

## Denmark: PhD scholarship in Market Mechanisms for Integrated Energy Systems

The Center for Electric Power and Energy at the Department of Electrical Engineering is looking for a PhD student in the field of market mechanisms for integrated energy systems.

The PhD student will contribute to the research of the strategic research center IT-Intelligent Energy Systems in Cities (CITIES). CITIES is funded with a budget of €10 million from the Innovation Fund Denmark and a wide range of industrial and academic partners.

Research activities are initiated in CITIES in order to support the Danish target of a 100% renewable energy system by 2050 with solutions for future smart cities. The goal of CITIES is to provide research results which will lead to IT-solutions for future smart cities that spread across the dimensions of time, space and detail. More information is available at [www.smart-cities-centre.org](http://www.smart-cities-centre.org).

### Responsibilities and tasks

Future energy systems in a smart city context will consider electricity heat and gas in a more integrated manner. In parallel, the operation of energy systems is to be considered in a market environment, in order to optimize social welfare while generating appropriate signals for further investment. In that context, this PhD project will focus on new market structures and mechanisms facilitating the optimal operation of integrated energy systems, while accounting for the operational constraints from its various components, and to limitations related to the city-limited setup.

Emphasis will also be placed on market coupling and new market mechanisms with high uncertainty on both supply and demand sides.

### Qualifications

The applicants should fulfill the following requirements (mandatory):

- MSc in Electrical Engineering or equivalent qualification such as a degree in Sustainable Energy, Mathematics, Computer Science or Physics.
- Knowledge of power system operation and integration of renewable electricity production
- Knowledge of electricity and energy markets, as well as market clearing mechanisms under uncertainty
- Knowledge of optimization tools (e.g. GAMS, Gurobi, etc.) as well as data handling and programming tools (e.g., Matlab, R, Python) Appreciated:
- Advanced skills in mathematical programming and advanced optimization techniques (e.g. linear optimization, mixed integer optimization, duality theory, large-scale optimization, decomposition techniques, etc.)
- Knowledge of decision making under uncertainty, stochastic programming and forecasting
- Knowledge of power system regulation and economics
- Ability to present results in technical reports, and prepare scientific papers for publication in international journals

### **Approval and Enrolment**

PhD scholarships are subject to academic approval, and the candidates will be enrolled in one of the general PhD programmes of DTU. For information about the general requirements for enrolment and the general planning of the scholarship studies, please see the [DTU PhD Guide](#).

### **Assessment**

The assessment of the applicants will be made by Professor Pierre Pinson.

### **We offer**

We offer an interesting and challenging job in an international environment focusing on education, research, public-sector consultancy and innovation, which contribute to enhancing the economy and improving social welfare. We strive for academic excellence, collegial respect and freedom tempered by responsibility. The Technical University of Denmark (DTU) is a leading technical university in Northern Europe and benchmarks with the best universities in the world.

### **Salary and appointment terms**

The salary and appointment terms are consistent with the current rules for PhD students. The period of employment is 3 years.

Workplace: DTU Lyngby Campus.

### **Further information**

Further information may be obtained from Professor Pierre Pinson, tel.: +45 4525 3541.

You can read more about the Center for Electric Power and Energy [here](#).

### **Application**

Please submit your online application no later than **25 April 2015**. Applications must be submitted as **one pdf file** containing all materials to be given consideration. To apply, please open the link "Apply online," fill in the online application form, and attach **all your materials in English in one pdf file**. The file must include:

- A letter motivating the application (cover letter)
- Curriculum vitae
- Grade transcripts and BSc/MSc diploma
- Excel sheet with translation of grades to the Danish grading system (see guidelines and [excel spreadsheet here](#))

Candidates may apply prior to obtaining their MSc, but cannot begin before having received it.

All qualified candidates irrespective of age, gender, race, disability, religion or ethnic background are encouraged to apply

### **Tentative Submission Deadline : 25 May 2015**

### [Further Information](#)