



## Open PhD Position in European Industrial Doctoral Network (DN-ID)



[www.cesaref.eu](http://www.cesaref.eu)

### Concerted European action on Sustainable Applications of REfractories (CESAREF)

#### What is CESAREF and what is the focus of this network?

CESAREF will train researchers in multi-engineering areas and expose them to the academic and non-academic sectors through international and inter-sectoral mobility combined with an innovation-oriented mind-set. They will get the right combination of research-related and transferable competences in the **full production-to-the-end-of-life cycle of refractory materials applied to Iron & Steelmaking processes** with regards to the new operation conditions requested by the drastic reduction of greenhouse gas emissions, improved energy efficiency, and by life cycle assessment requirements. An important part of the project will be dedicated to the sustainability of refractories, including recycling issues, using the **Life Cycle Assessment** methodology. **15 doctoral candidates** will take advantage of the most sophisticated numerical tools and laboratory equipment to model, design and predict the life of refractory materials in critical operational conditions. Being trained in scientific, technical, and soft skills, these PhDs are the next generation of highly employable scientists and engineers in the refractory sector and related areas. New testing methods and models will be developed to address the Scientific/Technological challenges for these applications and help to design better performing and sustainable refractory materials and linings. The research training is implemented through strong relationships between 10 academia and 16 industrial partners across the EU. The CESAREF network ([www.cesaref.eu](http://www.cesaref.eu)) is structured to take full advantage of intensive cooperation between **academia, raw material suppliers, refractory suppliers and high-tech metal component producers** with a direct link to the **FIRE federation** ([fire-refractory.org](http://fire-refractory.org)).

#### Specific subject of PhD3 (one of 15 PhD's of the CESAREF DN-ID project)

##### PhD3 Topic: Enhanced Value in Use of Refractories in Industrial systems, by developing Life Cycle Assessment methodologies

**Objectives:** In view of reaching EU Green objectives, reducing the environmental impacts of industrial activities is crucial. For refractories used in the steel industry significant improvements could be possible if a clear understanding on the effects of different solutions/options would be known.

The aim of this PhD thesis is to develop environmental assessment methodologies, based on LCA, which calculate (quantitatively) the effect of design and material choices on the refractory environmental footprint. Two types of vessels used in the steel industry will be investigated: steel ladle and tundish.

**Expected Results:** LCA profiles of several types of vessels for the steel industry. A Refractory Environmental Footprint Calculator (REF-C) tool for a minimum of one device used in the steel industry.

**Keywords:** Slow Down the Loop challenge. Focus on extended lifetime and environment. Life Cycle Assessment. Steel ladle. Tundish. Refractories

**Applicant Profile:** **Master's level in Industrial Engineering & Management, Chemical Engineering, Environmental Engineering, Mining Engineering or Metallurgical Engineering.** Candidates should have a technical background with strong affinity for economic considerations or an economic background with strong affinity for technology, should be excellent in their oral and written communication skills (English). Knowledge of LCA methodology and a previous use of an LCA software will be highly appreciated.

#### PhD main locations:

**Period 1** - University of Liège ([www.chemeng.uliege.be](http://www.chemeng.uliege.be)), Liège, Belgium (9 months)

**Period 2** - Tata Steel ([www.tatasteeleurope.com](http://www.tatasteeleurope.com)), Cer. Research. Cent., Velsen-Noord, Netherlands (18 months)

**Period 3** - University of Liège ([www.chemeng.uliege.be](http://www.chemeng.uliege.be)), Liège, Belgium (9 months)

Due to the Mobility Rule by the funding agency, residents of Belgium cannot apply for this PhD3 position

Apply until June 27<sup>th</sup> following indications at [www.cesaref.eu/recruitment-procedure](http://www.cesaref.eu/recruitment-procedure)

If you have any questions, feel free to contact the supervisors:

Prof. Angélique LEONARD, [a.leonard@uliege.be](mailto:a.leonard@uliege.be)

Rinus SIEBRING, [rinus.siebring@tatasteeleurope.com](mailto:rinus.siebring@tatasteeleurope.com)

*This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement no.101072625*