

Curriculum Vitae of Zafirakis Dimitrios (3/2016)

Surname **Zafirakis**
First Name **Dimitrios**
Date of Birth **October 10, 1981**
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Research Fields

- Technological innovation and policy development for the large-scale diffusion of RES
- Novel business models for the market uptake of energy storage
- Design and modelling of hybrid energy systems and smart energy grids
- Design and modelling of integrated energy and water systems
- Energy planning for off-grid / island regions
- Customer engagement and energy cooperatives

Education

2011-15 **PhD in Business**
Thesis: **Design, Modeling and Valuation of Innovative Dispatch Strategies for Energy Storage Systems**
Norwich Business School; University of East Anglia; UK
Supervisors: F. Lettice; G. Baiocchi, K. Chalvatzis; G. Daskalakis

2006-08 **MSc in Energy; Distinction (8.37/10)**
Thesis: **Evaluation of the Wind-Compressed Air Energy Storage (Wind-CAES) System Implementation in Aegean Islands: The Case of Crete (10/10)**
School of Engineering and Physical Sciences; Heriot Watt University, UK

2001-05 **BEng in Mechanical Engineering; Very Good (7.01/10)**
Thesis: **Parametrical Analysis for the Sizing of a Pumped Hydro Energy Storage System (10/10)**
Piraeus University of Applied Sciences (PUAS)

Awards / Studentships

2012 Full PhD studentship from the Greek State Scholarships Foundation (GR)
2011 Full UEA Postgraduate Studentship - University of East Anglia (UK)

Academic & Professional Affiliations

2011-... Tyndall Centre for Climate Change Research: Energy and Emissions, UEA, UK
2008-... Soft Energy Applications & Environmental Protection Lab – PUAS, Greece
2005-... Professional & Scientific Inst. of Technology Engineers - Greece

Programming-Software Skills

Experience with the development of modeling, simulation and optimization tools in the area of integrated energy systems and smart grids for the evaluation of alternative energy solutions. Experience also in forecasting techniques with the use of artificial intelligence (Artificial Neural Networks - ANNs)

Programming Languages: Python 2.7 (advanced-MIT course (88/100)); C# (Basic);
Commercial Software: Neurosolutions; PVsyst; WAsP

Professional Experience

Freelance Energy Engineer

Since 2013, I have been active as Freelance, Chartered Energy Engineer and Consultant, providing services with regards to the development of RES and Energy Storage projects, both for the Greek region and internationally. Recent, Indicative works and contracts, are given in the following:

2015-16	Eunice Energy Group <i>Support to Eunice in the issuance of production license with regards to the implementation of a RES-based battery storage hybrid system on the island of Tilos, SE Aegean Sea. A complete energy study was prepared for the Greek Regulatory Authority for Energy (RAE) and the Greek Distribution System Operator (DSO) HEDNO. The respective production license is to be issued in April 2016.</i> [Contract of 1year]
2015-...	EUROSOL P&M GmbH <i>Consulting contract with EUROSOL P&M GmbH to address the power needs of emerging remote area and island electrification market in the MENA region. Specifically, hybrid systems based on a combination of diesel gensets and RES (PV, wind) necessitate the revision of the PV-plant EPC business model so as to respond to the new challenges arising in the sector.</i> [Contract of 1year]
2016-...	United Nations Industrial Development Organization (UNIDO) <i>In collaboration with UNIDO, I am currently negotiating a contract as International Consultant on RES so as to contribute to the implementation of the "Mediterranean Island Renewable Energy Facility" project, undertaken by UNIDO's Renewable and Rural Energy (RRE) Unit Energy Branch</i> [Contract under negotiation]
2015-...	FIAMM Energy Storage Solutions <i>As from June 2015, I have been appointed with the role of Energy Storage Expert for FIAMM Energy Storage Solutions in the territory of the Hellenic Republic of Greece. As a local expert, I am entitled to consult FIAMM on opportunities concerning promotion of their energy storage products and also facilitate the necessary collaborations for the implementation of actual energy storage projects, focusing on the region of Aegean Sea islands.</i> [Contract of 2 years]
2014-15	World Wide Fund for Nature (WWF) <i>In the context of collaboration with "WWF Greece", in 2015 I completed a study for the evaluation of alternatives to the construction of a new lignite power station in the Greek National Grid. The study focused on the examination of combined RES-pumped hydro storage solutions for the supply of base-load generation. The specific study is currently the main negotiating tool of WWF in the ongoing debate for the cancellation of Ptolemaida V power station construction (i.e. the new lignite-based power station of the Greek PPC, 660MW) as well as one of the few sound proposals with regards to the decarbonisation of the Greek electricity market.</i> [Contract of 1 year]

