



Ahmed Elkafas

ABOUT ME

I'm a dedicated researcher in energy systems and maritime engineering with a PhD (European label) in Marine Sciences and Technologies (University of Genoa) and over 10 years of research and applied engineering experience in the energy and maritime sector. My expertise spans clean advanced energy systems, zero-emission technologies, hydrogen/e-fuels, energy efficiency improvement, decarbonization solutions, alternative fuels, waste heat recovery technologies, and renewable energy sources. I have contributed to multiple European-funded and industrial projects, focusing on the decarbonization of vessels, retrofitting existing ships, and integrating advanced energy systems such as fuel cells, alternative fuels, and hybrid systems. My work has resulted in numerous publications and international awards, including the Ian Telfer Prize from RINA and the TRA VISIONS 2024 Young Researcher Award for innovative research in sustainable waterborne transport.

WORK EXPERIENCE

🏢 **Thermochemical Power Group (TPG), University of Genoa** – Genoa, Italy

City: Genoa | Country: Italy | Website: <https://tpg.unige.eu/>

Research Assistant

[01/01/2022 – Current]

- Investigated retrofit solutions for ship decarbonization, including hybrid SOFC-ICE systems and alternative fuel integration.
- Conducted numerical simulations and energy analyses for short-sea and inland waterway vessels, optimizing performance, fuel consumption, and emissions.
- Participate in national and international research projects for ship decarbonization and advanced energy systems for maritime applications.
- Develop and integrate software tools and methods for research purposes.
- Prepare research papers and disseminate results via peer-reviewed journal publications and international conferences

🏢 **World Maritime University (WMU)** – Malmö, Sweden

City: Malmö | Country: Sweden | Website: <https://www.wmu.se/>

Visiting Research Fellow

[01/06/2024 – 15/10/2024]

- Conducted feasibility studies for retrofitting port vessels (tugs, pilot boats, fuel barges) with clean power systems, focusing on vessel stability, power integration, and operational performance.
- Presented findings to international maritime stakeholders, influencing decarbonization strategies for short-sea and inland waterway vessels.
- Applied computational simulations and technical analyses to evaluate energy efficiency and operational feasibility.

🏢 **RINA Consulting S.p.A** – Genova, Italy

City: Genova | Country: Italy | Website: <https://www.rina.org/en>

Energy and Climate Change Engineer

[02/05/2023 – 30/11/2023]

- Conducted hydrodynamic and energy performance analyses for ships and ports in European-funded projects (ENGIMMONIA, ZHENIT, SEANERGY).
- Evaluated waste heat recovery, fuel cell integration, and alternative fuel adoption on operational vessels, supporting client decision-making.
- Prepared technical deliverables and contributed to project reports, ensuring alignment with EU project objectives and standards.
- Collaborated with engineering teams to assess vessel stability, energy efficiency, and environmental compliance, bridging research outcomes with industrial applications.

 **Alexandria University, Faculty of Engineering** – Alexandria, Egypt

City: Alexandria | Country: Egypt | Website: <https://eng.alexu.edu.eg/index.php/en/>

Assistant lecturer

[21/07/2019 – 31/12/2021]

- Deliver lectures on Naval Architecture, Ship Design, Renewable Energy, Marine Drawing, Machine Mechanics, Marine Power Plants, Economic Engineering, and Ship Propulsion.
- Supervise undergraduate research projects and final-year theses.
- Develop course materials and contribute to curriculum enhancement for accredited programs.
- Instruct theoretical classes and lab experiments, correct homework assignments, prepare final exams, and help prepare handouts and teaching materials.
- Write up research work for publication and disseminate results via a peer-reviewed journal.

 **Arab Academy of science, Technology and Maritime Transportation (AASTMT)** – Alexandria, Egypt

City: Alexandria | Country: Egypt | Website: <https://aast.edu/en/>

Assistant lecturer

[01/09/2018 – 31/12/2021]

- Instructor of the following Undergraduate courses: Thermodynamics; Heat Transfer; Steam plant Engineering; Refrigeration & Air conditioning; Engineering Drawing; Mechanical Engineering Drawing.
- Coordinated lab sessions and project-based learning for engineering students.

 **Arab petroleum pipeline Company (SUMED)** – Alexandria, Egypt

City: Alexandria | Country: Egypt | Website: <https://www.sumed.org/>

Offshore maintenance engineer

[15/11/2017 – 20/07/2019]

- Supervise all regular and irregular inspection and maintenance works related to the offshore terminal of Arab Petroleum Pipeline (Sumed) company, whether above or underwater.
- Supervise the regular and irregular repair work of the single-point mooring system above and underwater.

