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George Caralis, Mechanical engineer, PhD, PostDoc

Mechanical Engineer, researcher and Laboratory Teaching staff in NTUA with PhD and Post Doc and with 25 years of experience in the field of wind energy. Specialized in wind energy, integration issues, hybrid solutions, economics and socio-economics of energy, with laboratory and field experience. Frequent public and private speaker with international exposure having worked in more than 4 countries.

Research interests in the field of renewable energy sources, wind energy and hybrid systems. Doctorate thesis on the analysis of wind energy with hydro pumped storage in autonomous islands. Post Doc on Wind energy planning using mesoscale atmospheric modeling applications. Involved in several issues regarding RES implementation: wind energy assessment, techno-economic and feasibility studies for RES investments, energy planning issues, simulation of hybrid systems, grid integration issues, action plans for renewable energy sources in national and regional level, policy issues, legislative issues, tariffs and incentives for the promotion of RES. Participated in several research programs of the European Commission and in workshops and conferences. With more than eighteen publications in scientific journals and many others in conferences and oral presentations.

Teaching wind energy, hydro energy and renewable energy sources in the School of Mechanical Engineering in National Technical University of Athens, in the European Master of Renewable Energy Sources of EUREC and in the ICARE master (China-EU Institute for Clean and Renewable Energy) in China.

Contact Information

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Education

Post Doc on “Wind energy planning using mesoscale atmospheric modeling applications” (March 2012 – September 2015)

Institute of Atmospheric Physics - Chinese Academy of Sciences (IAP-CAS)

PhD Diploma on “Analysis of Wind Energy with hydro pumped storage systems” (1998-2008)
National Technical University of Athens (NTUA)

Diploma in Mechanical Engineering (1992-1997)
National Technical University of Athens (NTUA)

Professional Activities

National Technical University of Athens (NTUA), Fluid session, School of Mechanical Engineering, GREECE
From 1998 to present, Researcher, Assistant in the Education Sector (Special teaching Laboratory staff since 2007):

- Responsible for the technical part of European Commission's projects in the fields of wind energy, Hybrid systems and Renewable Energy Sources (1998-today).
- Lectures in the ICARE master in China – Wuhan - Huazhong University of Science & Technology (HUST), (2011-today).
- Lectures in the EUREC (European Renewable Energy Center Agency) Master “European master in Renewable” for Wind specialization on Wind Energy, (2002-today).
- Responsible person for EUREC – Wind Specialization. Member of the Steering Committee of the EUREC master (2010-today)
- Lectures in the University of Peiraias Master “Energy Management and Environment protection” on Wind Energy (2006-2013)
- Lectures in the School of Mechanical Engineering in the NTUA, in the fields of “Wind Energy” (1998-today), “Aerodynamic” (1998-2005), “Renewable Energy Sources” (2005-today) and Hydro Energy (2017-today).

Interdisciplinary Institute for environmental Research (DIPE), the Aegean Energy Agency and Network of Aegean Islands for Sustainability (DAFNI), GREECE

From November 2007 until today, Consultant on Renewable Energy sources, Wind Energy, Hybrid systems and Desalination in the non-profit organizations Interdisciplinary Institute for environmental Research (DIPE) and the Aegean Energy Agency and Network of Aegean Islands for Sustainability (DAFNI).

Nanjing University of Information Science & Technology (NUIST), Nanjing, CHINA

From July 2013 – 2018, Invited professor in NUIST in the school of Applied meteorology (2013-2015) and in the school of Remote Sensing (2015-2018):

- Research on Applied meteorology for renewable energy planning
- Supervising of post graduate students

Ministry of Environment, Energy and Climate Change, General Secretary of Energy and Climate Change, GREECE

From January 2010 to October 2010 (10 months), Consultant of the Greek Ministry of Environment, Energy and Climate Change, on the fields:

- Renewable Energy Sources
- Legislative framework for Renewable Energy Sources
- National Renewable Energy Action Plans

