Funded by the European Union

Mitigation Enabling Energy Transition in the MEDiterranean region

SOLAR WATER HEATER– EDE1

Prepared by Anissia BEAINY, ALMEE

Presented by Adnan JOUNI, ALMEE

Training on GRASSMED – meetMED II

WP3_A3.1.6

Date 24-26 February 2024

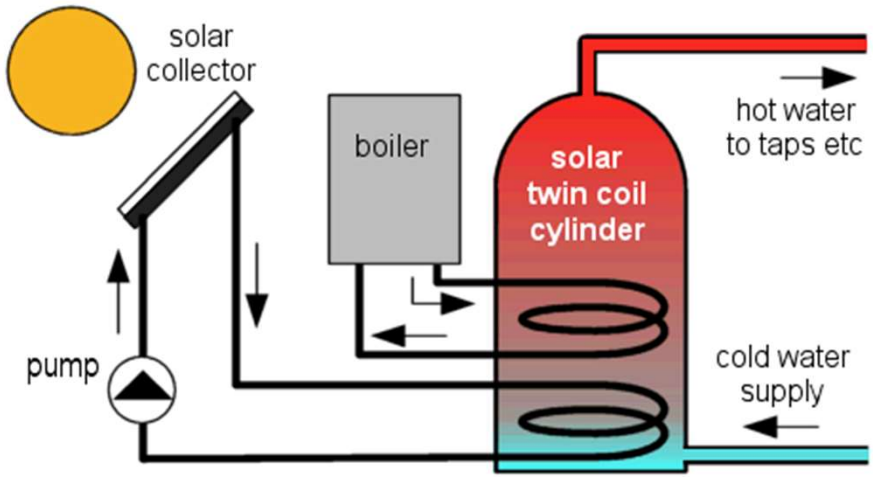
OUTLINE

- ✓ What is SOLAR WATER HEATER (SWH)?
- ✓ Why use SWH?
- ✓ How can SWH be integrated?
  - Active SWH Systems,
  - Storage Tanks and Solar Collectors
- ✓ How to select a SWH System?
- ✓ How to calculate the covered percent of HOT WATER DEMAND (% HWD)?
- ✓ How to comply with GRASSMED?

What is SOLAR WATER HEATING (SWH)?

- **Solar energy** comes from **natural sources**, leaves **no carbon emissions** like other fuels, and does not produce any **waste**, does not produce any noise pollution or any hazardous effects on the **environment**.

Solar Water Heaters (SWH), sometimes called **Thermal solar domestic hot water systems**, can be a **cost-effective way to generate hot water** and than reduce the need of fuel or electricity.



They can be used in **any climate**, and the fuel they use is **free, renewable, and unlimited.**

Why Use SWH?

- Water heating accounts for a **substantial portion of energy use** at many residential, commercial and institutional buildings.
- Most modern domestic boilers run on gas and heat water on demand. SWH is an **alternative clean solution**.
- SWH systems can be used effectively at buildings that have an appropriate **near-south-facing roof (Northern Hemisphere)** or nearby un-shaded grounds for installation of a collector. **A variety of building types can take advantage of SWH systems**.

- SWH systems are **most cost effective** for facilities with the following characteristics:
  - Water heating **load is constant throughout the year** (not vacant in summer)
  - Water heating **load is constant throughout the week** (use solar heat every day)
  - **Cost of fuel** used to heat water is high.
  - A **sunny** climate.

Here are the few **advantages** of SWH:

Zero-cost
Ideally, the solar panel uses energy from the sun. Being a renewable source of energy, it is completely free and almost available each day.

Efficient
High efficient solar collectors can convert up to 80% radiation into the heat energy without making use of any external fuels.

Relatively Cheap installation
They are a one-time investment for long term benefits.

Save for environment
They have no dependency on fuels, have zero-emission, and lower carbon footprints.

Low maintenance
Solar water heaters do not require high maintenance. It only demands simple cleaning.

How Can SWH Be Integrated? Active and Passive systems

- A SWH is integrated into a building by installing the collector on an appropriate near-south-facing roof or nearby un-shaded grounds. There are two types of SWH systems: **active**, which have circulating pumps and controls, and **passive**, which don't.

