

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.

2 Post Docs and 9 PhD Research fellowship positions in CINELDI

Centre for intelligent electricity distribution (CINELDI) is a cross-disciplinary research Centre for Environment-friendly Energy Research (FME) awarded by the Research Council of Norway.

CINELDI [1] is hosted by SINTEF Energy Research [2] with NTNU [3] as a major research partner.

CINELDI will facilitate renewable energy, electrification of transport and more efficient use of energy.

CINELDI will contribute to designing the future's flexible and robust electrical distribution grid at an acceptable cost.

CINELDI announces eleven positions (PhDs and Postdocs) at NTNU,

- *two* positions at Faculty of social science and technology management, Department of Industrial Economics and Technology Management [IØT],
- *one* position at Faculty of Humanities, Department of Interdisciplinary Studies of Culture [KULT],
- *eight* positions at Faculty of Information Technology, Mathematics and Electrical Engineering [IME], Department of Electric Power Engineering [elkraft], Department of Engineering Cybernetics [ITK], and Department of Telematics [ITEM].

Work descriptions

The PhDs and Postdocs will be working in a cross-disciplinary team, covering a broad set of challenges in modernizing the distribution grid. In total, 2 PostDocs and 9 PhD fellowships are defined as described in the following. More detailed descriptions about the positions can be found at <http://www.sintef.no/projectweb/cineldi/positions/>

Each position is marked with a reference code, IME-xxx/IØT-xxx/KULT-xxx, which must be used to refer to the position for which the application applies to. In [brackets] it is indicated whether the position is a [PhD] or [PostDoc]. The PhD positions are for 3 years, but can be extended up to 4 years with 25% teaching assistance in agreement with the host department. The PostDoc positions are for 2 years.

IE 001: [PostDoc]Modelling of complex interactions and interdependencies for security of electricity supply analysis

Short description: The smartgrid vision implies a new reality where the traditional power system and distributed ICT system converge into a complex system of systems, increasing and strengthening interactions and interdependencies between the systems. The challenge is then to avoid causing new risks and vulnerabilities with respect to uninterrupted power supply, while utilising the new possibilities to achieve a flexible and sustainable distribution system. The candidate will work with developing robust and stable communication system solutions for distribution system protection and automation.

Formal requirements: The position requires a PhD degree in communication technology and services. Knowledge on power system protection and automation will be required, so the candidate needs to have strong willingness to strengthen his/her background within this field if not already familiar with it. Knowledge on power systems and security of electricity supply is an advantage.

ØK-002: [PostDoc]Modelling transition strategies towards smart distribution grids

Short description: The objective of the post doc is to develop a modelling framework for studying transition to the future smart distribution grid. The models will be used to support analysis of transition pathways. In order to analyse the uncertainty affecting the transition, the post doc will use stochastic techno-economic optimization models including both long-term uncertainty (in terms of capacity need, demand trends, price trends, interaction with other systems) as well as short-term uncertainty (intermittent and distributed production, load, rare events).

Formal requirements: PhD degree in operations research required. Formal competence in economics is positive. Background from energy markets or energy systems is positive.

IE 002: [PhD] Development of risk indicators, reliability and vulnerability models for the combined power and ICT system

Short description: The increasing uncertainties in the future distribution system call for a high level, top down approach to be applied by the DSOs in order to assess the risks. At the same time, new components and technologies will provide new information for enhanced accuracy in the risk models, and new possibilities will be provided by automation, self-healing and islanding of microgrids in interplay with the distribution system. In order to control the effect of interdependencies and related threats and failures on the uninterrupted power supply, methods to monitor and manage the interdependencies are needed. This candidate will work with development of indicators for risk and vulnerabilities caused by interdependencies in future smart distribution grids

Formal requirements: The position requires a Master of Science degree in Electrical Engineering with a master thesis related to reliability and vulnerability, relay protection or smartgrids. The PhD will require a solid knowledge in protection and communication, so the candidate needs to have strong willingness to strengthen his/her background in communication related topics.

IE 003: [PhD] Principles for reconfigurable and autonomous adaptable smart grid operation in a complex control ecosystem

Short description: The objective is to develop principles for operation of the future SmartGrid distribution network, being a merger between power and ICT (| digital | communication and control) technologies. These will have high flexibility and controllability. The research will be directed towards obtaining an optimal balance between proactive and reactive maintenance and operations, where the candidate will use a

modelling approach to enable a quantifiable trade-off between the different design options, e.g., high or low degree of (semi-)automation, strategies applied, mm.