Publications

SCIENTIFIC PUBLICATIONS

1. Lykas, Panagiotis, Evangelos Bellos, George Caralis, and Christos Tzivanidis. 2022. "Dynamic Investigation and Optimization of a Solar-Based Unit for Power and Green Hydrogen Production: A Case Study of the Greek Island, Kythnos" *Applied Sciences* 12, no. 21: 11134. <https://doi.org/10.3390/app122111134>
2. Stergiannis, Nikolaos; Caralis, George; van Beeck, Jeroen; Runacres, Mark C. 2021. "The Effect of Wind Energy on Microclimate: Lessons Learnt from a CFD Modelling Approach in the Case Study of Chios Island" *Appl. Sci.* 11, no. 13: 5873. <https://doi.org/10.3390/app11135873>
3. Dianellou, A.; Christakopoulos, T.; Caralis, G.; Kotroni, V.; Lagouvardos, K.; Zervos, A. 'Is the Large-Scale Development of Wind-PV with Hydro-pumped Storage Economically Feasible in Greece?' *Appl. Sci.* 2021, 11, 2368. <https://doi.org/10.3390/app11052368>
4. G.Caralis, A.Kontzilas, Y.Peijin, P.Chasapogiannis,V.Kotroni, K.Lagouvardos, A.Zervos, 2020, A Probabilistic Approach to Analyze Wind Energy Curtailment in Non-Interconnected Greek Islands Based on Typical Wind Year Meteorological Data, *Fluids* 2020, 5(3), 123; <https://doi.org/10.3390/fluids5030123>
5. Caralis George, Christakopoulos Theofanis, Karellas Sotirios, Gao Zhiqiu, 2019, "Analysis of energy storage systems to exploit wind energy curtailment in Crete," *Renewable and Sustainable Energy Reviews*, Elsevier, vol. 103(C), pages 122-139. <https://doi.org/10.1016/j.rser.2018.12.017>

