Jobbnorge ID: 227264
Deadline: 6/12/2022
Website: http://www.ntnu.no
Scope: Fulltime
Duration: Fixed Term

The Department of Energy and Process Engineering has a vacancy for a

Postdoctoral Fellow in Process System Engineering

This is NTNU

NTNU is a broad-based university with a technical-scientific profile and a focus in professional education. The university is located in three cities with headquarters in Trondheim.

At NTNU, 9,000 employees and 42,000 students work to create knowledge for a better world.

You can find more information about working at NTNU and the application process here.

Video: https://youtu.be/Xt-yHCN5QS0

About the position

We have a vacancy for a Postdoctoral Fellow in the Department of Energy and Process Engineering. The position is funded by and part of the 8-year research program HighEFF (Centre for an Energy Efficient and Competitive Industry for the Future). More specifically, this 2-year position will be part of Research Area 1 on Methodologies, where focus is on developing and testing methods and tools for improved energy efficiency.

The announced position is instrumental for continuing and expanding the Process Systems Engineering (PSE) activities in HighEFF. PSE is here regarded to be systematic and general methods for process modeling and simulation, process synthesis and design, and process optimization. Within HighEFF, a novel methodology for Heat and Work Integration has been developed by combining thermodynamics (Pinch and Exergy Analysis) and Optimization (Mathematical Programming and Stochastic Search). While Heat Integration with focus on thermal energy and temperature is well established and applied in the process industries, the new methodology on Heat and Work Integration also considers mechanical energy and pressure in such industrial plants. Compression and expansion are sources of heating and cooling that can be utilized for increased heat recovery and thereby improved energy efficiency.

In order to handle energy forms (thermal and mechanical) with different qualities, exergy can be used that combines amounts and quality of energy, thereby combining the 1st and 2nd Law of Thermodynamics. Since the exergy of heat is currently obtained from the Carnot equations, the quality (or value) of heat is overestimated. Thus, there is a need for new methodologies for incorporating exergy and value-adjusted exergy into energy systems design. Superstructure optimization methods are the current state-of-the-art approach for the design of complex energy systems in uncertain markets, but these approaches are computationally intensive. As such, heat, work and energy integration methodologies (such as Pinch Analysis) must often be decoupled from superstructure optimization frameworks in order to yield tractable problems, potentially causing one to miss possible innovative designs.

To address this issue, stream exergy can be used as a proxy for stream value, reducing model complexity and thus making it possible to include energy integration problems directly in the superstructure optimization formulation. One key challenge is that the direct correlation of exergy with value depends on the type of exergy (thermomechanical, chemical, etc.), as mentioned above and noted in the recent work Exergy Tables (a book under development). In this work, we will create a methodology that maps exergy with value for different technologies and then modifies the superstructure optimization problem accordingly. We will demonstrate this using relevant industrial case studies in important sustainable energy contexts. The end result will be better algorithms and approaches for sustainable energy system design.

The postdoctoral fellowship position is a temporary position where the main goal is to qualify for work in senior academic positions.

Desired start date to the position is not later than 01.09.2022.

You will report to Professor Truls Gundersen.

Duties of the position

- Contribute to the HighEFF Centre through own research and collaboration with other NTNU and SINTEF researchers
- Publish the results of the research, including industrial case studies, in high quality international journals
- Assist in supervision of a few master students with theses related to HighEFF
- Participate and present in both HighEFF meetings and in international conferences

Required selection criteria

- You must have completed a Norwegian doctoral degree or corresponding foreign doctoral degree recognized as equivalent to a Norwegian PhD.
- Your academic work must be within the field of Process Systems Engineering, preferably focusing on sustainable energy conversion systems.
- A PhD in the field of Process Engineering including Chemical as well as Mechanical Engineering relevant to the field specified above.
- You must have documented experience in one or more of the following areas: Industrial energy systems, Process integration (e.g. Pinch Analysis) and Process optimization.
- Your recent research activities must be in the field of the call, with relevant and consistent track records (research articles in well-recognized scientific journals with demonstrated significant contributions from the applicant).
- You must have practical experience in implementing successful research with methodologies and tools of Process Systems Engineering.