Research Funding Applications

Since 2012, I have also been engaged in the development of applications for research funding in the broader area of Low Carbon Energy as:

- Research Associate of the Soft Energy Applications Lab of PUAS
- Research Associate of the University of East Anglia - Norwich Business School
- Freelance Energy Engineer

at both the national (Greek) and the European level (e.g. Horizon 2020). At the same time, I have experience in fund raising and management of M€ projects, with "TILOS" being the highlight (<http://www.tiloshorizon.eu/>), while also appreciating an extensive research network with numerous key partners in the field of low carbon technologies across Europe. Recent applications and projects are given below, indicating also the level of personal contribution.

2015-2019 <i>Successful</i>	<p>"Technology Innovation for the Local Scale Optimum Integration of Battery Energy Storage" (TILOS). Application submitted under the EU-funding framework H2020 (LCE-8 call). Total budget: ~15M€ out of which 11M€ come from EU funding; Submitted: 5/2014; Approved 10/2014; <u>Ongoing since 2/2015</u>. Coordinator: Piraeus University of Applied Sciences (PUAS) Key partners: Eunice Energy Group (GR); FIAMM (IT), CEA (FR); Younicos (DE); EUROSOL (DE); SMA (DE); HEDNO (GR); EON (DE) Personal contribution: Proposal writing, consortium development and project management, on behalf of the Coordinator, PUAS</p>
2015 <i>Under evaluation</i>	<p>"Novel Electrolysis System for Providing Grid Services and Hydrogen Production" (NOVELECTRON). Application submitted under the EU-funding framework FCH (Fuel Cells & Hydrogen Joint Undertaking). Total budget: ~2.5M€; Submitted: 8/2015; <u>Under evaluation</u> Key partners: Alstom (CH); Next-Hydrogen (UK); Eurosol (DE); Eunice Energy Group (GR), HEDNO (GR) Personal contribution: Contribution in proposal writing and consortium development in collaboration with Alstom coordinating submission of the application</p>
2015 <i>Under evaluation</i>	<p>"Promoting RES Integration for Smart Mediterranean Islands" (PRISMI). Application submitted under the INTERREG-Med EU-funding framework. Total budget: ~600k€; Submitted 11/2015; <u>Under evaluation</u> Key partners: Sapienza University of Rome (IT); University of Zagreb (HR); Cyprus Energy Agency (CY); Centre for Renewable Energy Sources and Saving (GR) Personal Involvement: Contribution in proposal writing and consortium development in collaboration with Sapienza university coordinating submission of the application</p>
2015 <i>Rejected</i>	<p>"Technological Innovation for the Development & Optimum System Integration of Minimum Impact, Seawater Pumped Hydro Energy Storage" (TIDE). Application submitted under the EU-H2020 funding framework (LCE-9 call on large scale energy storage demo projects). Total budget: ~18M€; Submitted: 5/2015; <u>Rejected (Score of 9/15)</u> Key partners: Geppert GmbH (AT); KSB AG (DE); Eurosol P&M (DE); Technological Institute of Canary Islands (ES); UEA (UK); Queen's University Belfast (UK); Technological Education Institute of Crete (TEIC) (GR); Gorona del Viento (ES) Personal contribution: Proposal writing and consortium development in collaboration with TEIC</p>
2014-15 <i>Completed</i>	<p>"An Integrated Planning Tool for Meeting Energy and Water Needs of Small and Medium Size Aegean Sea Islands using Optimum Renewable Energy Sources Hybrid Systems" (PHAROS). Application submitted under the Greek State Funding Framework. Total budget: 300k€; Submitted: 7/2013; <u>Implemented: 2/2014-10/2015</u> Key partners: PUAS (GR); National Observatory of Athens (GR) Personal contribution: Proposal writing; Application submission; Coordination and project management</p>
2014-15 <i>Completed</i>	<p>"Development of a Novel Prototype Software Tool for the Application of Optimum Energy and Water Supply Sustainable Solutions in Mediterranean Islands" (NAPOLEON). Application submitted under the Greek State Funding Framework for Greek-French collaborations. Total budget: 30k€; Submitted: 5/2013; <u>Implemented: 10/2013-10/2015</u> Key partners: PUAS (GR); University of Corsica (FR) Personal contribution: Proposal writing; Application submission; Coordination and project management</p>
2014 <i>Completed</i>	<p>"Development of an Innovative Energy Services Consultancy for the Industrial Sector". Application submitted under the 2013/14 Higher Education Innovation Fund (Associate Dean of Enterprise's Competition) of UEA. Total budget: 5k€; Submitted: 7/2013; <u>Implemented: 1/2014-10/2014</u> Key persons: Dr Konstantinos Chalvatzis (PI) Personal contribution: Contribution in proposal writing and project implementation under a 10-month occasional worker contract from UEA between 1/1/2014 and 31/10/2014 (Contract of 21 full days=4200€)</p>

