

RES cooperation

The aim of the particular Special Issue is to provide information and a comprehensive analysis of the technical, socio-economic and environmental aspects of Renewable Energy Sources (RES) cooperation, investigating how Europe will meet the 2020 RES targets and fully decarbonise its energy system in the long term. The motivation of this effort originated from the Intelligent Energy Europe (IEE) project: *“Bringing Europe and Third countries closer together through renewable Energies” (BETTER)*, whose main purpose was to assess, through case studies, stakeholders involvement and integrated analysis to what extent RES cooperation (as defined in Article 9 of RES Directive 2009/28/EC) among European Union (EU) Member States (MSs) and neighbouring countries can help Europe achieve its RES targets in 2020 and beyond.

In this Special Issue, nine high-quality articles were selected aligning latest practices, innovation and case studies with academic frameworks and theories, exploring critical parameters of the complex issue of the implementation of cooperation among Europe and its neighbours in the field of RES generation and expansion. Each paper illuminates one or more of the critical issues regarding the implementation of joint RES projects and RES deployment in EU for RES targets to be successfully reached in a 2020 timeframe and beyond.

The Issue opens with the article of Johan Lilliestam *et al.*, which tries to investigate the factors explaining the MSs weak interest in renewable electricity imports, despite the apparent potential cost attractiveness, including the views and needs of different types of actors at all levels, from the highest political level to the individual citizen level. The paper also identifies the determinants of success or failure of RES imports to the EU from non-EU countries as regulated by Article 9 of RES Directive.

Andreas Beneking *et al.* continue applying a strength, weakness, opportunities and threats (SWOT) method to the case of possible RES electricity joint projects under the Article 9 RES Directive between MS and North Africa region. The SWOT analysis follows a three tier structure examining macro, micro and acceptance issues, whereas the results are based on an intense stakeholders consultation process.

The third chapter is written by Charikleia Karakosta *et al.* exploring Turkey's current energy status with a focus on RES cooperation mechanisms within the framework of RES Directive. The study uses the SWOT analysis providing a clearer view of expanding RES in Turkey, as well as the level of utilization and potential of cooperation mechanisms and renewable energy in the country. The approach followed incorporates desktop analysis, stakeholders' mapping and involvement, key factors' identification and results analysis and validation.

Charikleia Karakosta *et al.* investigate the current energy status in the Western Balkan countries and the related perspectives for RES cooperation mechanisms though the elaboration of a SWOT analysis, laying particular emphasis on the case of Bosnia-Herzegovina, Croatia and Serbia. To this end, the main challenges to expand RES as starting point for exporting electricity are assessed with a country-by-country assessment of challenges while the cooperation opportunities and future energy pathways are investigated.

Emma Hakala *et al.* continue and carry out an analysis of sustainability and leapfrogging in the energy transition in Serbia. This article relies on quantitative data on sustainable energy indicators. The sustainable energy indicators, as well as policy analysis of key sector documents, will be used to identify the barriers that are locking Serbia into a path of large-scale projects that maintain unsustainable production and worsen energy poverty rather than helping the transition towards sustainability.

Aikaterini Papapostolou *et al.* assess the country risk to support bilateral cooperation for RES electricity generation projects in North Africa region. A multi-criteria decision support methodology is developed taking into account three evaluation parameters, namely, the investment framework, the social conditions and the energy and technological status. The proposed methodology has been applied to five North Africa countries so as to draw key results indicating how conducive the environment of each North Africa country is with regards to hosting a RES project under the umbrella of cooperation mechanism.

In the next paper, Marijke Welisch *et al.* undertake a quantitative assessment on the extent to which RES cooperation can create mutual benefits, identifying costs and benefits for both sides (EU and neighbouring countries) but in particular with respect to RES target achievement at EU level, with a specific focus at 2030. The potentials for RES generation in Turkey, North Africa and the Western Balkans are calculated under different policy pathways, taking into account different levels of economic and non-economic barriers. The overarching integrated assessment provides policy implications for future cooperation between the EU28 MSs and their neighbouring countries.

Franz Trieb *et al.* investigate the concept of solar electricity transfer from North Africa to Europe. The current background and the main barriers for RES electricity exports from North Africa to Europe are identified, whereas a potential business case for RES electricity transfers on the basis of a rigorous selection of win-win options for both regions is presented. From the findings of the North Africa case study, a number of recommendations are extracted for possible RES electricity cooperation between North Africa and Europe in the frame of Article 9 or a similar mechanism that could be implemented after 2020.