6. George Caralis, Panagiotis Chaviaropoulos, Virginia Ruiz Albacete, Danae Diakoulaki, Vassiliki Kotroni, Konstantinos Lagouvardos, Zhiqiu Gao, Arthouros Zervos, Kostas Rados, "Lessons learnt from the evaluation of the feed-in tariff scheme for offshore wind farms in Greece using a Monte Carlo approach", *Journal of Wind Engineering & Industrial Aerodynamics*, Volume 157, October 2016, p.63–75. <https://doi.org/10.1016/j.jweia.2016.08.008>
7. Dimitrios Mentis, George Karalis, Arthouros Zervos, Mark Howells, Constantinos Taliotis, Morgan Bazilian, Holger Rogner, "Desalination using renewable energy sources on the arid islands of South Aegean Sea", *Energy* 94 (2016) p.262-272. <https://doi.org/10.1016/j.energy.2015.11.003>
8. George Caralis, Zhiqiu GAO, Peijin YANG, Meng Huang, Arthouros Zervos, Kostas Rados, "Development of Aeolian map of China using mesoscale atmospheric modelling", *Renewable Energy*, Volume 74, February 2015, Pages 60-69 (2015). <https://doi.org/10.1016/j.renene.2014.07.055>
9. George Caralis, Danae Diakoulaki, Peijin YANG, Zhiqiu GAO, Arthouros Zervos, Kostas Rados, "Profitability of Wind Energy investments in China using a Monte Carlo approach for the treatment of uncertainties", *Review Article, Renewable and Sustainable Energy Reviews*, Volume 40, December 2014, Pages 224-236. <https://doi.org/10.1016/j.rser.2014.07.189>
10. G. Caralis, D. Papantonis, A. Zervos "The role of pumped storage systems towards the large scale wind integration in the Greek power supply system", *Renewable and Sustainable Energy Reviews*, Volume 16, Issue 5, June 2012, Pages 2558-2565. <https://doi.org/10.1016/j.rser.2012.01.068>
11. Krajačić, G., Duić, N., Tsikalakis, A., Zoulias, M., Caralis, G., Panteri, E., Carvalho, M.D.G., "Feed-in tariffs for promotion of energy storage technologies", *Energy Policy*, volume 39, issue 3, pp. 1410 – 1425, 2011. <https://doi.org/10.1016/j.enpol.2010.12.013>
12. O.-S. Parissis, E. Zoulias, E. Stamatakis, K. Sioulas, L. Alves, R. Martins, A. Tsikalakis, N. Hatzigiorgiou, G. Caralis and A. Zervos, "Integration of wind and hydrogen technologies in the power system of Corvo island, Azores: A cost-benefit analysis", *International Journal of Hydrogen Energy*, Volume 36, Issue 13, July 2011, Pages 8143–8151. <https://doi.org/10.1016/j.ijhydene.2010.12.074>
13. G. Caralis, K. Rados, A. Zervos, "On the market of wind with hydro-pumped storage systems in autonomous Greek islands", *Renewable and Sustainable Energy Reviews*, Volume 14, Issue 8, Pages 2221-2226, October 2010. <https://doi.org/10.1016/j.rser.2010.02.008>
14. George Caralis, Kostas Rados, Arthouros Zervos, "The effect of spatial dispersion of wind power plants on the curtailment of wind power in the Greek power supply system", *Wind Energy*, Volume 13, Issue 4, Pages: 339-355, May 2010. <https://doi.org/10.1002/we.355>
15. Caralis G. Zervos A. "The value of wind energy on the reliability of autonomous power systems" *IET Renewable Power Generation*, Volume: 4 Issue:2, pages: 186-197, ISSN: 1752-1416, March 2010 DOI: [10.1049/iet-rpg.2009.0052](https://doi.org/10.1049/iet-rpg.2009.0052)
16. G.Caralis, Y.Perivolaris, K.Rados, A.Zervos, (2008) "On the Effect of Spatial Dispersion of Wind Power Plants on the Wind Energy Capacity Credit in Greece", *Environmental Research Letters*, Volume 3, 015003 (13pp), January-March 2008. [10.1088/1748-9326/3/1/015003](https://doi.org/10.1088/1748-9326/3/1/015003)
