

# Journal of Energy

Scientific Professional Journal Of Energy, Electricity, Power Systems

Online ISSN 1849-0751, Print ISSN 0013-7448, VOL 63

## Published by

HEP d.d., Ulica grada Vukovara 37, HR-10000 Zagreb

HRO CIGRÉ, Berislavićeva 6, HR-10000 Zagreb

## Publishing Board

**Robert Krklec**, (president) HEP, Croatia,

**Božidar Filipović-Grčić**, (vicepresident), HRO CIGRÉ, Croatia

## Editor-in-Chief

**Goran Slipac**, HEP, Croatia

## Associate Editors

**Helena Božić** HEP, Croatia

**Stjepan Car** Končar-Electrical Engineering Institute, Croatia

**Tomislav Gelo** University of Zagreb, Croatia

**Davor Grgić** University of Zagreb, Croatia

**Mičo Klepo** Croatian Energy Regulatory Agency, Croatia

**Stevo Kolundžić** Croatia

**Vitomir Komen** HEP, Croatia

**Marija Šiško Kuliš** HEP, Croatia

**Dražan Lončar** University of Zagreb, Croatia

**Goran Majstrovic** Energy Institute Hrvoje Požar, Croatia

**Tomislav Plavšić** Croatian Transmission system Operator, Croatia

**Dubravko Sabolić** Croatian Transmission system Operator, Croatia

**Mladen Zeljko** Energy Institute Hrvoje Požar, Croatia

## International Editorial Council

**Franco Barbir** University of Split, Croatia

**Tomislav Barić** J.J. Strossmayer University of Osijek, Croatia

**Anastasios Bakirtzis** University of Thessaloniki, Greece

**Frank Bezzina** University of Malta

**Tomislav Capuder** University of Zagreb, Croatia

**Ante Elez** Končar-Generators and Motors, Croatia

**Dubravko Franković** University of Rijeka, Croatia

**Hrvoje Glavaš** J.J. Strossmayer University of Osijek, Croatia

**Mevludin Glavić** University of Liege, Belgium

**Božidar Filipović Grčić** University of Zagreb, Croatia

**Dalibor Filipović Grčić** Končar-Electrical Engineering Institute, Croatia

**Josep M. Guerrero** Aalborg Universitet, Aalborg East, Denmark

**Dirk Van Hertem** KU Leuven, Faculty of Engineering, Belgium

**Žarko Janić** Siemens-Končar-Power Transformers, Croatia

**Igor Kuzle** University of Zagreb, Croatia

**Niko Malbaša** Ekoneg, Croatia

**Matislav Majstrovic** University of Split, Croatia

**Zlatko Maljković** University of Zagreb, Croatia

**Predrag Marić** J.J. Strossmayer University of Osijek, Croatia

**Viktor Milardić** University of Zagreb, Croatia

**Srete Nikolovski** J.J. Strossmayer University of Osijek, Croatia

**Damir Novosel** Quanta Technology, Raleigh, USA

**Hrvoje Pandžić** University of Zagreb, Croatia

**Robert Sitar** Končar-Electrical Engineering Institute, Croatia

**Damir Sumina** University of Zagreb, Croatia

**Elis Sutlović** University of Split, Croatia

**Damir Šljivac** J.J. Strossmayer University of Osijek Croatia

**Darko Tipurić** University of Zagreb, Croatia

**Bojan Trkulja** University of Zagreb, Croatia

**Nela Vlahinić Lenz** University of Split, Croatia

**Mario Vražić** University of Zagreb, Croatia

## INTRODUCTION

**J**ournal of Energy special issue: Papers from 3<sup>rd</sup> International Colloquium "Transformer Research and Asset Management"

Welcome to this special issue, which is based on selected papers presented at the 3<sup>rd</sup> International Colloquium "Transformer Research and Asset Management", held in Split, Croatia, on October 15<sup>th</sup> –17<sup>th</sup>, 2014.

The International Colloquium was organized by the Croatian CIGRÉ National Committee in cooperation with the Faculty of Electrical Engineering and Computing in Zagreb and the Centre of Excellence for Transformers in Zagreb with support from CIGRÉ A2 Study committee (Transformers). The goal of the Colloquium was to share latest research in the in the areas of distribution, power and instrument transformers.

The Colloquium extended over three days. Two CIGRÉ tutorials were offered to all participants. In total there were 160 participants from 22 countries. All of the 50 accepted papers were presented in oral sessions, out of that there were three invited lectures. Participants from manufacturers, utilities and universities took part in discussions.

All the papers were divided into three sessions

### Numerical Modeling

- Electromagnetic field
- Coupled fields
- Transients
- Numerical modeling in design, etc.

### Materials, Components and New Technologies

- Insulating material
- Magnetic material
- Transformer components
- Transformer new technologies, etc.

### Transformer Life Management

- Monitoring
- Diagnostics
- Failures
- Asset management, etc.

From the 50 papers presented at the Colloquium, 29 papers were accepted for publication in Journal of Energy after having undergone the peer-review process. We would like to thank the authors for their contributions and the reviewers who dedicated their valuable time in selecting and reviewing these papers. We hope this special issue will provide you a valuable source of newest achievements in transformer technology.

### Guest Editor

*ass. prof. dr. sc. Bojan Trkulja*

University of Zagreb, Croatia

Faculty of Electrical Engineering and Computing

*asst. prof. dr. sc. Žarko Janić*

Končar Power Transformers

A joint Venture of Siemens AG and Končar d.d.