

Open PhD position: **“Charcoal and coal: Energy resources with a strong impact on the past environment and on-going stakes for energy transition”**

**Framework** University of Lorraine

**Graduate school** Science and engineering for resources, processes, products and environment RP2E

**Unité de recherche** Interdisciplinary Laboratory for Continental Environments (LIEC)  
University of Lorraine – CNRS <http://liec.univ-lorraine.fr>  
Campus Bridoux, rue Claude Bernard, 57070 Metz, France

**Founding** "Lorraine Université d'Excellence" (DEEPSURF program)  
From the 01-10-2018 to the 30-09-2021 (founding in validation)

**Supervision** First supervisor: Simon Devin (Pr. – HDR - LIEC)  
Second supervisor: Vincent Robin (Dr. - LIEC)

#### Research topic

Coal and charcoal are two historical sources of energy. Charcoal was used for centuries as the main source of energy for domestic and industrial usages. Then, coal emerged with its exploitation that had, and still has, great impact on the environment. Today, wood is targeted in the energy mix as raw material for the wood-energy sector, like the use of charcoal and wood in historical times. But this resource still has to be used in a sustainable way. Indeed, charcoal production during the last few centuries has been identified as one of the human activities with the greatest impact on the environment, especially on forests. We see here the importance of the historical perspective, as a postdictive approach, for the contextualization of the on-going and coming stakes of the energy transition.

The aim of the doctoral project is to assess the impact on the environment and the current heritage of the historical exploitation of wood and charcoal. This will be done from pre-existing database, historical written sources (historical management plan, ancient maps, etc.), phyto-historical indicators from charcoal production sites, physicochemical measurements (PAHs elementary composition, etc.), spatial analysis on LIDAR, etc. The PhD student will work to set-up an interdisciplinary quantitative assessment of the past biomass harvesting. This assessment will be then analyzed in a prospective manner regarding notably the on-going and future tendencies of wood resources need for the wood-energy industries.

Moreover, this assessment will be related to data gathered in parallel about the impact on the environment of the past coal exploitation (i.e. coal mining). This latter analyses will be based on the observation of geochemical markers of mining activities from soils and forest hollows samples, near investigated charcoal production sites.

In the end, these doctoral researches should permit postulating resistance and resilience threshold of the ecological systems related to the impact of forest biomass outputs and of coal mining, at local scale, to better contextualized the stakes and perspectives of the energy transition.

**Key words** Interdisciplinary, biomass harvesting, anthracology, written sources, spatial analyses, bio- and geo-statistics

**Collaborations** Laurence Mansuy-Huault, Anne Poszwa (LIEC)  
Xavier Rochel, Michel Deshaies (LOTTER)  
Jean-Luc Dupouey (SILVA)  
Laurent Saint-André (BEF)

#### Mandatory candidate's profile and capacities

The candidate should have knowledge in historical ecology and / or paleoecology-archeobotany (e.g. anthracological analysis), or in GIS and LIDAR data analysis.

Moreover, the candidate should have:

Solid knowledge about general concepts in vegetal ecology, disturbances ecology, ecosystems dynamics, etc.

Ability to use the classical office tools (Word, Excel, etc.) and software of data analysis (R, QGIS, etc.)

Good level in English (capacities to speak and write clearly and in an efficient way)

#### Document to apply

Curriculum Vitae, motivation letter, marks obtained for the master grade (at the date of the application), two recommendation letters

**Application must be sent at the latest on the 1<sup>st</sup> July 2018 to [vincent.robin@univ-lorraine.fr](mailto:vincent.robin@univ-lorraine.fr)**