

The Renewable Energies Chair was created in November 2010 and its Chairman is Prof. Manuel Collares Pereira. Focus its activity on Concentrating Solar Power, developing and testing new technologies to capture and convert solar radiation into heat (for environment heating and cooling, industrial processes, desalination, production of synthetic fuels, etc.) and electricity by photovoltaic or thermal means.

The infrastructure is involved in different solar concentrator developments. Some topics include: Development of stationary or quasi-stationary Compound Parabolic Concentrator for medium temperature applications and for solar thermal electricity, R&D in solar concentrated driven systems modelling (e.g. for combined heat and power production and industrial process heat), Solar Thermal energy storage (solid storage and molten salts storage), Materials related research and processes in particular dust control deposition in mirrors and covers, Direct normal radiation measurement and statistics. Particularly important is the 2-axis platform (PECS, dimensions: 18\*13m<sup>2</sup>) with two circuits, one operating with thermal oil up to 400°C and the other with pressurized water, unique in current World context. Additionally a facility with Molten Salts for collectors fields testing at temperatures up to 565°C, which is expected to be fully operational still during 2017. It is also relevant to mention the close cooperation with LNEG – National Laboratory for Energy and Geology, with whom it has constituted the National Research Infrastructure in Solar Energy Concentration – INIESC.

The infrastructure is composed by the following installations:

- CER - The Renewable Energies Chair centre can provide services on analysis/certification of solar thermal concentrators, thermal storage, PV and batteries systems, Materials related research and processes in particular dust control deposition in mirrors and covers, Direct Normal Radiation measurements and statistics.
- INIESC - INIESC stands for National Research Infrastructure in Solar Energy Concentration. It belongs to ESFRI infrastructures roadmap and it has two nodes, UEVORA and LNEG. The offer of TA to a node is the responsibility of each of the institutions. The research/services topics within INIESC are: i) Solar concentrators for thermal conversion of solar radiation, ii) Standardized methods and experimental testing of solar concentrators, iii) Solar Energy Storage, iv) Solar fuels, v) Applications and system demonstration, vi) Solar materials and components.
- DNI-N - The DNI-N is a network of solar stations measuring global, direct and diffuse solar radiation and its statistics. It is composed 12 stations mainly distributed in the southern of Portugal. It can provide data related to solar radiation.
- PECS - The PECS is a two-axis platform (test bench dimensions: 18\*13m<sup>2</sup>) with an oil loop to test concentrator collectors and promote collector development, as well as certification purposes. There are two circuits, one operating with thermal oil up to 400°C and the other with pressurized water.

The areas of research normally supported by the infrastructure are as follows:

1. Solar resource (DNI) and meteorological parameters assessment:
  - Solar Radiation Measurement and Weather Station (DNI-N)
  - Advising on Solar Radiation Measurement & Data Processing (DNI-N)
  - DNI Measurement and Analysis (DNI-N)
2. Services on reflectors and concentrators:
  - Optical Properties of Mirrors. Reflectance measurement. Facets characterization (PECS)
  - Photogrammetry Measurement of Concentrator's shape (PECS/CER)
  - Optical and thermal characterization of solar concentrators (PECS, INIESC)
3. Services on heat transfer fluids:
  - Qualification HTF based on particles (INIESC)
  - Characterization of HTF thermal properties (INIESC)
  - Qualification HSM/HTF (INIESC)
4. Services on thermal energy storage (media & systems):
  - Study on molten salts in PTCs and pipe section (INIESC)
  - Advanced solid concepts for thermal energy storage (INIESC)
  - Characterization of Materials and Components for TES systems with molten salts (INIESC)
  - Qualification of Heat Storage using concrete under experimental conditions (INIESC)
  - Simulation and modelling of thermal storage systems. Integration in STE plants or industrial heat processes (INIESC/CER)

The Évora Molten Salt Platform (EMSP, which belongs to INIESC) is expected to be fully operational still during 2018.

Services currently offered by the infrastructure:

The infrastructure can provide:

- Nonimaging optics expertise on the design of solar concentrators (this includes Innovative (patented) concepts of Etendue Matched Concentrators increasing and optimizing the optical performance of the line-focus Linear Fresnel Reflector concept)
- Development of stationary or quasi-stationary Compound Parabolic Concentrator for medium temperature applications and for solar thermal electricity (certification and process heat for industry)
- Solar Thermal energy storage (solid storage and molten salts storage). Innovative concepts as thermochemical up to 565°C are currently being developed within the H2020 project NewSOL
- Materials related research and processes in particular dust control deposition in mirrors and covers (New techniques for cleaning are being developed and dust measurements are possible)
- Direct normal radiation measurement and statistics (Data can be provided as a service)

All these services (within solar thermal field) attracted many researchers and students during the last years. Currently, the CER has a French Post-Doc researcher and the Évora Molten Salt Platform (which belongs to the INIESC) has a joint management with DLR (Deutsches Zentrum für Luft- und Raumfahrt, Germany) and other companies such as TSK Flagsol, Eltherm, Steinmüller Engineering and Yara as currently using the installations. The infrastructure has several MSc and PhD students and some international Post-Docs are also working within the structure. Some of the most interesting results obtained by the users include the development of the solar loop with parabolic troughs under the project HPS-2 (<http://www.emsp.uevora.pt/>) and the tests with a parabolic trough module on PECS platform.