Formal requirements: The position requires a Master of Science degree in Communication technology and services, and knowledge of modelling, optimization, control theory or power engineering is a plus.

IE 004: [PhD] Distributed and centralized control to support smart grid operation with high quality in a cost-efficient way

Short description: The objective is to develop principles for operation of the future SmartGrid distribution network, being a merger between power and ICT (| digital | communication and control) technologies. These will have high flexibility and controllability. The research will be directed towards finding the techno, economic, and operational best control and management structure. Both the physical platform and the logical structure should be included. The candidate shall establish models to allow a trade-off between distributed and centralised advanced control functionality. An important condition is that the (sub)systems of the different market actors, e.g. distribution companies, households, power producers, brokers, will form a digital ecosystem with an integrated information and communication system, supporting real-time, reliable, and secure smart grid operation.

Formal requirements: The position requires a Master of Science degree in Communication technology and services, and knowledge of modelling, optimization, control theory or power engineering is a plus.

IE 005: [PhD] Distributed and hierarchical dynamic state estimation for smart distribution grids

Short description: The PhD will study accurate monitoring of the power system, while handling (or avoiding) the 'data deluge'. At substation level, detailed dynamical models will be utilized, with full utilization of sensor data. Information transmitted to higher voltage levels of the power system will be filtered to focus on information and system services of relevance to those higher levels. Methodology will need to be developed for sensor selection and placement for observability at the lower level, and for filtering and data fusion under consideration of the particular dynamic phenomena to be observed at higher levels.

Formal requirements: MSC in Control Engineering or a related discipline, with a solid knowledge of state estimation. Knowledge of power systems dynamics and operation is desired.

ØK-003: [PhD] Techno-economic optimization for analysing consumer flexibility and related market structures

Short description: The main objective of the PhD project is to develop models, concepts and solutions for utilization of customer flexibility in the energy system. This includes realization of balancing services and flexibility services as an alternative to grid reinforcement, minimizing grid asset investments and maintenance costs. The project will study market structures for trading flexibility, the different players, business models and decision support for the analysis of markets, contracts and cooperation.

Formal requirements: Master degree in operations research required. Formal competence in economics is positive.

IE 006: [PhD] Fault handling in microgrids based on adaptive relaying and active controls aided by communication

Short description: The task will explore the protection scheme of microgrids, considering bi-directional power flow, conditional islanding, and complex fault situations, emphasizing a robust communication system. The microgrid itself can be dynamic or static, with different implications for the underlying communication architecture. The communication service need to adapt to both cases. The PhD will develop an architecture and a set of communication services that can support protection schemes for microgrids.

Formal requirements: The position requires a Master of Science degree in Electrical Engineering with a master thesis related to microgrid, relay protection, smartgrid or communication related aspects of these. The PhD will require a solid knowledge in protection and communication, so the candidate needs to have strong willingness to strengthen his/her background in communication related topics. It is preferable that the candidate has relevant communication courses in their BSc or MSc.

IE 007: [PhD] Smart Power Control in Microgrids with Modern Power Converters

Short description: Intelligent power flow in microgrids is enabled by power electronics and their control. The PhD-student will preferably work on and develop new methods for virtual impedance control of DC microgrids with supercapacitor energy storage, and validate the methods experimentally. The student may also work on development of methods for active filtering and/or other ancillary services based on instantaneous power theory and/or theory of virtual synchronous machines.

Formal requirements: Primary background in electrical power engineering, with a master's thesis in power electronics, and strong interest/knowledge of control theory.

IE 008: [PhD] The value of buildings' energy flexibility in the power market

Short description: The objective of this PhD will be to develop a methodology for quantification of energy flexibility of Zero Emission Neighborhoods (ZEN) in smart distribution grids. The candidate will investigate electricity market mechanisms to value ZEN development in the local grid and the power market.

Formal requirements: Master of Science degree, background in electrical power engineering, energy economics, optimization.

HF 16-055: [PhD] Understanding mechanisms and incentives for motivating user flexibility

Short description: This PhD will explore electricity consumption in everyday life, with a particular focus on mechanisms and incentives aimed at motivating user flexibility. How are such mechanisms and incentives interpreted and understood, and what is the relationship between such mechanisms, incentives and practice changes and the provision of user flexibility.

