

**Faculty of Science and Engineering, University of Groningen  
Energy and Sustainability Research Institute Groningen (ESRIG)**

**Profile report: Energy Systems and Scenario Evaluation**

**Level: Full Professor ("Hoogleraar 2")**

**FTE: 1.0**

**1. Scientific Discipline**

Environmental Sciences, focusing on energy systems and scenario evaluation.

**2. Vacancy**

The position is opened by the Board of the Faculty (ref. 17/00576) and will be embedded within the Energy and Sustainability Research Institute Groningen (ESRIG) of the Faculty of Science and Engineering (FSE) of the University of Groningen (RUG). The successful candidate will chair the existing group Energy Environment Science (IVEM) within ESRIG.

**3. Research Area**

Keyword for the area of research is "Energy Transition": the road that inevitably has to be taken in the coming decades from the present era of fossil fuels into a future of (decentralized) systems based on renewables. Major subjects along this road are: which sources of energy will be chosen and for what reason(s), who will be the future actors and stakeholders, and what will be the environmental impacts. Amidst researchers who tend to focus on their specialism, a more holistic view on the dynamics of the energy system is urgently needed to produce balanced and scientifically sound results on present and future production and consumption systems all over the world. The outcome of such studies will help shape the energy future. The research of the Center for Energy and Environmental Sciences (IVEM) focuses on the how these changes in energy supply systems will affect sustainability and whether we can identify options to improve sustainability of these systems. The research varies from local energy supply systems in rural Africa and Asia to national energy supply systems in Western Europe. The interactions with agriculture, food supply and land use issues often play a role and are taken into account. The candidate for this position preferably focuses primarily on the field of industrial ecology/sustainable engineering, as that will complement and strengthen present research at IVEM the best.

**4. Local, National and International Position**

Energy sustainability and healthy aging are the key foci of the Groningen University. Within the Faculty of Science and Engineering the ESRIG research institute covers the Energy and Sustainability themes. Within ESRIG the IVEM focuses on the sustainability of (future) energy supply systems. Systems analysis, energy modeling and scenario development are the most frequently used scientific methodologies. The center plays a vital role in the master program Energy and Environmental Sciences. This master within the Faculty of Science and Engineering is the only master program within the university that clearly addresses the key foci of the university. IVEM has a long and fruitful tradition in co-operation with groups from other faculties, such as energy law, energy economics, engineering and social psychology. The candidate will chair the IVEM, and will further ensure the leadership of IVEM in these developments. Her/his research will complement that of the three present permanent staff members (one part-time professor, one associate professor by special appointment and one senior researcher). Furthermore, two "tenure track" assistant professors at IVEM are (or will soon be) active in the field of industrial ecology.

Cooperation with other, engineering-oriented groups within the Faculty is expected.

In 2012 the Energy Academy Europe (EAE) was launched in Groningen. In this organisation the UG collaborates with the Hanzehogeschool Groningen (University of Applied Sciences, offering professional education), provincial and municipal authorities and energy companies to establish a firm base for high-level interdisciplinary energy education and research.

Because of the overlap in aims and research themes, collaboration with the EAE will lead to mutual benefits. Models and scenarios are essential to combine insights from different parts of the EAE, in both research and teaching activities. Furthermore, scenarios are a powerful tool for knowledge dissemination and as frameworks for engaging stakeholders. In turn, the EAE provides a high-profile environment with significant international visibility. Its partnerships with businesses, governments and NGOs form a valuable interface and enable innovative forms of collaborations for knowledge production and circulation.

At the national level, IVEM is member of the national research school SENSE (Socio-Economic and Natural Sciences for the Environment), along with related groups from other Dutch universities (Wageningen, Free University Amsterdam, Leiden and Utrecht). Compared to the other Dutch groups, IVEM has the stronger embedding in the natural sciences.

In Europe, groups with a similar profile as the IVEM are e.g. found in the Nordic countries (Lund and Gothenburg, Trondheim, Turku), in Spain (Barcelona) and in Austria. Especially the International Institute for Applied Systems Analysis (IIASA) in Austria is a renowned research institute, to which the IVEM has several connections.

