Solutions for Improving Water-Energy Nexus for Buildings

A 3.1.3 Solutions For Improving Water-Energy Nexus For Buildings

Funded by the European Union

meetM
Mitigation Enabling Energy Transition in the MEDiterranean region
Together We Switch to Clean Energy

adene
Agência para a Energia

MED ENER

RCREEE
Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

1. The Water-Energy Nexus in the Mediterranean Basin

The water-energy nexus refers to the interdependency relation between the water and the energy sector.

Water & Energy as interdependent resources with mutual impacts

Energy as a critical factor for the water cycle

- Water production, treatment, transport and distribution
- Wastewater collection and treatment
- Desalination
- Etc

Water as a critical factor for energy production

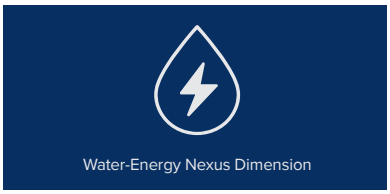
- Hydroelectric power production
- Production and distillation of biofuels
- Transformation in plants and refineries
- Etc

The Mediterranean Basin is characterized by water-scarcity and a high-dependence on fossil fuels. With population growth, increasing competition for water and the effects of climate change, the balance between water demand and water supply is currently already under stress. This makes it the ideal region to promote water efficiency and energy efficiency on the scope of the water-energy nexus.

2. The Water-Energy Nexus Evaluation Methodology for the Mediterranean Basin

To evaluate the water-energy nexus in Mediterranean Basin buildings, a methodology was developed by ADENE– the Portuguese Energy Agency, as part of the Mitigation Enabling Energy Transition in the Mediterranean region “meetMED II” project initiatives. It aims to assess and promote the adoption of infrastructural measures that reduce energy and water consumption while enhancing resilience to climate change.

The Water-Energy Nexus Evaluation Methodology for the Mediterranean Basin assesses three dimensions: Water Efficiency, Water-Energy Nexus, and Climate Adaptation, providing a transversal performance analysis of the building.

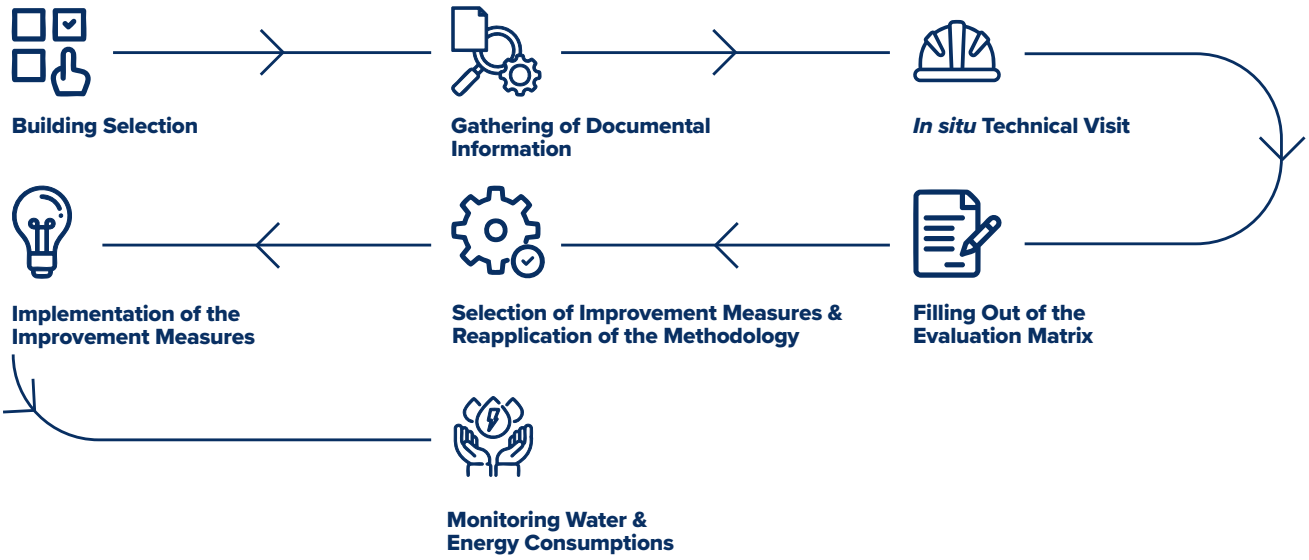


Its applicable to residential, small service & commercial buildings in the Mediterranean Basin, at their different life-cycle stages:

3. How to Apply the Methodology?

The methodology evaluates 66 criteria, including:

Inside & outside water uses (e.g. irrigation & swimming pools)	Water sources & networks	Fixture’s efficiency	Domestic hot water networks
Water & energy monitoring	Local climate adaptation plans	Mapping of climate risks	Mitigation measures implemented

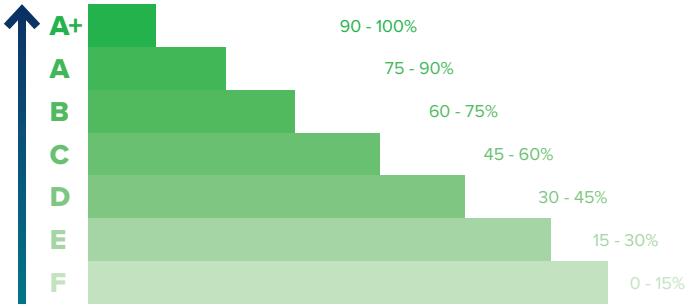


Its application is supported by documental proofs and *in situ* measurements

4. The Water-Energy Nexus Evaluation Methodology Outputs

For each dimension, each evaluated criterion determines a value, in percentage, that adds up to the total score of the dimension.

These scores are then translated into classifications on an efficiency scale, that range from F (least efficient) to A+ (most efficient).



- Each building is assigned three sub-classifications—one for each dimension—and a single overall classification, both for its current state and for its state following the implementation of improvement measures.
- Comparing the scores before and after the implementation of improvement measures enables the selection of the most effective set of actions. A greater increase in score indicates a higher improvement in the building's efficiency.

Recommended Infrastructural Improvement Measures

Water Efficiency Dimension	Water-Energy Nexus Dimension	Climate Adaptation Dimension
Introduce flow restrictors with aerators on taps Introduce on the various types of taps flow restrictors that limit water flow to maximum: • 4L/min for sink and bidet taps; • 6L/min for kitchen or service taps. Flow restrictors (flow regulators or flow controllers) are simple and cheap devices that can be easily installed inside a fixture, reducing and regulating the water flow. They allow water to run at a constant rate and allow fixtures to run optimally, preventing damage caused by excess flow. The flow values indicated above represent the levels that ensure water savings while maintaining user comfort for each type of tap and usage.	**Install efficient water elevation/circulation pumps for adequate and stable pressure/head loss values on the water network** Priority should be given to the installation of high energy efficiency elevation and circulation pumps, with the aim of reducing energy consumption in water distribution systems. This is particularly relevant in large buildings and multi-storey constructions, where maintaining adequate water pressure throughout the building is essential.	**Incorporate blue infrastructure, such as rain gardens, into outdoor landscaping** Rain gardens are man-made depressed areas in the landscape that collect rainwater and allow it to soak into the ground. They are usually planted with grasses and flowering perennials. They reduce water irrigation needs thus help to mitigate droughts, and reduce runoff, thus helping to mitigate floods.
Installation of local and decentralized licensed rainwater harvesting systems and/or greywater reuse systems Install rainwater harvesting systems and greywater reuse systems to reduce the use of drinkable water from the public water supply systems. This water is only suitable for non-potable uses such as toilet flushers, laundry machines, irrigation, cleaning of garages and outdoor spaces.	**Opt for gravity and renewable energy sources for water distribution** Give preference to passive systems that rely solely on gravitational potential energy for water supply and distribution, or to active systems powered by on-site renewable energy sources, such as solar photovoltaic technology.	**Increase permeable areas or place permeable flooring** Increasing the amount of permeable outdoor surfaces enhances water infiltration into the soil and reduces runoff, helping to mitigate both floods and droughts.

meetMED

www.meetmed.org

meetMED-Project

meetMED1

meetMED

Funded by the
European Union

This publication was produced with the financial support of the European Union.
Its contents are the sole responsibility of MEDENER and RCREEE and do not
necessarily reflect the views of the European Union.

MED ENER

RCREEE
Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

For more information please see the Green Guide for Buildings Water-Energy Nexus