

Faculty of Science and Engineering

Profile report: Materials and the energy transition (zeldzame mineralen voor de energietransitie)

- Discipline: Environmental Science; Geology; Ecological Economics
- Level: Assistant professor
- Focus: Research
- Fte: Full time (1,0)

1. Scientific discipline

The position will investigate the material requirements for the energy transition along global value chains from geological, environmental sciences and/or techno- and socio-economic perspectives.

2. Vacancy

This position is opened by the Board of the Faculty. The position is created in the context of the sector plan Earth and Environmental Sciences. It will be embedded in the Energy and Sustainability Research Institute Groningen (ESRIG), base unit Integrated Research on Energy, Environment and Society (IREES). The position falls within the framework of the newly instated career development program, [Career Paths in Science and Engineering](#). As the focus domain of the position is research, the criteria of the career path with a focus on research apply. Please see the link for more information.

3. Selection Committee (BAC)

Prof. dr. N. (Nasser) Kalantar-Nayestanaki, director of ESRIG (chair)

Prof. dr. K. (Klaus) Hubacek, IREES, chairman ESRIG, chairman IREES

Prof. dr. M. (Moniek) Tromp, Professor of Materials Chemistry

Prof. dr. E.J. (Eize) Stamhuis, Associate Professor of Marine Zoology & Biomimetics, Director of Education of ESRIG

dr. J.M. (Johannes) Miocic, Assistant Professor of Geosciences

Prof. dr. Andrea Ramírez Ramírez, Professor of Low Carbon Systems and Technologies, TU Delft

Student tbc

HR advisor Dorien Smit

4. Area of expertise

Energy supply is a key problem of today. While Europe's green energy transition reduces dependence on fossil fuels it also increases dependency on raw materials required for the construction of renewable energy infrastructure and technologies often imported from only a few countries and/or from politically unstable countries. This causes immense pressure on global supply chains and continued material extraction can lead to exhaustion and form new dependencies. This requires a wider view and extension

of the system boundary of the technology along the entire global value chain toward places of resource extraction.

Research in this field addresses a wide range of topics such as material requirements for specific energy technologies, possibilities of substitution, vulnerabilities, and supply chain management. This might also include consideration of the dependency of local communities on economic and political activities related to resource extraction as well as negative impacts such as pollution, effects on biodiversity, traffic, noise, and public health implications. A further interesting avenue for research in this area is the possibilities of urban mining.

To appropriately address these questions, novel combinations of existing tools (e.g. global value chain analysis tools, life cycle analysis, learning curves, costs, and system dynamics) and new approaches are needed. The envisioned post should contribute to analyzing raw material demands vs. availability and economic geology and/or political (dependency) aspects in the energy transition and thus contribute to one or more of the global discourses on climate change mitigation (e.g. the UNFCCC and IPCC), the UN Sustainable Development Goals (SDGs), the energy transition (e.g. EU's Green Deal), and biodiversity loss (e.g. the Convention on Biological Diversity).

5. Embedding: institute (and base unit)

Energy and climate change, sustainable society, artificial intelligence, and healthy aging are the key focuses of the University of Groningen and are the main topics of the newly established Schools within the University. Within the Faculty of Science and Engineering, the Energy & Sustainability Research Institute Groningen (ESRIG) covers Energy and Climate Change and wider Sustainability themes. The position will be embedded in ESRIG. This institute has six base units that all contribute to the MSc Programme on Energy & Environmental Sciences (EES) and also contribute to Science & Society-related education in other degree programs. Within ESRIG, the Integrated Research on Energy, Environment & Society group (IREES) focuses on the key challenge to address the energy transition that requires a substantial transformation of the economy and society and thus shifts towards a (more) sustainable society. The particular base unit this position will be part of is IREES, and then in particular within the research line on circular economy and energy transition. IREES offers the opportunity to perform independent research on one of the themes mentioned or on topics where these meet, as well as intensive collaboration with colleagues working on similar topics. The new assistant professor is essential for the continuation and expansion of the current focus on the energy transition as well as the circular economy research and education portfolio within the faculty and beyond. Furthermore, the new post will create a strong link to the base unit of Geo-energy.

