The world increasingly turns to renewable energy in order to maintain a sustainable standard of living, with solar energy being the largest global renewable resource available. Concentrated Solar Power (CSP) technologies offer access to this vast solar resource, with a proven track record of two decades on industrial scale, and potential breakthrough paths toward **higher operation temperatures**
, i.e. higher conversion efficiency, thermal storage, and emerging offshoots such as solar chemistry and solar fuel generation. CSP can play a central role in the future mix of renewable energy supply. However, realizing this promise requires major advances in the science and technologies of high-temperature photothermal conversion.

The CSP technology based on **parabolic trough solar collector** for large electricity generation purposes is currently the most mature of all CSP designs in terms of previous operation experience and scientific and technical research and development. As a result, this technology has led the way to a world-wide extended implementation of CSP technologies: more than 1500 MW are currently operating and more than 10 GW are estimated to be commissioned in the next 5 years (including 1 GW in China). This means to have around
12000-16000 km of solar receivers
. The current parabolic trough design deals with a maximum operating temperature around 400ºC in the absorber collector tube but some recent designs are planned to increase the working temperature to 600ºC increasing the performance by 5-10% (when classical plants are around 12-14%) as this is considered to be the only way to attain the improved productivity that the market demands. These systems are expected to be working during 20-25 years.

However, there is a great lack of knowledge about the performance of the selective absorber coatings of the collectors during the whole life of the receiver as the new designs have not being working for too long. Even more, **it is necessary to establish characterization methods and standard protocols to guarantee the performance, durability and quality control and in order to get further advances in the development of high temperature coatings**
. It
is also very important to design accelerated degradation and ageing protocols to test the evolution of these coatings under these new, more aggressive conditions in the newer designs.

The main idea behind this NECSO project is to provide tools to the end users, namely solar plants builders, to guarantee that the selective coating will work properly during 20 to 25 years. Novel experimental methods for testing materials under extreme conditions (temperature and radiation) are needed providing a deeper understanding of the interaction of electromagnetic radiation with nanomaterials, as basis for design of new spectrally selective absorber coatings. Nanoscale characterisation will correlate the nanostructure parameters with coating performance. The resulting outcomes are expected to contribute significantly to the infrastructure of the solar energy research, development and industrial activities worldwide.