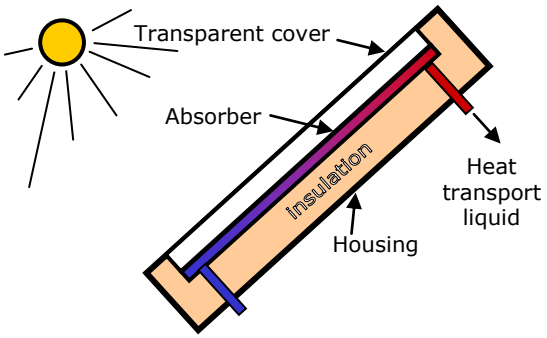
COLLECTOR TYPE: **ZEN Renewables Thermic** (single glazed flat plate)



COLLECTOR:
The Thermic collector is a modern high efficiency type of collector that produces hot water from sunlight.
The basic components are:

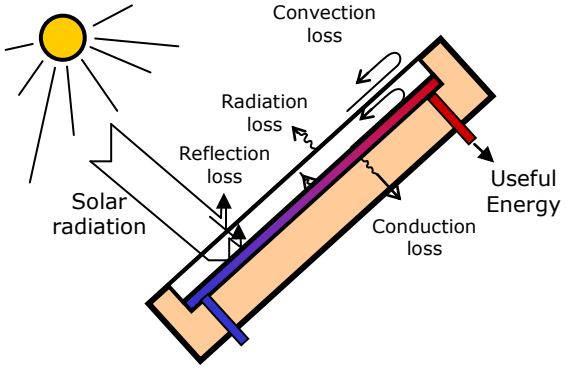
- the **absorber** that converts sunlight into hot water. The fluid dynamics are designed for drain-back and flooded systems
- **Glass cover** to prevent heat losses
- Insulated aluminium **collector housing**.

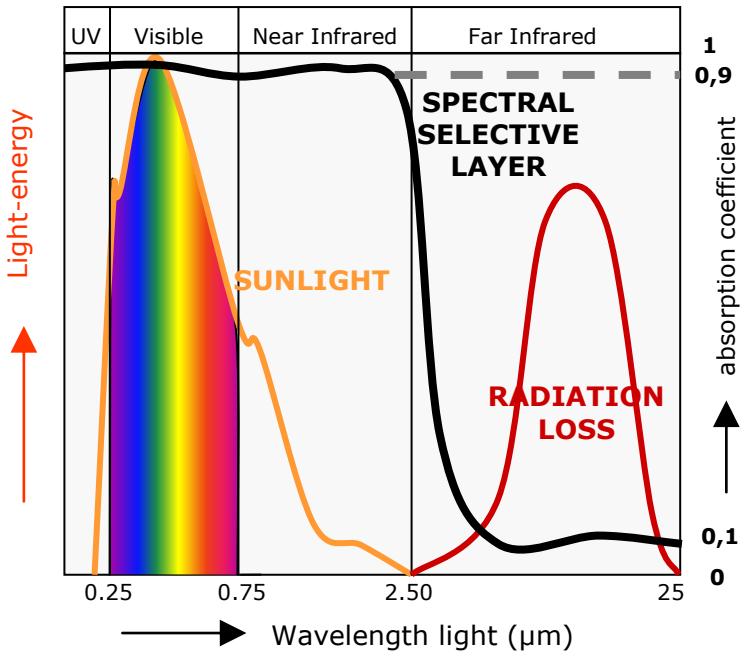
APPLICATIONS: Small to large domestic hot water systems, industrial process and swimming pool heating.

COLLECTOR PHYSICS:

- the Thermic **absorber** converts sunlight into heat by means of a spectral selective layer. The spectral selective layer absorbs 96% of sunlight. Further, the copper absorber conducts 96% (fin-factor) of this solar heat into the heat transport fluid.
- The spectral selective layer reduces radiation heat losses to 8-12%
- The **Glass cover** together with the back and side insulation reduces the convection heat losses to a minimum.
- The overall efficiency of the Thermic collector is 79% with a heat loss coefficient of 3,5W/°Cm².
  $\eta = 0.7847 - 3.4746\ T^* - 0.01572\ G\ T^{*2}$

$T^* = (T_{coll} - T_{ambient})/G_{solar\ radiation\ W/m^2)}$





SUNLIGHT:
Solar radiation can be split in colours ranging from ultra violet to blue->green->yellow->red and infra red. The Thermic solar collector is designed to absorb and convert all these available radiation colours into heat. The transmission of the glass cover for all these colours is 91%.

SPECTRAL SELECTIVE LAYER:
The spectral selective layer that is coated on the Thermic absorber has an absorption coefficient of α=96% and an emission coefficient of ε=8-12%.
The graph shows that the spectral selective layer absorbs all wavelengths (colours) of sunlight from ultra violet to near infrared. The layer responds completely differently to far infrared radiation. Far infrared radiation starts as soon as the absorber is heated by sunlight. This radiation would cause heat losses if the spectral selective layer did not reflect it back into the absorber. Only 8-12% of this heat loss is allowed to escape.