

## **PhD position at Mines Paris PSL**

### **Evaluation of the potential development of lithium production at 2040 horizon**

#### **Summary**

Practically unknown from the public 20 years ago, lithium is today at the heart of the concerns related to energetic transition. Indeed, development of low carbon mobility relies essentially on electric vehicles, and the Li-Ion battery technology appears today to be the only industrially available solution.

Various institutions (IEA at international level, RTE in France...) develop scenarios in which they quantify the requested evolutions in technologies and uses, to maintain the increase of average world temperature under given levels. The underlying needs of these scenarios (for instance the growth in the lithium production needed for a given scenario of electric mobility development) are most often evaluated a posteriori by other institutions or research teams. But the feasibility of these scenarios always remains hypothetical, as no-one can confirm if the expected lithium production will be achievable in the foreseen delays.

This multidisciplinary research project aims to develop an approach that shall permit to estimate the possible evolution of primary lithium production at horizon 2040. To do so, it will first be necessary to identify the varied possible sources of lithium and quantify the resources that may be quickly available: the classical ones (salars, spodumen deposits), the new types of lithium sources from rocks (lepidolite in granites, jadarite, lithium in shales...), and the unconventional sources (lithium in geothermal brines, in oil production brines...). Another task will be to identify the methods and technics that will be used to mine and process each type of deposit, and to develop models to estimate the costs (investment and operating expenses) and the construction delays associated to these methods. Combining the results of the two first steps, it will be possible to evaluate the potential lithium production growth at 2040 horizon, and to identify and quantify the levers that would allow to speed up this growth.

#### **PhD supervision and research team**

The PhD is proposed by the Geosciences Research Department of Mines Paris PSL, under the supervision of Pr. Damien Goetz, in the frame of the Geosciences, Natural resources and Environment (GRNE) doctoral school (specialty Geosciences and geoengineering). Matthieu Glachant, professor at Mines Paris PSL and head of the Research Department for Industrial Economy, will co-supervise the PhD, for the questions related to the financing of the production capacity development.

#### **Candidate 's profile**

The candidate will essentially have to proof its capacity to integrate various scientific topics (lithium geology, mining techniques and associated parameters, economic models) and to develop a prospective modeling of the future production, based on various assumptions (time constraints of the industry, investment capacity...).

**Application file**

The application file is to be sent to [damien.goetz@minesparis.psl.eu](mailto:damien.goetz@minesparis.psl.eu)

It has to include a cover letter, a CV, a copy of master's degree or equivalent, a certification of English level, and the names of three referees who may provide an evaluation of the candidate in case the selection committee would ask for that.

The submission deadline is fixed on Friday, August 18<sup>th</sup>.

Auditions of pre-selected candidates will be organized end August-beginning September.

The PhD is expected to start as soon as possible after October 2<sup>nd</sup>.

For any further information, please contact [damien.goetz@minesparis.psl.eu](mailto:damien.goetz@minesparis.psl.eu)