17. Caralis G. Zervos A. (2007) "Analysis of the combined use of wind and pumped storage systems in autonomous Greek islands" *IET Renewable Power Generation*, Volume 1, page 49-60, 2007. [10.1049/iet-rpg:20060010](https://doi.org/10.1049/iet-rpg:20060010)
18. G.Caralis, A.Zervos (2007) "Analysis of wind power penetration in autonomous Greek islands" *Wind Engineering*, Volume 31, No. 6, 2007, pp.487-502. [10.1049/iet-rpg:20060010](https://doi.org/10.1049/iet-rpg:20060010)

Conferences – other publications – announcements

1. George Caralis, Peijin YANG, Meng Huang, Zhiqiu GAO, Arthouros Zervos, Kostas Rados, "Analysis of the smoothing effect of wind power in China using mesoscale data towards large scale wind integration", paper submitted in the China Wind Power 2014, October 22-24, 2014, China International Exhibition Center.
2. George Caralis, "The boom of the PV market in Greece: A good or bad practice?", 1st RPN Working Meeting 'Large-scale penetration of low C policies: Opportunities and threats', Friday 3 October, 2014, Venue: Central Athens Hotel, Apollonos 21, Plaka, GR-10557, Athens, GREECE (2014)
3. N.Stergiannis, K.G.Rados, G.Caralis, C.Lacor, R.Donnely, A.Tourlidakis, I.Perivolaris, A.Zervos, "CFD modelling approaches of onshore wind farms and their potential impact on the microclimate of Chios", *EWEA 2014*, 10 - 13 March, Fira de Barcelona Gran Via, Spain (2014).
4. "Renewable Energy Governance – Complexities and Challenges", Editors: Evanthe Michalena – Jeremy Maxwell Hills, Volume with contributing authors, to be published by SPRINGER Publisher Ltd in the series "Lecture Notes in Energy": Chapter 11: George Caralis, Arthouros Zervos, Gao Zhiqiu and Kostas Rados, "The Perplexed Technical Governance of Wind Turbines in Greek Islands", London, Volume 23, pp 183-202, 30 Nov 2013.
5. George Caralis, Kostas Rados, Gao Zhiqiu, Arthouros Zervos "Wind and PV integration to slow down new conventional power plants' development in China", *IET-RPG 2013*, Beijing, China, 9-11 September 2013.
6. George Caralis, Nikos Mavrodontis, Hu Chao, Qiu Liang, Kostas Rados, Gao Zhiqiu, Arthouros Zervos, "A meso-scale application for China to predict the impact of offshore wind development on the wind capacity credit", *EWEA OFFSHORE 2013*, Frankfurt, 19-21 November 2013.
7. G. Caralis, D. Diakoulaki, A. Zervos, (2013) "Financial Profitability of Wind Farms in Greece in times of economic crisis: A Monte Carlo Analysis for the Treatment of emerging uncertainties", *EWEA '13*, Vienna, 4-7 February 2013, First poster price
8. George Caralis, Kostas Rados, Gao Zhiqiu, Arthouros Zervos, "The spatial behavior of Wind Capacity Credit – The case of Mediterranean" *EWEA '13*, Vienna, 4-7 February 2013.
9. G. Caralis, D. Papantonis, A. Zervos "The role of pumped storage systems towards the large scale wind integration in the Greek power supply system", *Renewable and Sustainable Energy Reviews*, Volume 16, Issue 5, June 2012, Pages 2558-2565.
10. Rados, K., Mosfillis, S., Stergiannis, N., Tourlidakis, A. Caralis, G., and Zervos, A. 2012: CFD modeling approaches of wind turbine single and multiple wakes, *European Wind Energy Conference*, Copenhagen, April 2012, 8 pp.