How Can SWH Be Integrated?

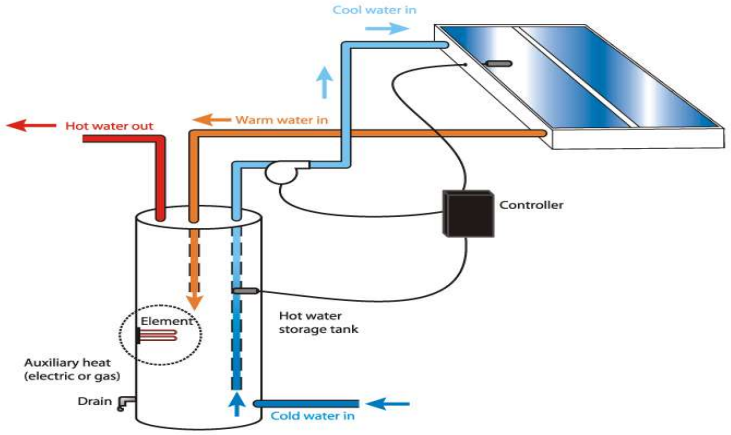
Active SWH Systems

There are two types of active SWH systems:

- **Direct circulation systems**

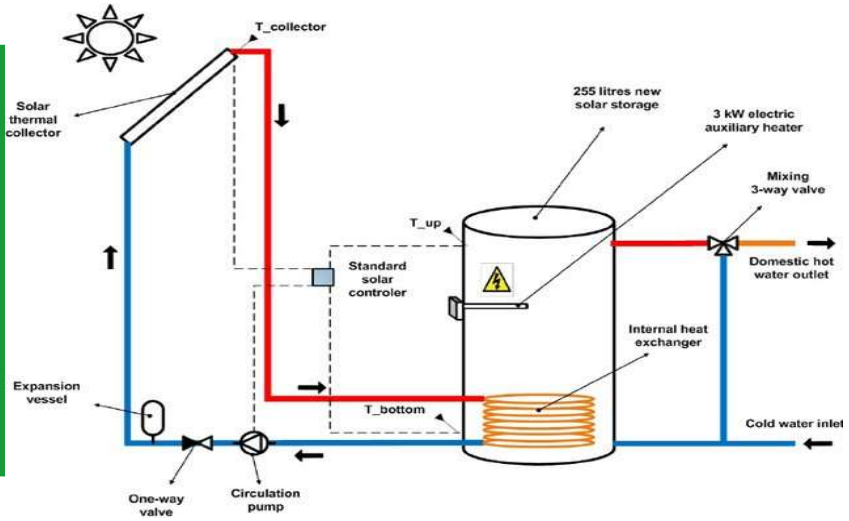
  Pumps circulate household water **through the collectors and into the home**. They work well in climates where it **rarely freezes**.

Active Open Loop System



- **Indirect circulation systems**

  Pumps circulate **a non-freezing, heat-transfer fluid through the collectors and a heat exchanger.** They are popular in climates prone to freezing temperatures.