Teaching Experience

I have been teaching energy-related modules since 2009, as Associate Lecturer in the Mechanical Engineering Department of PUAS. Currently, I am also responsible for the Postgraduate Module of "Demand Side Management and Energy Storage", in the context of the "MSc in Energy Systems" Course, co-organized by PUAS and the UK Heriot Watt University.

2009-... **Mechanical Eng. Dept of PUAS**

- Renewable Energy Sources
- Hybrid Energy Systems & Energy Storage

2015-... **MSc in Energy Systems; Heriot Watt & PUAS**

- Demand Side Management & Energy Storage

Publications

Scientific Journal Publications

Since 2007, I have collaborated with several research colleagues, having my research results published in **35** peer reviewed journal papers, **6** book chapters and more than **50** national and international conference papers. I have a total of more than **700** citations (**Scopus h-index=15**), with paper No 8 in the following publication list, cited by the recently published "5th Assessment Report" of the Intergovernmental Panel on Climate Change (IPCC); Chapter 7-Energy Systems; p. 534.

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- 1 Zafirakis D., Chalvatzis K.J., Baiocchi G., 2015. "Embodied CO2 emissions and cross-border electricity trade in Europe: Rebalancing burden sharing with energy storage", *Applied Energy*, Vol. 143, pp. 283-300
 - 2 Kaldellis J.K., Kavadias K., Zafirakis D., 2015. "The role of hydrogen-based energy storage in the support of large-scale wind energy integration in island grids", *International Journal of Sustainable Energy*, Vol. 34, pp. 188-201
 - 3 Zafirakis D., Papapostolou Ch., Kondili E.M., Kaldellis J.K., 2014. "Evaluation of water-use needs in the electricity generation sector of Greece", *International Journal of Environment and Resource*, Vol. 3, pp. 39-45
 - 4 Zafirakis D., Kavadias K., Kondili E.M., Kaldellis J.K., 2014. "Optimum sizing of PV-CAES configurations for the electrification of remote consumers", *Computer Aided Chemical Engineering*, Vol. 33, pp. 1135-1140
 - 5 Zafirakis D., Elmasides C., Sauer D.U., Leuthold M., Meri G., Kaldellis J.K., Vokas G., Chalvatzis K.J., 2014. "The multiple role of energy storage in the industrial sector: Evidence from a Greek industrial facility", *Energy Procedia*, Vol. 46, pp. 178-185
 - 6 Stathopoulos M., Zafirakis D., Kavadias K., Kaldellis J.K., 2014. "The role of residential load-management in the support of RES- based power generation in remote electricity grids", *Energy Procedia*, Vol. 46, pp. 281-286
 - 7 Zafirakis D., Chalvatzis K.J., 2014. "Wind energy and natural gas-based energy storage to promote energy security and lower emissions in island regions", *Fuel*, Vol. 115, pp. 203-219
 - 8 Zafirakis D., Chalvatzis K.J., Baiocchi G., Daskalakis G., 2013. "Modeling of financial incentives for investments in energy storage systems that promote the large-scale integration of wind energy", *Applied Energy*, Vol. 105, pp. 138-154
 - 9 Kaldellis, J.K., Zafirakis D., 2013. "The influence of technical availability on the energy performance of wind farms: Overview of critical factors and development of a proxy prediction model", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 115, pp. 65-81
 - 10 Zafirakis D., Chalvatzis K., Kaldellis J.K., 2013. "Socially just support mechanisms for the promotion of renewable energy sources in Greece", *Renewable and Sustainable Energy Reviews*, Vol. 21, pp. 478-493
 - 11 Kaldellis J.K., Zafirakis D., Stavropoulou V., Kaldelli E., 2012. "Optimum wind- and photovoltaic-based stand-alone systems on the basis of life cycle energy analysis", *Energy Policy*, Vol. 50, pp. 345-357
 - 12 Kaldellis J.K., Kavadias K., Zafirakis D., 2012. "Experimental validation of the optimum photovoltaic panels' tilt angle for remote consumers", *Renewable Energy*, Vol. 46, pp. 179-191
 - 13 Kaldellis J.K., Zafirakis D., Kavadias K., Kondili E., 2012. "Optimum PV-diesel hybrid systems for remote consumers of the Greek territory", *Applied Energy*, Vol. 97, pp. 61-67
 - 14 Kaldellis J.K., Zafirakis D., 2012. "Optimum sizing of stand-alone wind-photovoltaic hybrid systems for representative wind and solar potential cases of the Greek territory", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 107-108, pp. 169-178
 - 15 Kaldellis J.K., Kavadias K.A., Zafirakis D., 2012. "Minimum cost solution of wind-photovoltaic based stand-alone power systems for remote consumers", *Energy Policy* (2.723), Volume 42, pp. 105-117
