria". With a Master scholarship from Erasmus Mundus. She is a PhD student of the Architecture school of the university of Minho, Portugal. She is presently developing a PhD thesis titled: "FUNCTIONAL CONDITIONING SYSTEMS FOR URBAN ENVIRONMENTS". It aims toward the development of functional conditioning solutions that take the maintains of the ecosystem as a priority, and that considers a lot of suggested solutions around the world as a reference. The main research subjects involve green infrastructure, development of sustainable projects and promote new techniques of building in urban areas.