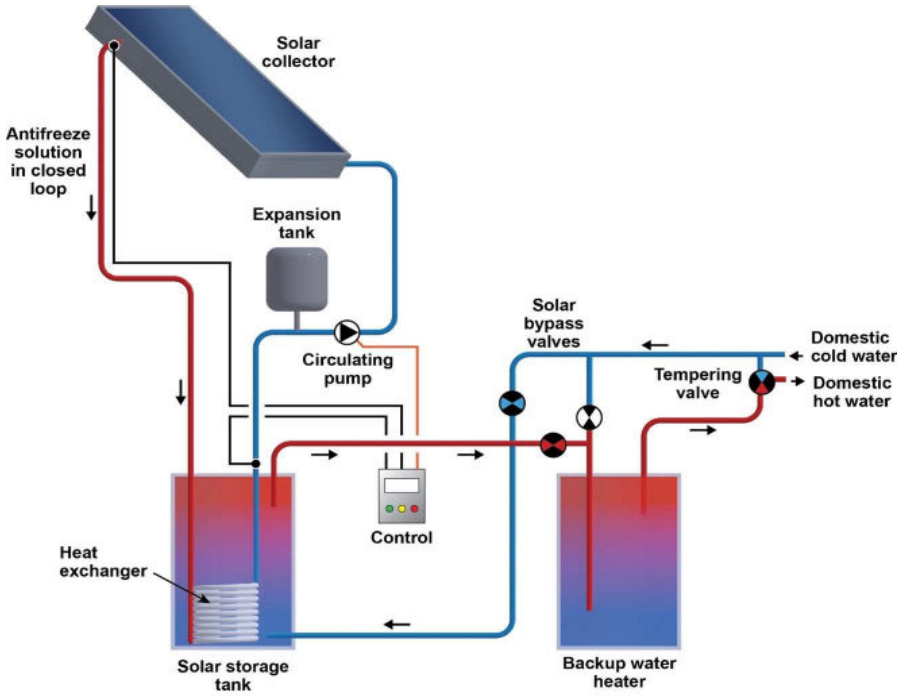
How Can SWH Be Integrated?

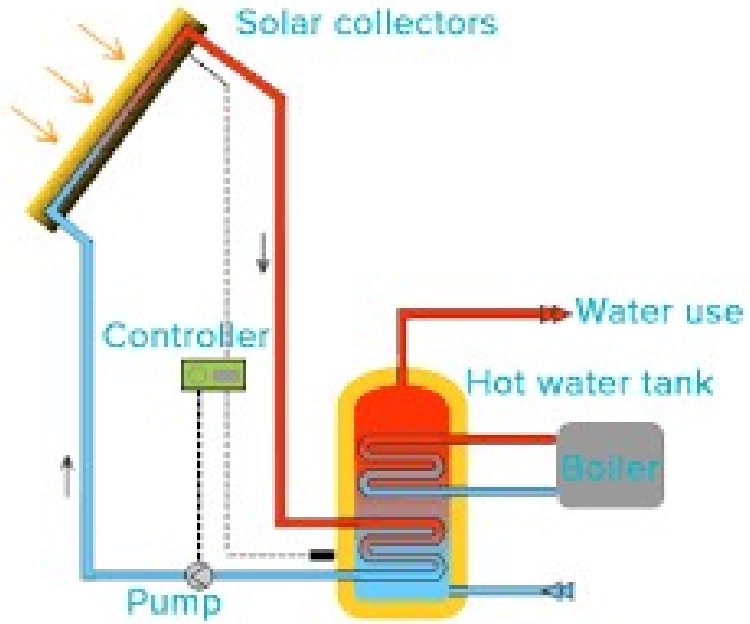
Storage Tanks and Solar Collectors

- Most SWH require a well-insulated storage tank. The common types are:

➢ **Two-tank systems**

➢ **One-tank systems**

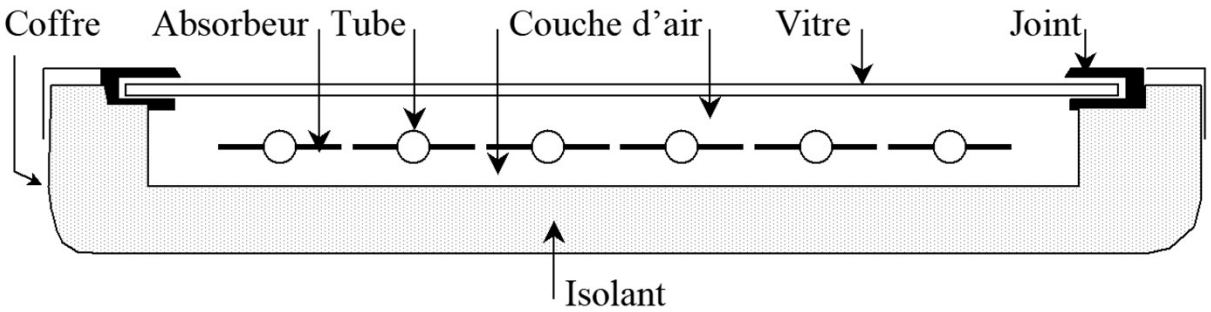


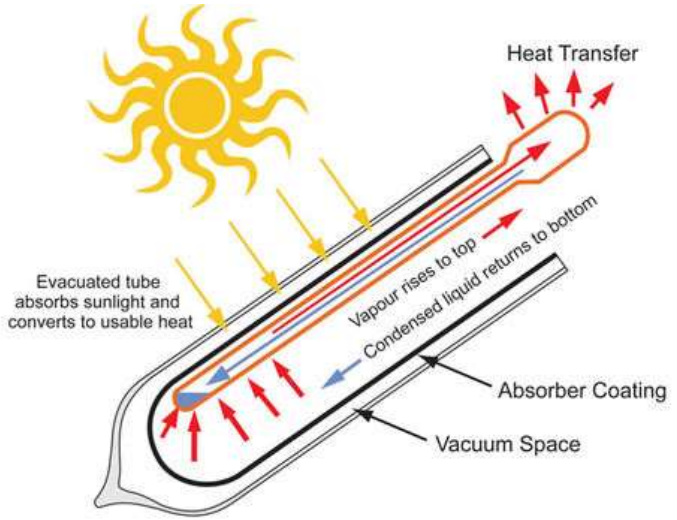


How Can SWH Be Integrated?

Storage Tanks and Solar Collectors

- **Two main types of solar collectors** are used for residential and tertiary applications:
  - Flat-plate collector
  - Evacuated-tube solar collector