11. G.Caralis, K.Rados, A.Zervos, "Towards wind power transmission and transcontinental interconnections in Mediterranean region", EWEA OFFSHORE 2011, 29 November – 1 December 2011, Amsterdam, Netherlands.
12. Jan De Decker, Paul Kreutzkamp, Pieter Joseph, Achim Woyte, Simon Cowdroy, Peter McGarley, Leif Warland, Harald Svendsen, Jakob Völker, Carolin Funk, Hannes Peinl, Jens Tambke, Lüder von Bremen, Katarzyna Michalowska, George Caralis "OffshoreGrid: Offshore Electricity Grid Infrastructure in Europe", Final report, October 2011.
13. G.Caralis, S.Delikaraoglou, A.Zervos, "Towards the optimum mix between wind and PV capacity in the Greek power system", EWEA 2011, 14-17 March 2011, Brussels, Belgium.
14. G.Caralis, "Technical and regulatory issues for the penetration of RES in the Greek power system", ENERTECH' 2010, "Electric power as a development driver", Friday 22/10/10, HOLIDAY INN Attica Tollway.
15. G.Caralis, "Legislative Framework for RES", Meeting ProDes "Renewable Energy Sources and Desalination: Technology, Legislative framework and Financing", 9 September 2010.
16. Caralis G., Presentation of the Law 3851/2010 for «Accelerating the development of Renewable Energy Sources to deal with climate change and other regulations in topics under the authority of the Ministry of Environment, Energy and Climate Change», 12 June 2010, Conference Centre P.M.Nomikos, Foira, Santorini.
17. G. Karalis, "Renewable Sources of Energy" Hellenic-Chinese BUSINESS FORUM 2010 "The Future of Hellenic-Chinese Business Cooperation" LEDRA MARRIOTT HOTEL 10/6/2010
18. Caralis G., Papantonis D, Zervos A., "Large scale wind integration with parallel use of pumped storage systems in the Greek power system", 4th National Conference RENES: Implementation of Renewable Energy Sources: "Towards an ambitious and reliable National Action Plan", Athens, 10-12 May 2010.
19. Komninos K., Caralis G., Emmanouilidis G., "The role of insular local administration to deal with the climate change", 4th National Conference RENES: Implementation of Renewable Energy Sources: "Towards an ambitious and reliable National Action Plan", Athens, 10-12 May 2010.
20. Arapogianni A., Caralis G., Zervos A, Rodrigues G., "Modeling and comparison of electricity production cost by conventional sources, nuclear and wind energy", 4th National Conference RENES: Implementation of Renewable Energy Sources: "Towards an ambitious and reliable National Action Plan", Athens, 10-12 May 2010.
21. Caralis G., Saliagas A., Zervos A., "The path for the achievement of the targets: Measures, costs and benefits", 4th National Conference RENES: Implementation of Renewable Energy Sources: "Towards an ambitious and reliable National Action Plan", Athens, 10-12 May 2010.
22. Caralis G., Delikaraoglou S., Rados K., Zervos A., "Effective integration of wind energy in the Greek power system using Generalized Evolutionary Algorithms", 4th National Conference RENES: Implementation of Renewable Energy Sources: "Towards an ambitious and reliable National Action Plan", Athens, 10-12 May 2010.
23. G.Caralis, S.Delikaraoglou, K.Rados, A.Zervos, "Towards optimum macro-siting of wind farms in the Greek power supply system using Generalized Evolutionary Algorithms", EWEC 2010, Warsaw, Poland, 20-23 April 2010.
24. Eleni Giontzi, Efthimios Zervas, George Caralis, Technoeconomical assessment of potential investments in photovoltaic power plants of 100kWp in Greece according to the new legislation. 2009, 5th International Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD'09)
25. G.Caralis (2009), "Hybrid systems", International Conference on RES & Energy Savings in islands local planning and European cooperation, 23, 24 & 25 October 2009, Milos (Cyclades), George Iliopoulos Conference Center.
26. G.Caralis (2009) "Wind Energy, Technology and Land Planning" Energy Academy, 25 & 26 October 2009, Milos (Cyclades), George Iliopoulos Conference Center.
27. G.Caralis (2009) "Increasing Renewables Penetration in Islands and the grid connection", Energy Academy, 25 & 26 October 2009, Milos (Cyclades), George Iliopoulos Conference Center.
28. M.Zoulias, M.Stamatakis, O.Parissis, P.Coroyannakis, S.S.Garcia, A.Tsikalakis, G.Caralis, G.Krajacic, E.Panteri (2009), "Stories project brochure", Brochure, Islenet, Intelligent Energy - Europe (IEE) programme, 2009.G.Caralis (2009) "An alternative energy scenario for Lesbos", Workshop for sustainable development in Aegean sea, European cooperation, Renewable Energy Sources and Recycling, Lesbos, 12 June 2009, Technical Chamber of Mytilini (in Greek).
29. G.Caralis, K.Rados, A.Zervos, (2009) "The benefits from the spatial dispersion of the wind farms in the Greek power supply system", EWEC '09, Parc Chanot, Marseille, France 16 - 19 March 2009
30. G.Caralis (2009) "The benefits from the spatial dispersion of wind farms in the Greek power system", EnergyRES'09 Scientific Forum RES/RUE, 19-22 February 2009, Athens Greece. (in Greek)
31. G.Caralis, K.Rados, A.Zervos (2009) "Large scale wind integration and land planning issues in the Greek power system", Greek Women's Engineering Association EDEM, two-days workshop "Towards a future with Renewable Energy Sources", 4&5 March 2009.
32. G.Caralis "The case study of Ios: Pumped storage" Workshop, 3rd Workshop of the Stories project "Results: The Greek case studies", 11 March 2009, Athens, Greece, NTUA.
33. G.Caralis, K.Rados, A.Zervos, (2009) "The benefits from the spatial dispersion of the wind farms in the Greek power supply system", EWEC '09, Parc Chanot, Marseille, France 16 - 19 March 2009
34. Caralis G, Rados K, Zervos A (2008) "The effect of the wind farms spatial dispersion in the Greek power supply system on the wind power absorption" Anemologia – Hellenic Wind Energy Association, Volume 50&51, 2008. (in Greek)
35. G.Caralis, M.Zoulias, "Pilot project with desalination unit and hydrogen production from RES in Ios island" Workshop: Energy – Recycling and urban environment, Central Union of Municipalities & Communities of Greece (KEDKE), 18th April 2008. (in Greek)
36. G.Caralis, K.Rados, A.Zervos, (2008) "The benefits from the spatial dispersion of the wind farms in the Greek power supply system", Enertech '08, 3rd International Conference on Renewable Energy sources and Energy efficiency, 20-23 November 2008, Conference Center, MEC, Peania Athens, Greece.