Åsa Tvetan *et al.* analyse the effects of increased integration between thermal and hydropower-dominated power systems on variable renewable energy (VRE) sources integration. A theoretical introduction to the market value of VRE and the effect of thermal-hydro interconnection is provided, followed by analysis with a high-resolution, comprehensive power market model for the Northern European power system.

The Editors would like to acknowledge the support from the European Commission (EC) which is financing the Intelligent Energy Europe project BETTER – Contract N°: IEE/11/845/SI2.616378. The content of this Special Issue is the sole responsibility of its authors and editors and does not necessarily reflect the views of the EC. In addition, the Editors would like to thank the project coordinator – Dr Natalia Caldés Gómez – and all members of the CIEMAT team for the excellent Coordination of activities within the BETTER project, as well as the project officer, Ms Dana Dutianu, for her dedication and continuous support.

As Editors of this Special Issue, we do hope that it will contribute to realizing the necessity of RES cooperation among European and its neighbouring countries to meet the 2020 and beyond RES target.

About the Editors

Dr Alexandros Flamos is an Associate Professor at the University of Piraeus (UNIPi). He has a degree on Electrical and Computer Engineering and a PhD in the area of Decision Support Systems applied in energy and environmental policy and planning. He teaches Energy Management and Technoeconomics of Energy Systems at graduate and post-graduate level at UNIPi and the National Technical University of Athens (NTUA). He has over 15 years of working experience in the scientific areas of Decision Support Systems (DSS), Energy Management and Planning and their applications for analysing energy and environmental policy, energy and environmental modelling, security of energy supply and energy pricing competitiveness. He has held the position of scientific coordinator/senior researcher in more than 30 EC-funded projects (FP5, FP6, FP7, H2020, Synergy, IEE, etc.) related to energy systems management, appraisal, planning, etc. and as consultant in projects funded by international donors (European Investment Bank, EuropeAid, etc.). He has more than 100 publications in high-impact international scientific Journals and international conferences and as invited speaker in major international energy policy cooperation events (MENAREC, Euro-Asia meetings, COPs, etc). More specifically, as single author or co-author of 57 articles in (peer-review) scientific journals, six chapters in scientific books (collection of papers following review), more than 30 announcements in international scientific conferences, more than 15 international policy cooperation events, special editions in energy and climate policy journals etc. Alexandros Flamos is the corresponding editor and can be contacted at: afamos@unipi.gr

Dr Charikleia Karakosta is a Chemical Engineer and works as a Research Associate at the Management and Decision Support Systems Laboratory of the National Technical University of Athens (NTUA), as well as at the University of Piraeus Research Centre (UPRC). She has participated in several research and consultancy projects in the fields of energy-environmental and climate policy, energy planning and management, technology transfer and decision support. She holds a PhD in Decision Support Systems for the Promotion of the Effective Technology Transfer within the frame of Climate Change from the School of Electrical and Computer Engineering and MSc in Energy Production and Management by NTUA. She has more 115 scientific publications in international journals with reviewers, announcements in international conferences and chapters in books (SCOPUS h-index 11, 332 citations). For her work, she has received awards by the Alexander S. Onassis Public Benefit Foundation, the State Scholarship Foundation (IKY) and the NTUA.

Dr Haris Doukas is currently an Assistant Professor in the School of Electrical & Computer Engineering, National Technical University of Athens (NTUA). Dr Doukas has a degree on Mechanical Engineering (Aristotle University of Thessaloniki – AUTH, 2003) and a PhD on the decision support systems for the sustainable energy sector's operation (NTUA, 2009). His areas of expertise include the development of models and decision support systems for energy and climate policy. In these fields, he has more than 70 scientific publications in international journals. Dr Doukas has a working experience of 13 years as a project manager and/senior expert in European and national energy and environmental policy and planning projects. Dr Doukas has more than 100 announcements in international conferences, chapters in books etc. For his work, Dr Doukas has received awards by the State Scholarship Foundation (IKY), the NTUA, the AUTH, the Technical Chamber of Greece (TCG) and the Hellenic Operational Research Society (HELORS).