EDUCATION AND TRAINING

Doctor of Philosophy (PhD) - European PhD

Department of Mechanical, Energy, Management and Transport Engineering, University of Genoa [01/01/2022 – 31/12/2024]

City: Genoa | Country: Italy | Website: <https://unige.it/> | Field(s) of study: Marine Sciences and Technologies (Curriculum: Fluid Machines and Energy systems for Maritime applications) | Level in EQF: EQF level 8 | Thesis: Feasibility assessment of retrofitting ships with fuel cell-based hybrid systems to decarbonize the domestic maritime sector

Link: https://doi.org/10.15167/elkafas-ahmed-gamal-hamed_phd2025-05-22

Master of science (MSc)

Faculty of Engineering, Alexandria University [20/09/2017 – 15/07/2020]

Address: Lotfy El-Sied st. off Gamal Abd El-Naser - Elshatby, Alexandria (Egypt) | Website: <https://eng.alexu.edu.eg/index.php/en/> | Field(s) of study: Naval Architecture and Marine Engineering | Final grade: 3.6 out of 4 | Level in EQF: EQF level 7 | Thesis: Short and Long-Term measures for Marine Energy Efficiency Improvement

Link: <https://doi.org/10.5281/zenodo.5652023>

Bachelor of science (BSc)

Faculty of Engineering, Alexandria university [20/09/2012 – 15/06/2017]

Address: Lotfy El-Sied st. off Gamal Abd El-Naser - Elshatby, Alexandria (Egypt) | **Website:** <https://eng.alexu.edu.eg/index.php/en/> | **Field(s) of study:** Naval Architecture and Marine Engineering | **Final grade:** Excellent with degree of honors (85.41%) (Rank:1st /75 students of class 2017) | **Level in EQF:** EQF level 6 | **Thesis:** Preliminary design of inland waterway Container Barge in the Nile River

HONOURS AND AWARDS

[15/04/2024] TRA VISIONS - Transport Research Arena

Winner of the Waterborne category - TRA VISIONS 2024 I awarded a prize and trophy for the best innovative research idea and project proposal for the waterborne category in TRA VISIONS 2024 Young Researcher Competition. This prize was for the best innovative research project in the sustainability of mobility area for my research idea titled "Hybrid Integration between Solid Oxide Fuel Cell and Internal Combustion Engine Fueled by Clean Fuels for Domestic Vessels".

Link: https://www.travisions.eu/TRAVisions/young_researcher_results_2024/

[27/04/2023] Royal Institution of Naval Architects

Ian Telfer Prize The best published research article in RINA Transactions in 2022 by an author aged under 35 on the subject of the environment and energy.

Link: <https://life.unige.it/rina-ian-telfer-prize>

[2022] Alexandria University

Distinguished Scientific Publication Award

[15/06/2017] Alexandria University, Faculty of Engineering

First Rank of class 2017 (1st /75 students)

[08/2017] Institute of Marine Engineering, science & Technology (IMAREST)

Best Bachelor of Science graduation project

LANGUAGE SKILLS

Mother tongue(s): Arabic

Other language(s):

English

LISTENING C1 READING C1 WRITING C1

SPOKEN PRODUCTION C1 SPOKEN INTERACTION C1

Italian

LISTENING A2 READING A2 WRITING A2

SPOKEN PRODUCTION A2 SPOKEN INTERACTION A2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

Office programs

Microsoft Word / Microsoft Excel / Microsoft Powerpoint

Programming language

MATLAB/simulink / Python / NI LabVIEW 2019

Modelling software

- AutoCAD – Advanced / Rhinoceros 3D basic user / PropCad / Maxsurf

Simulation programs

Dynamic Analysis / Ansys Workbench, Ansys Fluent, Ansys APDL / Abaqus (Basic)

PUBLICATIONS

[2025]

Multi-aspect assessment for the retrofitting of operating vessels in ports by using advanced power systems

Ahmed G. Elkafas, et al., Energy Conversion and Management: X

[2025]

Design performance analysis of a turbocharged solid oxide fuel cell integrated with internal combustion engine for maritime applications☆

Elkafas, A.G.; et al. Applied Thermal Engineering

[2024]

Application of renewable energy systems in seaports towards sustainability and decarbonization

Ahmed G. Elkafas, Ibrahim S. Seddiek, Renewable Energy, Volume 228 ,120690

[2024]

Parametric study and techno-economic analysis of a novel integration between thermoelectric generator and organic Rankine cycle onboard passenger ship

Elkafas, A.G. Journal of Thermal Analysis and Calorimetry, 149, 6385–6404

[2024]

Techno-economic and environmental analysis for the application of renewable energy sources in seaports

Elkafas, A.G., Seddiek, I.S. Environmental Science and Pollution Research

[2024]

Thermodynamic Analysis and Economic Assessment of Organic Rankine Cycle Integrated with Thermoelectric Generator Onboard Container Ship

Elkafas, A.G. Processes 2024, 12, 355.

[2023]

Development of a Decision Support System for Operation Mode Detection of Offshore Supply Vessels

Elkafas, A.G. Naval Engineers Journal 2023, Volume 135, Number 4, pp. 157-168.

[2023]

Thermo-economic Analysis of Combined Waste Heat Recovery System for Maritime Applications

Elkafas, A.G. , Medhat, M. Naval Engineers Journal 2023, Volume 135, Number 4, pp. 135-143.

