



Contacts

Teresa Cunha Diamantino

Maria João Carvalho

Estrada do Paço do Lumiar, nº22
1649-038 Lisboa
Portugal
+ 351 21 0924600

info@lneg.pt

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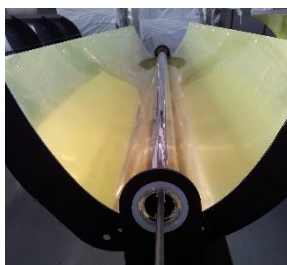
LIFESOLAR

Service life of key components for solar thermal energy applications



Motivation

Solar thermal collectors (STC) are the main component of solar thermal systems for production of hot water for applications such as swimming pools, sanitary hot water (domestic hot water) or hot water for industrial processes with working temperatures from 20-95°C, as well as, solar thermal systems delivering thermal power for industrial application at medium temperature (95°C-250°C). These applications cover different collector technologies that go from stationary collectors to tracking concentrating collectors.



Portugal is a country with a large potential for the solar thermal energy, due to its high solar resource. This fact in association with its long coast line has a strong impact on the durability of the materials used in STC, either metallic or polymeric, and consequently on their lifetime. Some of these materials are particularly susceptible to corrosion/degradation, due to the combined effect of the different atmospheric parameters, namely chloride ions, sulphur dioxide, relative humidity and ultraviolet radiation, which are intensified by the operation temperatures. Lifetime of the key components is most relevant to ensure that the systems are economically viable.

Objectives

- Establish the correlation of degradation mechanisms of key components of STC, namely absorbers, reflectors and seals from natural exposure and accelerated aging tests;
- Development and validation of accelerated aging test methods for qualification of the key components;
- Assessment of service life of absorbers, reflectors and seals considering two different corrosivity categories of atmosphere (medium and very high);
- Increment the stability of a selective paint to increase their lifetime as selective coating for STC and for others solar energy applications (building facades, solar assisted heat pumps)
- Transfer the knowledge and increase of the laboratorial services offer to companies producing the components and STC to stimulate the internationalization and a more reliable solar thermal energy market.

Partnership



Support:



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Project Duration

2016-2020

Main Tasks:

- Task 1 - Outdoor Exposure Testing (OET) of collectors and component samples
- Task 2 Optimization of an 'in-situ' smart sensor system for conditions inside STC
- Task 3 Lifetime of a selective paint
- Task 4 Degradation mechanisms of key components of STC
 - Task 4.1 Absorbers and reflectors
 - Task 4.2 Seals
- Task 5 Validation of accelerated aging tests methods for qualification of key components
- Task 6 Performance conditions for qualification of key components
- Task 7 Dissemination