In this international setting, the IVEM strives to get and maintain a leading role in system-dynamic analysis and modelling by addressing energy transitions and contributing to long-term energy and environmental scenario development. In order to achieve this, IVEM aims at opening new pathways in the field of 'big data' handling and application of data complexity analysis, whilst maintaining a lead in the development of the food, environment and land use research line.

## **5. Selection Committee**

Prof. H.A.J. Meijer, director of ESRIG (chair)

Ms. dr. S. Nonhebel, IVEM, ESRIG, and programme director of EES

Prof. M.A. Herber, current chair of IVEM (a.i.), ESRIG

Prof. T.H. van der Meer, Faculty of Engineering Technology, University of Twente

Prof. A.P.C. Faaij, IVEM, ESRIG and Energy Academy Europe

Ms. prof. J.M.A. Scherpen, director Engineering and Technology Institute Groningen

M. Sc. student EES

Advisory member: Ms M. Renker, Human Resources

## **6. Expected contribution to Research**

The candidate is expected to have a broad overview over the field and associated methodologies, and will focus on the energy aspects of long term sustainability. Sustainability is a complex, long-term and global concept that encompasses ecology, economics, engineering and social conditions. The candidate will develop and apply models and scenarios in order to assess the local, global and future aspects of sustainable development, focused on energy. Such an approach enables thorough and constructive analyses of existing and proposed energy systems, including

- developing frameworks for understanding energy systems
- analysing the dynamics of resources in the energy economy
- describing economic and social feasibility of different scenarios

- identifying the causes of technological, market or policy failure in present energy system development and elaborating solutions to failures that take systems into account.
- staying abreast of engineering innovations in the field of energy

The candidate initiates and develops an internationally competitive research programme, addressing the energy transition and its societal context, using the fundamental principles of integrated system approach, in which both integrated modelling and scenario designs are applied.

The candidate's research programme should include a clear picture on the role of modelling and integrated systems analysis in energy and sustainability research, preferably focussed on industrial ecology and sustainable engineering and should include a strategy to build up and strengthen multidisciplinary contacts within and outside the university.

Alignment of the programme with the other research groups in ESRIG, other institutes of the faculty (most prominently the Engineering and Technology Institute ENTEG), other faculties of the RUG, and the Energy Academy Europe will be key to growth and international reputation. The programme should mainly be based on extramural funding.

The candidate's efforts will lead to world class, original contributions for these lines of research, and preferably also have societal impact ("outreach").

### **7. Expected contribution to Teaching**

The candidate will lecture in the teaching programmes within the faculty (Bachelor- and Master levels), and contribute to Ph.D. student educational programs. The candidate will contribute to a series of bachelor programmes with substantial energy-related elements, including the track "energy and environment" in the Physics Bachelor's degree programme, the intra-university minor programme Future Planet Innovation, and the minor programme "Energy" which is under development. Depending on the background and interests of the candidate, contributions to one of the disciplines in the faculty is also possible.

With respect to the Master Phase, the candidate will be mainly involved in the Energy and Environmental Science Master's degree programme. This includes the supervision of master students during their final research.

The successful candidate will supervise Ph.D. students and act as Ph.D. advisor ("promotor").

Furthermore, within the EAE framework, the candidate will contribute to courses and to the development of EAE programmes.

### **8. Expected contribution to the Organisation**

Next to leading the research group, the candidate is expected to have an active interest and to provide a positive contribution to the management and organizational tasks of the institute. At the level of the FSE, the candidate will contribute to the organization of the faculty, for example by participating in working groups and committees, in the fields of teaching, research and management. The candidate will participate in relevant national and international organizations. Furthermore, a prominent role is foreseen in connection with the university-wide "Energy" theme, and, last but not least, in the EAE.

### **9. Career perspective**

The position will be offered as full professor according to the document "Career Paths in the Sciences" of the faculty. The position will be at the level of 'Hoogleraar 2' according to the actual university function ordering system and regulations. For a suitable candidate with less seniority an Associate Professorship is possible.