[2023]

Feasibility Assessment of Alternative Clean Power Systems onboard Passenger Short-Distance Ferry

Elkafas, A.G.; Rivarolo, M.; Barberis, S.; Massardo, A.F. J. Mar. Sci. Eng. 2023, 11, 1735

[2023]

Thermodynamic analysis for SOFC/ICE integration in hybrid systems for maritime application

Elkafas, A.G.; Rivarolo, M.; Barberis, S. E3S Web Conf. Volume 414, 2023

[2023]

Environmental economic analysis of speed reduction measure onboard container ships

Elkafas, A.G., Rivarolo, M. & Massardo, A.F. Environmental Science and Pollution Research

[2023]

Fuel Cell Systems for Maritime: A Review of Research Development, Commercial Products, Applications, and Perspectives

Elkafas, A.G.; Rivarolo, M.; Gadducci, E.; Magistri, L.; Massardo, A.F. Processes 2023, 11, 97.

[2022]

Assessment of alternative marine fuels from environmental, technical, and economic perspectives onboard ultra large container ship

Elkafas, A.G.; Rivarolo, M.; Massardo, A.F. International Journal of Maritime Engineering, Vol. 164

[2022]

Advanced operational measure for reducing fuel consumption onboard ships

Elkafas, A.G. Environmental Science and Pollution Research

[2022]

Implementation of liquefied natural gas as a marine fuel to reduce the maritime industries climate impact

Elkafas, A.G. Naval Engineers Journal. 2022, 134, 125–135.

[2022]

Assessment of Station Keeping Capability for Dynamically Positioned Offshore Supply Vessel

Elkafas, A.G. Journal of ship production and design. 38 (03): 148–159.

[2022]

Hydrodynamic Analysis of Floating Offshore Wind Turbine With Different Numbers of Offset Columns

Elkafas, Ahmed G.; Ahmed, Yasser M.; Elgohary, Mohamed M. Marine Technology Society Journal

[2022]

A Study of the Performance of Ship Diesel-Electric Propulsion Systems from an Environmental, Energy Efficiency, and Economic Perspective

Elkafas, Ahmed G.; Shouman, Mohamed R. Marine technology society journal

[2021]

Environmental protection and energy efficiency improvement by using natural gas fuel in maritime transportation

Elkafas, A.G., Khalil, M., Shouman, M.R. et al. Environment Science and Pollution Research

[2021]

Assessment of energy efficiency and ship emissions from speed reduction measures on a medium sized container ship

Ahmed G. Elkafas, Mohamed R. Shouman. International Journal of Maritime Engineering

[2021]

Numerical analysis of economic and environmental benefits of marine fuel conversion from diesel oil to natural gas for container ships

Elkafas, A.G., Elgohary, M.M. & Shouman, M.R. Environmental Science and Pollution Research

[2019]

Numerical study on the hydrodynamic drag force of a container ship model

Elkafas, A. G., Elgohary, M. M., & Zeid, A. E. Alexandria Engineering Journal, 58(3), 849-859

[2019]

Prediction of Shallow Water Resistance for a New Ship Model using CFD Simulation: Case Study Container Barge

Ammar, N.R., Elgohary, M.M., Zeid, A.E., and Elkafas, A.G. Journal of ship production and design

CONFERENCES AND SEMINARS

[15/09/2024 – 18/09/2024] Washington, District of Columbia

ASME 2024 Power Conference

Link: <https://event.asme.org/POWER>

[30/06/2024 – 05/07/2024] Rhodes (Greece)

International Conference on Efficiency, Cost, Optimization, Simulation, and Environmental Impact of Energy Systems (ECOS 2024)

Link: <https://ecos2024.com/>

[15/04/2024 – 18/04/2024] Dublin, Ireland

Transport Research Arena 2024

Link: <https://traconference.eu/>

[02/10/2023 – 05/10/2023] Rende, Italy

Euro-Mediterranean Conference for Environmental Integration - EMCEI 2023

Link: <https://2023.emcei.net/>

[06/09/2023 – 08/09/2023] Savona, Italy

2nd International Conference “Sustainable PolyEnergy generation and HaRvesting – SUPEHR23”

Link: <https://supehr23.unige.it/>

[10/12/2021 – 13/10/2024] Shanghai, China

International Conference on Naval Architecture and Ocean & Marine Engineering (NAOME)

Link: <https://www.icnaome.org/>

[24/03/2021] International Maritime College Oman

3rd Research and Innovation Seminar held by International Maritime College Oman (Promoting Teaching-Research-Innovation Nexus at Higher Education Institutions)

PROJECTS

[01/06/2024 – 30/12/2025]

NH3 fueled energy systems towards ships' decarbonization

[01/06/2024 – 01/03/2025]

JUST-GREEN AFRH2ICA

Link: <https://just-green-afrh2ica.eu/>

[12/2023 – 31/12/2025]

PRIN project: SOFC Hybridization with Internal Combustion Engine fuelled by Natural gas for maritime applications (SOFFHICE)

[02/05/2023 – 30/11/2023]

ZHENIT project

Link: <https://www.zhenit.eu/>

[02/05/2023 – 30/11/2023]

ENGIMMONIA

Link: <https://www.engimmonia.eu/>

[02/05/2023 – 30/11/2023]

SEANERGY

Link: <https://seanergyproject.eu/>

[01/01/2023 – 31/12/2023]

RAISE Liquiria