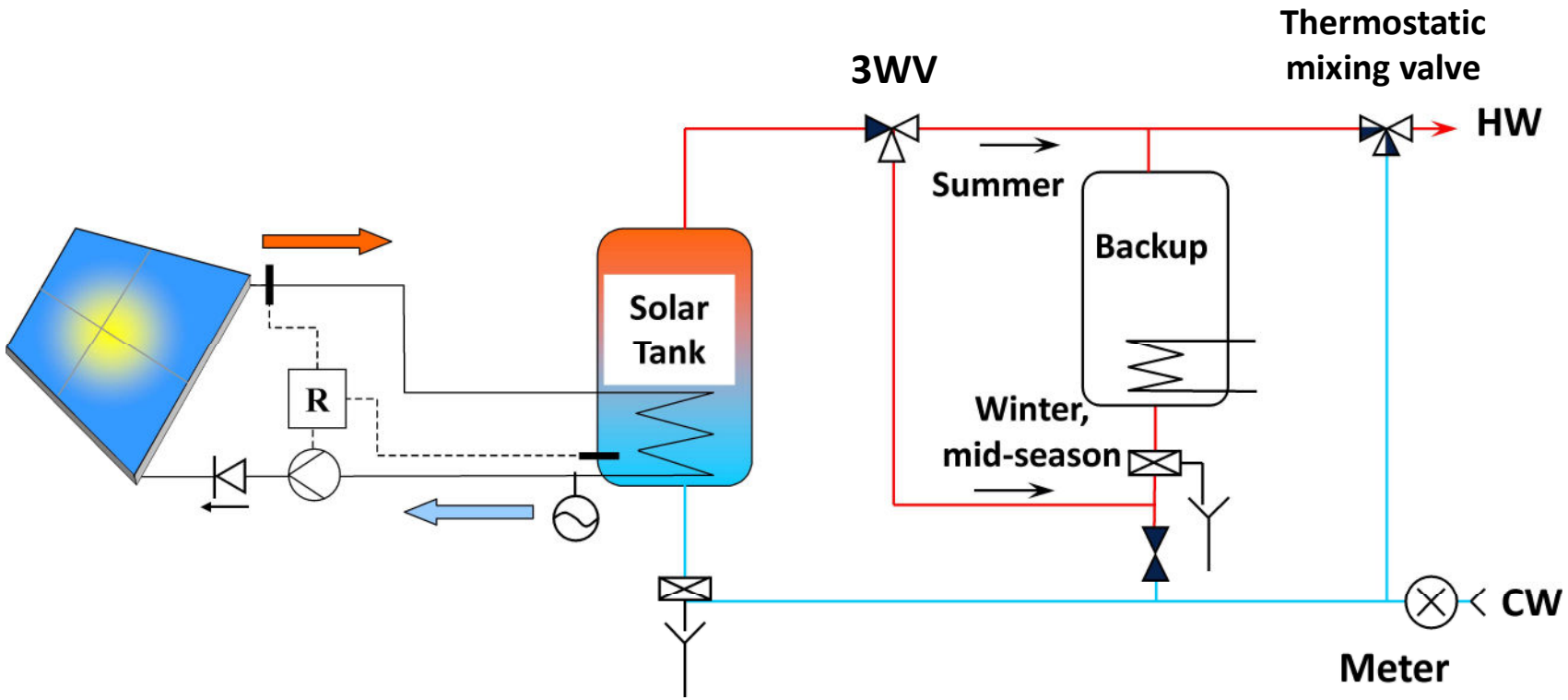




How To Select a SWH?

Any installation must include the following parts to be eligible for certification:

- **Thermostat**: To activate the on and off of the circulator and the backup system
- **Three-way valve**: Bypass the backup system when designed temperature is reached.
- **Circulator**: must be installed at the return of the collector.
- **Insulation for pipes:** to reduce heat losses.



How To Select a SWH?

- There are mainly **two mandatory steps** to successfully select a suitable and most efficient system to suit the building in question.

Identify specifications of SWH System

- A catalogue or a material submittal that includes all the **technical data** regarding the solar system installed, **must be available**.
- To conserve the efficient performance of the solar water heating system, it is **prohibited to install the electric resistor (or any other backup heater) in the heat exchange**r. Whereas, it's required at the same time, to **install thermostat, three-way valve, circulator and insulation for the pipes.**
- Therefore, **installation of these components should be verified**, otherwise the system is considered inefficient and will not receive any point.

Determine the area of the collector as per the table

- The **documents must include the technical information of the collector** since it’s a major component of the solar system.

How To Calculate The Percent HOT WATER DEMAND covered (% HWD)?

- The necessary data regarding **full-time occupants** of the building needs to be collected to be able to **calculate the area of collector** supposed **to be installed** in order **to cover approximately 100% hot water demand.**

- Once the area has been identified as per the table below, then the formula for the Percent of HWD covered is applied:

Component	Allowable Area with respect to number of people
Collector Area	**Commercial: 2 m²** of collector area for **3 persons (no use of shower)** **Residential: 2 m²** of collector area for **2 persons**

$$\%\text{HWD covered} = \frac{\text{Actual Area of Collector}}{\text{Approximated Area for 100\% coverage}}$$

How To Comply With GRASSMED?

- Scoring points will be awarded as long as the **building includes a solar water heating system**.
- Gradual increase in scoring is based on the percent Hot Water Demand covered **(% HWD)** as well as **any innovation used.**

- **NOTED: If the requirement of "Step 1: Identify specifications of Solar Water Heating System" are not met, no points** will be given.

- Maximum scoring table is found below.

How To Comply With GRASSMED?

Maximum Scoring for Residential Buildings	**30**
Maximum Scoring for Commercial Buildings	**8**
COMMERCIAL BUILDING Percent HWD	Scoring Points
HWD ≤ 40%	2
40.1% ≤ HWD≤ 60%	4
HWD ≥ 60.1%	6
Additional Innovations	Scoring Points
Installation of PV-panel to power circulating pump (s)	2
RESIDENTIAL BUILDING Percent HWD	Scoring Points
HWD ≤ 50%	12
50.1% ≤ HWD≤ 60%	16
60.1% ≤ HWD≤ 70%	20
70.1% ≤ HWD≤ 80%	24
HWD ≥ 80.1%	28
Additional Innovations	Scoring Points
Installation of PV-panel to power circulating pump(s)	2

Contact us!

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

For any inquires or comments,
please don't hesitate to contact us

www.meetmed.org
meetMED Project
@meetmed1

www.almeelebanon.com
almeelb
AlmeeLB
AlmeeLB
almeelb

This project is funded by the European Union