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants and national guidelines for appointment as PhD, post doctor and research assistant

Preferred selection criteria

- Good written and oral English language skills
- Industrial experience would be an advantage but not a requirement

Personal characteristics

- Innovative, development-oriented and initiative-oriented
- Ability to work organizationally and purposefully
- Independent, but team-oriented and good at interactions and cooperation

We offer

- Exciting and stimulating tasks in a strong international academic environment
- An open and inclusive work environment with dedicated colleagues
- Favourable terms in the Norwegian Public Service Pension Fund
- Employee benefits

Salary and conditions

As a Postdoctoral Fellow (code 1352) you are normally paid from gross NOK 574 700 per annum before tax, depending on qualifications and seniority. From the salary, 2% is deducted as a contribution to the Norwegian Public Service Pension Fund.

The period of employment is 2 years.

The engagement is to be made in accordance with the regulations in force concerning State Employees and Civil Servants, and the acts relating to Control of the Export of Strategic Goods, Services and Technology. Candidates who by assessment of the application and attachment are seen to conflict with the criteria in the latter law will be prohibited from recruitment to NTNU. After the appointment you must assume that there may be changes in the area of work.

The position is subject to external funding.

It is a prerequisite you can be present at and accessible to the institution on a daily basis.

About the application

The application and supporting documentation to be used as the basis for the assessment must be in English.

Publications and other scientific work must follow the application. Please note that applications are only evaluated based on the information available on the application deadline. You should ensure that your application shows clearly how your skills and experience meet the criteria which are set out above.

If, for any reason, you have taken a career break or have had an atypical career and wish to disclose this in your application, the selection committee will take this into account, recognizing that the quantity of your research may be reduced as a result.

The application must include:

- CV, certificates and diplomas
- Transcripts and diplomas for bachelor's-, master's- and PhD degrees.
- Academic works - published or unpublished - that you would like to be considered in the assessment.
- Research plan
- Name and address of three relevant referees

If all, or parts, of your education has been taken abroad, we also ask you to attach documentation of the scope and quality of your entire education. Description of the documentation required can be found here. If you already have a statement from NOKUT, please attach this as well.

Joint works will be considered. If it is difficult to identify your contribution to joint works, you must attach a brief description of your participation.

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal and interpersonal qualities. Motivation, ambitions, and potential will also count in the assessment of the candidates.

NTNU is committed to following evaluation criteria for research quality according to The San Francisco Declaration on Research Assessment - DORA.

General information

Working at NTNU

A good work environment is characterized by diversity. We encourage qualified candidates to apply, regardless of their gender, functional capacity or cultural background.

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the innovation capital of Norway with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

As an employee at NTNU, you must at all times adhere to the changes that the development in the subject entails and the organizational changes that are adopted.

Under the freedom of Information Act (Offentleglova), your name, age, position and municipality may be made public even if you have requested not to have your name entered on the list of applicants.

If you have any questions about the position, please contact Professor Truls Gundersen, telephone +47 916 81 726 or email: truls.gundersen@ntnu.no. If you have any questions about the recruitment process, please contact HR consultant, Renate Fjellheim, e-mail: renate.fjellheim@ntnu.no.

Please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates. Applications submitted elsewhere will not be considered. Diploma Supplement is required to attach for European Master Diplomas outside Norway. Chinese applicants are required to provide confirmation of Master Diploma from China Credentials Verification (CHSI).

If you are invited for interview you must include certified copies of transcripts and reference letters. Please refer to the application number IV-140/22 when applying.

Application deadline: 12.06.2022

NTNU

NTNU - knowledge for a better world

The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Energy and Process Engineering

We conduct research and teaching covering the entire energy chain, from resources to the end-user. We look at how energy is produced and used by humans and machines in a sustainable way with regard to health, climate change and the resource base. The Department of Energy and Process Engineering is one of eight departments in the Faculty of Engineering.

Additional information

Place of service:

Gløshaugen 7034 Trondheim (Trondheim Municipality)