6. Local and (inter)national position

Sustainability and Energy are two of the main themes at the UG. In addition, Innovation, Responsibility, and Interdisciplinarity are recognized as key themes for UG. IREES through its two former sub-groups (Science and Society group or SSG and the Center for Energy and Environmental Sciences or IVEM) has a long and fruitful tradition in cooperation with groups from other Faculties, such as Spatial Sciences, Law, Economics and Business, Philosophy, Arts, and Behavioural and Social Sciences, and has a unique position because of its focus on human-environment and science-society interactions. Since Energy and Sustainability have been selected as focus areas, cooperation in research and teaching with other research groups at FSE and within the UG has been intensified. The candidate will contribute to ensuring the

scientific leadership of IREES in these areas as far as interactions concerning science, technology, and human-environment interactions involved.

On the national level, IREES is a member of the national research school WTMC (The Netherlands Graduate Research School of Science, Technology and Modern Culture) along with related groups from other universities as well as a member of the Research School for Socio-Economic and Natural Sciences of the Environment (SENSE). Globally, IREES has strong research ties with groups in Europe, the US, China, and other Asian countries and Africa, which has led to joining research projects and proposals and the exchange of researchers in both directions. For example, we have a joint virtual research center with the University of Maryland in the US and Shandong University in China with funded joint research projects, publications, joint students, and faculty exchange. In addition, IREES was successful in collaborating on a teaming proposal with 15 million Euro EU and 25 million Euro co-funding to set up a joint energy research center at the University of Cyprus and in collaboration with the Technical University of Denmark (DTU). In all of these collaborations, the energy transition toward renewables and associated environmental and societal impacts are a key focus. In this context, IREES strives to attain and maintain a substantial role in developing interdisciplinary approaches to informing the energy transition.

7. Expected contributions to research

The candidate is expected to have a broad overview of concepts and methodologies within the fields related to the research on the material aspects of the energy transition and Sustainability Science more generally and will focus on the dynamics of natural sciences and society interactions, with a focus on sustainability, energy systems, and natural resources. The candidate initiates and develops an internationally competitive research program, based to a large extent on extramural funding, addressing the role of material inputs in the energy transition. The candidate's research program should include a strategy to build up and strengthen multidisciplinary contacts within and outside the university. Alignment of the program with the other research groups in ESRIG, other faculties of the UG, and the new schools within UG will be key to research excellence and international reputation.

8. Expected contributions to teaching

These wide-ranging contributions to the energy transition and its trade-offs to research and society is reflected in our teaching program with contributions to courses across the University (e.g. recent FSE-initiated honors course on Limits to Growth) as well as specialist courses within the Energy and Environmental Sciences MSc program such as Modeling Energy and Material Systems. The candidate will teach in the educational programs within the faculty (Bachelor-, Master, and Ph.D. levels). The candidate will contribute to the EES Master's degree program in terms of teaching and student supervision, and to the faculty-wide education with substantial energy, natural resources, and sustainability-related elements (e.g. the SEPA courses). The candidate will contribute to the development of educational programs, in particular with respect to sustainability, the energy transition, and natural resource management. The successful candidate will also supervise Ph.D. students.

9. Expected contributions to the organization

The candidate is expected to have an active interest in and to provide a positive contribution to the management and organizational tasks of the institute and faculty, for example by participating in working groups and committees on teaching, research, and management. The candidate will participate in relevant national and international research organizations. Furthermore, a prominent role by initiating and leading new initiatives is expected in the university-wide schools on energy ([Wubbo Ockels School for Energy and Climate](#)) and sustainable society ([The Rudolf Agricola School for Sustainable Development](#)) and inter-university collaborations such as [SENSE](#). As outreach is increasingly important, the candidate will be involved in outreach and engagement activities of FSE, such as supporting FEWS nexus research components in grant proposals and stimulating cooperation between partners from science, industry, and society.