

GENESIS – Green Roofs/Walls Environmental Economic and Social Savings: Modelling Uncertainty and Investors/Users Preferences in all-inclusive Cost-Benefit Analysis of Green Roofs/Walls

Summary

Both owners and designers point to the lack of effective models as a reliable tool in the feasibility of green roofs/walls. The purpose of GENESIS is to enhance cost benefit analysis of green roofs/walls by developing three improvements:

- i. Include all environmental economic and social benefits in the analysis;
- ii. Comprise an uncertainty model to cope with inaccurate forecasting and climate change;
- iii. Incorporate users/investors preferences through a multi-criteria model.

This (all-inclusive) model is a step forward and crucial for a wide spreading of green roofs/walls.

GENESIS team is multidisciplinary, with complementary experience in estimating green roofs/walls multiple benefits and performing accurate cost-benefit analysis. The contribution of practitioners, companies and investors/owners from private and public sectors (national and international) is also defined to guarantee the validation/usefulness of the proposed model for replication in different regions of the world and type of infrastructure.

From a structure viewpoint, the research project is divided into 4 main tasks, as illustrated in Figure 1. Project started with comprehensive state of the art review (task 1) covering past research on CBA of green roofs/walls, main conclusions and challenges, as well as a survey of green roofs and green walls (past and ongoing) projects. These projects were divided by type of infrastructure, type of green roof/wall solution and climate, to allow accurate benchmarking. Furthermore, task 1 involved the long term modelling of costs and benefits of green

roofs/walls and translation of benefits and co-benefits into economic gains that is essential when balancing costs and benefits in the long run.

Tasks 2 and 3 are being developed mostly simultaneously to allow information exchange. Task 2 concentrates on establishing the methodological approach to develop life cycle CBA of green roofs/walls while task 3 focusses in testing the methodology with four complementary benchmark cases, namely: i) existing roof spaces in a city (task 3.1), ii) transport infrastructures (task 3.2), iii) primary schools (task 3.3); and iv) tourist accommodations (task 3.4). The selection of these four benchmark demonstration projects took into account that: a) they have a strong replication and can work as evidence for encouraging green roofs and walls in cities; b) the most relevant benefits of green roofs/walls vary between them. For each case study, several scenarios of rehabilitation with green roofs /walls were simulated, varying the type of green roof/wall.

A specific task (task 4) involving all team members was defined for dissemination, to assure two main aspects: i) inputs from different stakeholders are taken into account and ii) the model and case studies spread out.

So far, GENESIS produced 16 papers in international journals (15 ISI ones), participated in several conferences and reports, as well as several Master and PhD theses. Also, GENESIS organized two workshops involving different stakeholders and produced a user friendly tool to be used by any non-expert user. Please check more details on publications and main results in <https://www.projectgenesis-ist.com/publications>.



Figure 1. GENESIS' methodology.



Project Reference

PTDC/GES-URB/29444/2017

Leading Institution

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal)

Partners

ISA – Instituto Superior de Agronomia (Portugal), UA – University of Aveiro (Portugal)

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CERIS

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Project Website

<https://www.projectgenesis-ist.com/>