37. I.Kleiasou, G.Caralis (2008), "On the operational strategy of a hybrid system in los island", Anemologia – Hellenic Wind Energy Association, Volume 52, 2008.
38. Rados K., Perivolaris Y., Vougiouka A., Venezis K., Caralis G., Zervos A., "Application of a Mesoscale Weather Prediction Model for Short-term Forecasting of Power Production of Wind Farms in Complex Terrain - Test case: Island of Crete", CEST2007, Cos Island, Greece September 2007.
39. G.Caralis, A.Zervos "Prospects of Wind and Pumped Storage system's integration in Greek islands", EWEC 2006, Athens.
40. G. Caralis, A. Zervos (2005) "Calculation of the maximum Wind Energy Penetration level in Autonomous islands", 3rd Greek National Conference: The Application of RES – Prospects and priorities for the 2010's target, 23-25 February 2005, Athens.
41. Ch. Parnassas, S. Garifalakis, G. Caralis, A. Zervos, "Micro-siting evaluation of an existing wind farm in Crete and optimization of new wind turbines" , 3rd Greek National Conference: The Application of RES – Prospects and priorities for the 2010's target, 23-25 February 2005, Athens.
42. G. Caralis, A. Zervos (2004) "Scenaria of RES development in Cyprus", Greek Forum: The market of Renewable Energy Sources, 21-23 July 2004 Milos island.
43. G. Caralis, A. Zervos, A. Saliagas (2004) "The development of wind energy market in Greece", Greek Forum: The market of Renewable Energy Sources, 21-23 July 2004 Milos island.
44. A.Zervos, G.Caralis, D.Diakoulaki, Ch.Lins, J.Crettaz, L.Blanchard, A.Charalambous, Y.Thoma, S.Kassinis, I.Chryssis, C.Marin. (2004), "Towards a White Paper for RES and RUE Strategy and Action Plan for the Republic of Cyprus", Leaflet.
45. G.Panaras, G.Caralis, A.Zervos, P.Garofallis (2003) "Towards 100%RES supply in the island of Lemnos-Greece" International Conference: RES for island tourism and water, Crete, Greece.
46. Caralis G., Zervos A.(2003) "A pumped storage unit to increase wind energy penetration in the island of Crete" International Conference: RES for island tourism and water, Crete, Greece.
47. Zervos A., Caralis G., Kaltsa I. (2001) "Socio-economic and environmental evaluation of the wind energy penetration in Greece" National Conference of RES, Greece.
48. Zervos A., Caralis G., Gorgoulis M., Zografakis N. (2000) "Implementation plan for the large scale deployment of RES in Crete-Greece", Altener 2000 conference, Toulouse-France.
49. Diakoulaki D., Caralis G., Zervos A. (2000) "Strategies for communities aiming at 100% RES supply", Altener 2000 conference, Toulouse-France.
50. Zervos A., Caralis G., Zografakis N. (1999) "The effect of RES to the increase of employment in the islands. Case study: The island of Crete", Workshop in Ikaria.
51. Zervos A., Voutsinas Sp., Gorgoulis M., Tambaki C., Caralis G.(NTUA), Zografakis N., Dassenakis D.(Regional energy Agency of Crete), "Renewable Energy Sources in Crete: An Implementation Plan", Leaflet, 1999.

REVIEWER - CHAIRMAN

- Reviewer of papers on Journal of Wind Engineering & Industrial Aerodynamics
- Reviewer of papers on IET Renewable Power Generation.
- Reviewer of papers on Renewable and Sustainable Energy Reviews
- Chairman and Reviewer on EWEA OFFSHORE 2011, Amsterdam, The Netherlands, 29 November – 1 December 2011
- Chairman and reviewer on EWEA 2012 Annual Event, Bella Center, Copenhagen, Denmark, 16 - 19 April 2012,
- Chairman and reviewer on EWEA 2013 Annual Event, Vienna, Austria, 4 - 7 February 2013