UNIVERSITÉ DE GENÈVE
INSTITUT DES SCIENCES DE L'ENVIRONNEMENT
Department F.-A. Forel for Environmental and Aquatic Sciences

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University of Geneva, Institute for Environmental Sciences, Chair for Energy Efficiency

At the Institute for Environmental Sciences there are two vacancies in the energy domain:

Ph.D. student on thermal grids and energy storage
and
Ph.D. student on energy efficiency in industrial processes.

The successful applicants will become members of the Chair for Energy Efficiency within the Department F.-A. Forel for Environmental and Aquatic Sciences, Faculty of Sciences and they will be housed by the inter-faculty Institute for Environmental Sciences (ISE, http://www.unige.ch/environnement) that is active in cross-disciplinary research in the domains of energy, climate change, surface waters, urban ecology other sustainability domains. The institute represents an enthusiastic, dynamic and international working environment. It offers an interdisciplinary Master programme in Environmental Sciences (MUSE) with a track on Energy to which the successful candidates will contribute.

Project and job description:
Energy efficiency and renewables play key roles in the European Union's energy and climate policy, in Switzerland's Energy Strategy 2050 and in the energy plans prepared by Swiss cantons. Buildings and industry, and in particular their energy use related to heating and cooling, are among the largest sources of CO2, e.g. causing half of all greenhouse gas emissions in Switzerland. Against this background, energy use and CO2 emissions caused by the built environment and by industry need to be drastically reduced. The analysis of the options is the objective of the project Decarbonisation of Cooling and Heating in Switzerland (DeCarbCH, https://www.sweet-decarb.ch/) which provides the funding for the two Ph.D. student positions. The foreseen research is purely desktop-based. It involves collaboration with industry and/or utilities and is linked to ongoing activities in other groups belonging to DeCarbCH.

The *Ph.D. student position on thermal grids and energy storage* deals with spatio-temporal modelling for decarbonisation heating and cooling in the building stock, including solutions for climate-change driven increase in cooling demand such as low-temperature thermal grids. Energy storage is foreseen to play an important role in order to increase flexibility and maximize the use of renewables while minimizing CO2 emissions. The candidate's contribution will be to model energy systems including thermal energy storage at high temporal resolution and at

various geographical scales, i.e. national, regional and local with different objective functions (minimisation of emissions, costs etc.).

The *Ph.D. student position on energy efficiency in industrial processes* deals primarily with thermal energy optimisation (heating and cooling) using Pinch technology. New optimisation models are required in order to identify improved system configurations making use of heat recovery, heat pumping, renewable energy and energy storage, while considering the constraints encountered in real systems. Trade-offs between energy optimisation and costs need to be considered. In-depth analysis of several key production processes of one or two industry sectors are foreseen.

Requirements:

The positions offer unique opportunities to the successful candidates to further develop a wide range of analytic and modelling skills, presentation and reporting skills and networking in a cutting-edge R&D areas that are essential for the energy transition, nationally and internationally. Candidates should have a Master's degree respectively in physics, engineering or environmental sciences and they must be able to combine thorough technical understanding with economic assessment and broader aspects of the energy transition. Good knowledge of English is a necessity and good knowledge of French and/or German is a clear advantage.

For the position on *thermal grids and energy storage,* a solid understanding of quantitative analysis methods is expected (preferably in the realm of physical systems, e.g. thermodynamics) and experience with programming in Python or a similar scientific language (e.g. R, Matlab) is highly desired. Previous experience with thermal technologies including thermal grids, storage, heat pumps is a plus. Familiarity with geospatial information systems (GIS) is also considered an advantage.

Similarly, for the position on *energy efficiency in industrial processes,* experience with programming (e.g. Python) for simulation and/or optimisation is expected. Knowledge in the areas of systems analysis, Pinch technology and/or thermal energy storage are also desired.

Conditions of employment:

We offer an initial 1-year appointment with planned further extension by at least three further years. The salary will be in accordance with the regulations at the University of Geneva.

Interested applicants are kindly requested to send their application at earliest convenience. The application package should include a letter describing the applicant's motivation and competences next to an up-to-date CV with publication list, overview of teaching activities and transcripts (course load and grades). The announcement remains valid until qualified candidates have been found. Applications should be sent by email to job-efficiency@unige.ch. Prof. Martin Patel (martin.patel@unige.ch) can provide more information about the positions.