

## Special Issue List in Section

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### Electrical Machine Design 2020

Guest Editor: Prof. Dr. João Filipe Pereira Fernandes  
Deadline: **31 December 2020**

### Design and Control of Power Converters 2020

Guest Editor: Prof. Dr. Manuel Arias Pérez de Azpeitia  
Deadline: **10 December 2020**

### Short-Term Load Forecasting 2021

Guest Editor: Prof. Dr. Antonio Gabaldón  
Deadline: **31 July 2021**

### MV and HV Transmission Lines

Guest Editor: Prof. Dr. Rodolfo Araneo  
Deadline: **20 May 2021**

### Integration of Large-Scale Renewable Energy Sources into the Low-Inertia Power Grid

Guest Editor: Dr. Edris Pouresmaeil  
Deadline: **30 September 2020**

### Emerging Technologies and Advanced Controls in Renewable-Energy-Based Power Generation Systems

Guest Editor: Prof. Dr. Alberto Dolara  
Deadline: **20 November 2020**

### Modeling and Simulation of Electricity Systems for Transport and Energy Storage

Guest Editor: Prof. Dr. Regina Lamedica  
Deadline: **20 August 2020**

### Cloud Computing for Energy Management

Guest Editor: Prof. Giuseppe Marco Tina  
Deadline: **30 September 2020**

### DC and AC Insulated Power Cables and Hybrid Transmission Lines: Insights, Operating Experiences and New Challenges

Guest Editor: Prof. Dr. Roberto Benato  
Deadline: **30 September 2020**

### Applications of Medium Voltage Direct Current in Electric Systems

Guest Editor: Prof. Dr. Luis M. Fernández-Ramírez  
Deadline: **31 December 2020**

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# Section

## Electrical Power and Energy System



### Section Editor-in-Chief

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### Section Information:

We are living nowadays an Energy transition. We are going more electrical than ever before in transportation: electrical vehicles and ships, electrical motors are every were. Back home, more electronics, electrical kitchens and electronic controlled devices are more and more present. In some houses is not rare to see photovoltaic systems, home batteries, electrical vehicle chargers, electrical grass cutting machines, even equipped with small batteries. It is clear that energy is going more to be electrical and this is a great chance to go more toward renewable energies. Photovoltaics, wind power generation, and other renewables are going to play an unprecedented role in the way that we generate, store and consume energy. This is a the chance of the change in a sustainable world that has only one possible direction, with new technologies and ideas.

This section is devoted to present the new technologies, trends and breakthroughs to promote more renewable energies for a future 100% renewable energy reality. This section, focuses on original and new research results regarding electrical power and energy technologies, as well as in diverse applications. Thus, manuscripts on planning, design, implementation, theoretical studies, economical and viability studies, as well as on their application to traditional as well as novel scenarios are solicited. Submissions addressing reviews and surveys will also be welcome.

### Featured Papers

DOI: 10.3390/en12040710

#### Multi-Objective Optimization of Energy Consumption and Surface Quality in Nanofluid SQCL Assisted Face Milling

Authors: *Aqib Mashood Khan, Muhammad Jamil, Konstantinos Salonitis, Shoaib Sarfraz, Wei Zhao, Ning He, Mozammel Mia and GuoLong Zhao*

Abstract: Considering the significance of improving the energy efficiency, surface quality and material removal quantity of machining processes, the present study is conducted in the form of an experimental investigation and a multi-objective optimization. The experiments were conducted by face milling AISI 1045 steel on a Computer Numerical Controlled (CNC) milling machine using a carbide cutting tool. The Cu-nano-fluid, dispersed in distilled water, was impinged in small quantity cooling lubrication (SQCL) spray applied to the cutting zone. The data of surface roughness and active cutting energy were measured while the material removal rate was calculated. A multi-objective optimization was performed by the integration of the Taguchi method, Grey Relational Analysis (GRA), and the Non-Dominated Sorting Genetic Algorithm (NSGA-II). The optimum results calculated were a cutting speed of 1200 rev/min, a feed rate of 320 mm/min, a depth of cut of 0.5 mm, and a width of cut of 15 mm. It was also endowed with a 20.7% reduction in energy consumption. Furthermore, the use of SQCL promoted sustainable manufacturing. The novelty of the work is in reducing energy consumption under nano fluid assisted machining while paying adequate attention to material removal quantity and the product's surface quality.



