

## EVIDENCE – Rainwater harvesting simulator: waTer saVings In DifferENt ClimatE

### Summary

Designers, owners, urban planners and users have been requiring reliable models and tools to optimize and invest in water efficiency of buildings, namely in rainwater harvesting systems. Research in this field has already proven that the efficiency of these systems must be addressed through accurate models, using local long series of precipitation data and real water consumption patterns, for each type of building. Yet, this know-how is not easily available. A wide spreading of these solutions will only happen when accurate tools for rainwater harvesting systems simulation are made available to all stakeholders.

The main goal of project EVIDENCE is to provide a tool for rainwater harvesting simulation, validated for different type of climate and type of buildings, to make it evident for all stakeholders how rainwater harvesting systems may minimize potable water consumption and how it can contribute to water savings globally.

A rainwater harvesting system can be installed in any location where there is precipitation available and demand for water.

Considering that, in most countries, the meteorological services provide such information freely and there are also organizations providing information at a global scale (e.g., NASA Global Precipitation Measurement - <https://gpm.nasa.gov/data>), the potential geographical impact of project EVIDENCE is extensive.

The work will have a national impact in the two countries involved in the project, because both precipitation series and water consumption patterns in these countries will be studied and made available freely online to all. This will cover warmer climates, namely the Mediterranean climate (Portugal), and colder climates, as Continental and Subartic climate (Norway).

From a practical perspective, the impact for homeowners is expected to be higher in regions with more single-family buildings, since the implementation of a rainwater harvesting system is simpler in this context than in multi-family buildings. Still, rainwater harvesting is not limited for residential buildings and it is possible in other types of buildings (e.g., commercial, industrial, education, hotel, educational), in which the water consumption intensity is typically even higher.

Thus, there are potential users of the rainwater harvesting simulator of EVIDENCE at both national and also international scale.

The main goal of project EVIDENCE will be achieved through the following subtasks:

1. Study rain patterns in two complementary climates in Europe, the Mediterranean climate of Portugal and the Northern one of Norway.
2. Evaluate water consumption in both countries in different type of buildings, namely residential and office buildings.
3. Research models on snow melting, to allow including snow's contribution as additional available water for harvesting in colder climate. This has not yet been done.
4. Develop a user-friendly tool to perform detailed and accurate rainwater harvesting modelling, combining climate and consumption patterns, and including both rainfall and snow contributions.
5. Estimate expected water savings in both countries.
6. Disseminate all results, to the academic, technical and local communities.

This innovative approach of project EVIDENCE will strengthen the bilateral relations already started through a joint supervision of a master thesis in the topic and is expected to promote future collaborations.

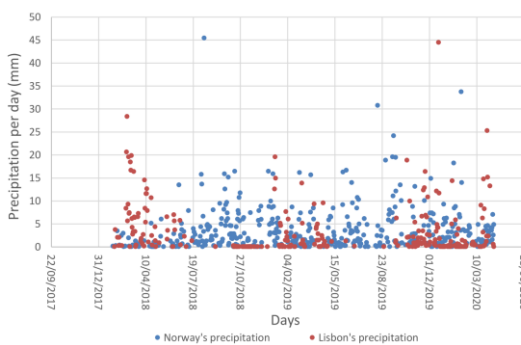


Figure 1. Trondheim's and Lisbon's daily precipitation.

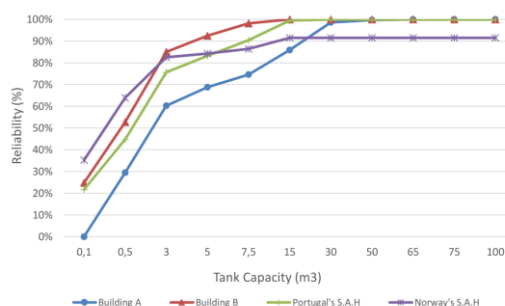


Figure 2. Examples of system reliability for different buildings and climate.



### Project Reference

FBR\_OC2\_90

### Leading Institution

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

### Partners

SINTEF (Norway)

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### CERIS Research Team

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EEA Grants

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### Total

13 145.15€

### CERIS

13 145.15€

### Project Website

[gigroup.tecnico.ulisboa.pt/PHP/about.php?ProjectId=EVIDENCE](http://gigroup.tecnico.ulisboa.pt/PHP/about.php?ProjectId=EVIDENCE)