 - 16 Kaldellis J.K., Zafirakis D., 2012. "Experimental investigation of the optimum photovoltaic panels' tilt angle during the summer period", *Energy*, Vol. 38, pp. 305-314
 - 17 Kaldellis J.K., Mantelis N., Zafirakis D., 2011. "Evaluating the ability of Greek power stations to comply with the obligations posed by the second National Allocation Plan concerning carbon dioxide emissions", *Fuel*, Vol. 90, pp. 2884-2895
 - 18 Kaldellis J.K., Zafirakis D., Mantelis N., 2011. "Critical evaluation of the national allocation plans under the European Union Emission Trading Scheme. Case study Greece", *Fresenius Environmental Bulletin*, Vol. 20, pp. 1629-1641
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- 19 Kaldellis J.K., Meidanis E., *Zafirakis D.*, 2011. "Experimental energy analysis of a stand-alone photovoltaic-based water pumping installation", *Applied Energy*, Vol. 88, pp. 4556-4562
 - 20 Kaldellis J.K., *Zafirakis D.*, 2011. "The wind energy (r)evolution: A short review of a long history", *Renewable Energy*, Vol. 36, pp. 1887-1901
 - 21 Kaldellis J.K., Ninou I., *Zafirakis D.*, 2011. "Minimum long-term cost solution for remote telecommunication stations on the basis of photovoltaic-based hybrid power systems", *Energy Policy*, Vol. 39, pp. 2512-2527
 - 22 *Zafirakis D.*, Kaldellis J.K., 2010. "Autonomous dual-mode CAES systems for maximum wind energy contribution in remote island networks", *Energy Conversion and Management*, Vol. 51, pp. 2150-2161
 - 23 Kaldellis J.K., *Zafirakis D.*, Kondili E.K., 2010. "Energy pay-back period analysis of stand-alone photovoltaic systems", *Renewable Energy*, Vol. 35, pp. 1444-1454
 - 24 Kaldellis J.K., *Zafirakis D.*, Kondili E.K., 2009. "Optimum sizing of photovoltaic-energy storage systems for autonomous small islands", *International Journal of Electrical Power & Energy Systems*, Vol. 32, pp. 24-36
 - 25 Kaldellis J.K., *Zafirakis D.*, Kondili E.K., 2009. "Optimum autonomous stand-alone photovoltaic system design on the basis of energy pay-back analysis", *Energy*, Vol. 34, pp. 1187-1198
 - 26 Kaldellis J.K., Simotas M., *Zafirakis D.*, Kondili E.K., 2009. "Optimum autonomous photovoltaic solution for the Greek islands on the basis of energy pay-back analysis", *Journal of Cleaner Production*, Vol. 17, pp. 1311-1323
 - 27 Kaldellis J.K., *Zafirakis D.*, Kaldelli E.L., Kondili E.K., 2009. "Combined photovoltaic and energy storage systems: an integrated electrification solution for small islands", *International Journal of Environmental Technology and Management*, Vol. 10, pp. 123-149
 - 28 *Zafirakis D.*, Papapostolou Ch., Kondili E.K., Tsoutsos Th., Kaldellis J.K., 2009. "Environmental non-governmental organizations and public awareness concerning the environment in Greece", *Fresenius Environmental Bulletin*, Vol. 18, pp. 1324-1335
 - 29 *Zafirakis D.*, Kaldellis J.K., 2009. "Economic evaluation of the dual mode CAES solution for increased wind energy contribution in autonomous island networks", *Energy Policy*, Vol. 37, pp. 1958-1969
 - 30 Kaldellis J.K., *Zafirakis D.*, Kaldelli E.L., Kavadias K.A., 2009. "Cost benefit analysis of a photovoltaic-energy storage electrification solution for remote islands", *Renewable Energy*, Vol. 34, pp. 1299-1311
 - 31 Kaldellis J.K., *Zafirakis D.*, Kavadias K.A., Kondili E.K., 2009. "An optimum sizing methodology for combined photovoltaic-energy storage electricity generation configurations", *Solar Energy Engineering Journal-ASME*, Vol. 131, pp.21010 (1-12)
 - 32 Kaldellis J.K., *Zafirakis D.*, Kondili E.K., 2009. "Contribution of lignite in the Greek electricity generation. Review and future prospects", *Fuel*, Vol. 88, pp.475-489
 - 33 Kaldellis J.K., *Zafirakis D.*, Kavadias K., 2009. "Techno-economic comparison of energy storage systems for island autonomous electrical networks", *Renewable and Sustainable Energy Reviews*, Vol. 13, pp.378-392
 - 34 Kaldellis J.K., *Zafirakis D.*, 2007. "Present situation and future prospects of electricity generation in Aegean Archipelago islands", *Energy Policy*, Vol. 35, pp.4623-4639
 - 35 Kaldellis J.K., *Zafirakis D.*, 2007. "Optimum energy storage techniques for the improvement of renewable energy sources-based electricity generation economic efficiency", *Energy*, Vol. 32, pp. 2295-2305
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Book Chapters

