

## CALL FOR APPLICATIONS

### PhD in Environmental Economics: Innovation and Circular Economy of Mineral Resources

The candidate will have a strong interest in Economics and Knowledges in the assessment of environmental impacts and on innovations in the field recycling activities. The candidate should have excellent academic qualifications. Interdisciplinary experience or prior experience in mineral resource or recycling economics would be appreciated.

**Keywords:** Circular Economy, Mineral Resource, Innovation adoption, Recycling, Cost-Benefit Analysis, Environmental valuation, Critical metal.

#### ADMISSION CRITERIA

Candidates should have a master's degree in economics or environmental sciences, with a strong theoretical background and training in quantitative and statistical techniques. A background in social sciences will be appreciated for candidates coming from environmental sciences.

Following her/his academic background, the PhD student will be integrated either:

- In the Graduate School of Economic and Management Sciences of Aix Marseille (ED 372) through the [PhD Program of AMSE](#)
- Or in the Graduate School of Environmental Sciences (ED 251) through the PhD Program of [CEREGE](#)

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#### PROPOSAL'S CONTEXT

The PhD will take place in the interdisciplinary [RECALL](#) (Sustainable REcovery of vALuable metaLs in bauxite residue project), a program funded by the ANR (Agence Nationale de la Recherche) which brings together several academic and non-academic partners: CEREGE, AMSE, ICSM, HYMAG'IN and ALTEO. The aim of the RECALL project is to selectively recover critical metals and to valorize the iron in bauxite residues with the overall goal of reducing the pressure on natural mineral resources. A shortage of these materials could be a potential bottleneck to the deployment of a number of strategic technologies including electronic and renewable energies that contain a large number of critical metals including Rare Earth Elements (REEs).

To reduce the environmental footprint of the extractions, this interdisciplinary project will develop two sustainable processes as an alternative to traditional pyro- and hydrometallurgy processes and will value the economic impact of this technological change in terms of social welfare in which potential environmental and health impacts will be considered.

The PhD student will work in interaction with (and benefit from) another PhD fellow (AMIDEX- Aix-Marseille University foundation) started in June 2020 and working on the extraction of critical metals from bauxite residue at CEREGE.

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#### PhD MISSIONS

First, social well-being will be considered, that includes the externalities associated with the process (e.g. environmental and health impacts) and other sources of economic inefficiency (e.g. technological and economic uncertainties) that have an impact on welfare at the aggregate level. The PhD student will have to identify and model social welfare variations using new processes compared to traditional ones.

Second, analysis of the economic conditions that will favor the adoption of the new technologies through a prospective analysis will be developed.

Third, because in the case of critical metals, the development of the proposed technologies will probably have a significant impact on relative prices, the impacts on the social welfare of different types of risks and uncertainties related to technological, economic, and environmental changes must be explored. To this end, a socioeconomic assessment method based on technology readiness assessment (TRA) using the Technology Readiness Levels (TRL) will be developed.

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## HOW TO APPLY?

The full application package must be sent as PDF files to the AMSE PhD secretariat, [bernadette.vouriot@univ-amu.fr](mailto:bernadette.vouriot@univ-amu.fr). The subject of the mail must be **"YOUR\_NAME\_RECALL\_AMSE PhD Application"**.

The full application package must contain the following documents:

1. A cover letter.
2. A detailed CV.
3. A letter of motivation that highlights the adequacy between the applicant's background and the RECALL project as well as the ability of the applicant to integrate and contribute to the interdisciplinary team.
4. Detailed bachelor-and master-level grades (including official grades for the ongoing academic year, which can be sent directly to the *AMSE PhD program secretariat*, by the applicants' institution); Detailed transcript are required for student from foreign institution.
5. **The first four items must be included in a single PDF file, following the order given above.** The name of the zip file must be **"YOUR\_NAME\_RECALL\_application.pdf"**.
6. Master dissertation (or equivalent research work). The name of the master dissertation file must be **"YOUR\_NAME\_RECALL\_Master dissertation.pdf"**. **For students currently enrolled in the second year of the Master's program, send a detailed abstract (from 5 to 10 pages) of the Master's Thesis.**
7. At least two reference letters, which must be sent directly and confidentially to [dominique.ami@univ-amu.fr](mailto:dominique.ami@univ-amu.fr) and [frederic.rychen@univ-amu.fr](mailto:frederic.rychen@univ-amu.fr).

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## RECRUITMENT CALENDAR

Application deadline	April 29, 2022, at noon (CET, Paris time)
Interview for pre-selected candidates by RECALL TEAM	May 2022
Interview in front of AMSE committee*	June 13-14, 2022
Decision	By the end of June 2022
Contract start date	As close as possible to the final decision

*\*only for candidates with a master's degree in economics who wish to enroll in the AMSE PhD program*

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## CONTACT

### Supervisors

Dominique AMI [dominique.ami@univ-amu.fr](mailto:dominique.ami@univ-amu.fr) and Frédéric RYCHEN [frederic.rychen@univ-amu.fr](mailto:frederic.rychen@univ-amu.fr)

### AMSE PhD program Secretary

Bernadette VOURIOT [bernadette.vouriot@univ-amu.fr](mailto:bernadette.vouriot@univ-amu.fr) - +33 (0)4 13 55 25 83

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## GENERAL INFORMATION

Scholarship value: around 1,770 euros monthly gross salary (1,400 euros net of social contributions). The grant includes social security coverage.

Expenses: applicants will pay the annual tuition fee (around 500 €).

Tenure of award: 3 years.