Formal requirements: Master degree in social sciences e.g. science and technology studies (STS), sociology or similar. Interest in energy issues, experience in qualitative research methods.

Qualifications

PhD: We seek highly motivated and excellent candidates with a MSc or education at the equivalent level compliant with the research field of the position (see list above). According to the formal PhD regulations, average grade B or better is required. Personal suitability will be emphasised.

PostDoc: We seek highly motivated and excellent candidates with a PhD and experience in the research field as defined for the position (see list above). We will prioritize candidates with strong publication record, with publications in top level conferences and journals.

All: We will prioritize candidates based on the following criteria:

- Excellent communication skills - written and oral.
- Ability to work independently, as well as in team.

Language requirements

Applicants who do not master a Scandinavian language must provide evidence of good English language skills, written and spoken. The following tests can be used as such documentation: TOEFL, IELTS or Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE). Minimum scores are:

- TOEFL: 600 (paper-based test), 92 (Internet-based test)
- IELTS: 6.5, with no section lower than 5.5 (only Academic IELTS test accepted)
- CAE/CPE: grade B or A.

Formal regulations for PhD

Appointments are made in accordance with the regulations in force regarding terms of employment for PhD candidates issued by the Ministry of Education and Research, with relevant parts of the additional guidelines for appointment as a PhD candidate at NTNU. Applicants must undertake to participate in an organized PhD programme of study during their period of employment. The person who is appointed must comply with the conditions that apply at any time to employees in the public sector. In addition, a contract will be signed regarding the period of employment.

Applicants must be qualified for admission as PhD students at NTNU. See <http://www.ime.ntnu.no/forskning/phd> for information about PhD studies at NTNU.

Salary conditions

The PhD position is in code 1017 Research fellow, salary grade 50-62 in the Norwegian State salary scale, gross NOK 435100 - 535500 per year, depending on qualifications. The Post doc position is in code 1352 Research fellow, salary grade 57 - 72 in the Norwegian State salary scale, gross NOK 488900 - 647 700 per year, depending on qualifications. A deduction of 2% is made as a statutory contribution to the Norwegian Public Service Pension Fund.

General

We can offer

- an informal and friendly workplace with dedicated colleagues
- academic challenges
- attractive schemes for housing loan, insurance and pension in the Norwegian Public Service Pension Fund

NTNU wants to attract outstanding and creative candidates who can contribute to our ongoing research activities. We believe that diversity is important to achieve a good, inclusive working environment. We encourage all qualified candidates to apply, regardless of the gender, disability or cultural background.

The appointment is subject to the conditions in effect at any time for employees in the public sector.

Under Section 25 of the Freedom of Information Act, information about the applicant may be made public even if the applicant has requested not to have his or her name entered on the list of applicants.

The application

The application must be sent electronically via www.jobbnorge.no with information about education and relevant experience (all in one combined PDF file). Mark your application with the code indicated for each position.

The application for both PhD and PostDoc positions should contain:

- The reference code (IE/IØT/KULT-xxx) for the position
- Information about education, exams and previous relevant work/research experience (a CV).
- Certified copies of academic diplomas and certificates.
- Applicants from universities outside Norway are kindly requested to send a [diploma supplement](#) or a similar document, which describes in detail the study and grading system and the rights for further studies associated with the obtained degree.
- Publications relevant to the research scope and any other work which the applicant wishes to be taken into account should clearly state the applicant's contribution. A short summary should be attached outlining the applicant's input to joint work.
- Names and contact information of at least two references

Specific for PostDoc:

- A description (maximum one page) of the research proposal for the applied position.
- A statement of purpose including an explanation of how your research interests and background would fit the position.

Incomplete applications will not be taken into consideration.

NB! For candidates applying for more than one position, a separate and complete application must be made for each position. **Mark each application with the corresponding reference code (IME/IØT/KULT-xxx)**

For further information about the application process, please contact:
Anne Bratseth (anne.kristin.bratseth@ime.ntnu.no)

Detailed descriptions if the positions can be found at: <http://www.sintef.no/projectweb/cineldi/positions/>

The application deadline is **February 1, 2017.**

[1] CINELDI: <http://www.sintef.no/en/projects/cineldi/>

[2] SINTEF Energy Research: <https://www.sintef.no/en/sintef-energy/>

[3] NTNU: <http://www.ntnu.edu/research>