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- 1 Chalvatzis K.J., *Zafirakis D.*, 2016, "Feed in Tariff", in: *SAGE Encyclopaedia of Energy and Environment*, SAGE Publications.
 - 2 Chalvatzis K.J., *Zafirakis D.*, 2016, "Grid Energy Storage", in: *SAGE Encyclopaedia of Energy and Environment*, SAGE Publications.
 - 3 *Zafirakis D.*, 2015, "Modern Energy Storage Applications", in: *Handbook of Clean Energy Systems*, Volume of Energy Storage, Wiley.
 - 4 *Zafirakis D.*, Paliatsos A.G., Kaldellis J.K., 2012, "2.06-Energy Yield of Contemporary Wind Turbines", in: *Comprehensive Renewable Energy*, Elsevier, Vol. 2, pp. 113-168
 - 5 Kaldellis J.K., *Zafirakis D.*, 2012, "2.21-Trends, Prospects, and R&D Directions in Wind Turbine Technology", in: *Comprehensive Renewable Energy*, Elsevier, Vol. 2, pp. 671-724
 - 6 *Zafirakis D.*, 2010, "Overview of energy storage technologies for renewable energy systems", in: *Stand-alone and hybrid wind energy systems: Technology, energy storage and applications* (ISBN 1 84569 527 5), Woodhead Publishing Limited.
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