DOI: 10.3390/en12020292

#### A Self-Contained Electro-Hydraulic Cylinder with Passive Load-Holding Capability

Authors: *Damiano Padovani, Søren Ketelsen, Daniel Hagen and Lasse Schmidt*

Abstract: Self-contained electro-hydraulic cylinders have the potential to replace both conventional hydraulic systems and the electro-mechanical counterparts enhancing energy efficiency, plug-and-play installation, and reduced maintenance. Current commercial solutions of this technology are limited and typically tailor-made, whereas the research emphasis is primarily on cost efficiency and power applications below five [kW]. Therefore, there is the need of developing more flexible systems adaptable to multiple applications. This research paper offers a contribution in this regard. It presents an electro-hydraulic self-contained single-rod cylinder with passive load-holding capability, sealed tank, capable of recovering energy, and scalable up to about eighty [kW]. The system implementation on a single-boom crane confirms its feasibility: The position tracking error remains well within  $\pm 2$  [mm], oscillations are limited, and the overall energy efficiency is about 60 [%] during actuation. Concerning the passive load-holding devices, it is shown that both vented and non-vented pilot-operated check valves achieve the desired functioning and can hold the actuator position without consuming energy. Additional observations about the size and the arrangement of the load-holding valves are also provided. In conclusion, this paper demonstrates that the proposed self-contained cylinder can be successfully extended to several practical applications, especially to those characterized by overrunning external loads and the need of securing the actuator position.



DOI: 10.3390/en12020254

#### A Review on Hybrid Empirical Mode Decomposition Models for Wind Speed and Wind Power Prediction

Authors: *Neeraj Bokde, Andrés Feijóo, Daniel Villanueva and Kishore Kulat*

Abstract: Reliable and accurate planning and scheduling of wind farms and power grids to ensure sustainable use of wind energy can be better achieved with the use of precise and accurate prediction models. However, due to the highly chaotic, intermittent and stochastic behavior of wind, which means a high level of difficulty when predicting wind speed and, consequently, wind power, the evolution of models capable of narrating data of such a complexity is an emerging area of research. A thorough review of literature, present research overviews, and information about possible expansions and extensions of models play a significant role in the enhancement of the potential of accurate prediction models. The last few decades have experienced a remarkable breakthrough in the development of accurate prediction models. Among various physical, statistical and artificial intelligent models developed over this period, the models hybridized with pre-processing or/and post-processing methods have seen promising prediction results in wind applications. The present review is focused on hybrid empirical mode decomposition (EMD) or ensemble empirical mode decomposition (EEMD) models with their advantages, timely growth and possible future in wind speed and power forecasting. Over the years, the practice of EEMD based hybrid models in wind data predictions has risen steadily and has become popular because of the robust and accurate nature of this approach. In addition, this review is focused on distinct attributes including the evolution of EMD based methods, novel techniques of treating Intrinsic Mode Functions (IMFs) generated with EMD/EEMD and overview of suitable error measures for such studies.



DOI: 10.3390/en12010174

#### Determination of Optimal Location and Sizing of Solar Photovoltaic Distribution Generation Units in Radial Distribution Systems

Authors: *Minh Quan Duong, Thai Dinh Pham, Thang Trung Nguyen, Anh Tuan Doan and Hai Van Tran*

Abstract: This paper presents an effective biogeography-based optimization (BBO) for optimal location and sizing of solar photovoltaic distributed generation (PVDG) units to reduce power losses while maintaining voltage profile and voltage harmonic distortion at the limits. This applied algorithm was motivated by biogeography, that the study of the distribution of biological species through time and space. This technique is able to expand the searching space and retain good solution group at each generation. Therefore, the applied method can significantly improve performance. The effectiveness of the applied algorithm is validated by testing it on IEEE 33-bus and IEEE 69-bus radial distribution systems. The obtained results are compared with the genetic algorithm (GA), the particle swarm optimization algorithm (PSO) and the artificial bee colony algorithm (ABC). As a result, the applied algorithm offers better solution quality and accuracy with faster convergence.

