

PERSONAL
INFORMATION**Giulio Guandalini***Associate professor – Politecnico di Milano – Dip. Energia*

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Sex: Male | Date of birth: 19/02/1988 | Nationality: Italian

APPLIED FOR Gara acquisto riscaldatore

POSITIONS

October 2024 – Ongoing

Associate professor

Politecnico di Milano - via Lambruschini 4A - Milano (Italy)

Energy Department - Group of Energy Conversion Systems (GECOS)

- Innovative biofuel production systems from biomass
- Advanced research on natural gas and hydrogen technologies, fuel cell vehicles
- Cooperation in national and European projects (technical/management)
- Cooperation in private industrial projects (technical)

Sector Biofuels, Hydrogen production technologies, Fuel cells, Natural gas infrastructure, Innovative energy storage systemsOctober 2021 – September
2024**Research fellow (RTDb – senior)**

Politecnico di Milano - via Lambruschini 4A - Milano (Italy)

Energy Department - Group of Energy Conversion Systems (GECOS)

- Innovative biofuel production systems from biomass
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Sector Biofuels, Hydrogen production technologies, Fuel cells, Natural gas infrastructure, Innovative energy storage systems

January 2018 – October 2021

Research fellow (RTDa – junior)

Politecnico di Milano - via Lambruschini 4A - Milano (Italy)

Energy Department - Group of Energy Conversion Systems (GECOS)

- Innovative biofuel production systems from biomass
- Advanced research on natural gas and hydrogen technologies, fuel cell vehicles
- Cooperation in national and European projects (technical/management)
- Cooperation in private industrial projects (technical)

<p>April 2016 – January 2018</p>	<p>Sector Biofuels, Hydrogen production technologies, Fuel cells, Natural gas infrastructure, Innovative energy storage systems</p> <p>Research fellow (Assegnista di Ricerca)</p> <p>Politecnico di Milano - via Lambruschini 4A - Milano (Italy) Energy Department - Group of Energy Conversion Systems (GECOS)</p> <ul style="list-style-type: none"> ▪ Advanced research on natural gas and hydrogen technologies, fuel cell vehicles ▪ Cooperation in national and European projects (technical/management) ▪ Cooperation in private industrial projects (technical) <p>Sector Hydrogen production technologies, Fuel cells, Natural gas infrastructure, Innovative energy systems</p>
<p>November 2014 - May 2015</p>	<p>Visiting scientist</p> <p>Research Center Jülich - Jülich - Germany IEK-3 - Group of Energy Systems Analysis (prof. D. Stolten)</p> <ul style="list-style-type: none"> ▪ Analysis of Italian potential for Power-to-Gas ▪ Hydrogen energy storage applied to wind parks ▪ Electrolysis systems models development <p>Sector Power-to-gas and energy storage, energy system scenarios</p>

EDUCATION AND TRAINING

<p>January 2013 - April 2016</p>	<p>PhD (Energy and Nuclear Science and Technology) EQF 8</p> <p>3 years - Mark: “Cum laude” Energy Department - Politecnico di Milano - Milano (Italy)</p> <p>Research activity on hydrogen and power to gas systems. Electrolysers modelling. Gas grid modelling. Methanation systems.</p> <p>Winner of national scholarship for PhD</p>
<p>September 2010 - December 2012</p>	<p>Master degree (Energy Engineering) EQF 7</p> <p>2 years - Mark: 110/110 cum laude Politecnico di Milano (Technical university) - Milano (Italy)</p> <p>Energy conversion oriented course: Thermodynamics and heat exchange, Power plants, Electrical machines, Chemical processes for clean energy conversion, Energy economics, Renewable Energy, Turbomachines, Materials for energy, Finite volume numerical methods (CFD)</p> <p>Winner of university scholarship (100% refund of taxes) each semester</p>
<p>September 2007 - September 2010</p>	<p>Bachelor degree (Energy Engineering) EQF 6</p> <p>3 years - Mark: 110/110 cum laude Politecnico di Milano (Technical university) - Milano (Italy)</p>

Energy conversion oriented course: Fundamentals of thermodynamics and heat exchange, energy systems, fundamentals of chemistry, mechanics of solids and fluids, statistics and measurements, numerical methods, principle of machine design

September 2002 -
July 2007

High school diploma (Scientific curricula)

EQF 4

5 years - Mark: 100/100

Liceo Scientifico A. Volta - Milano (Italy)

Italian, Maths, Physics, Chemistry, English, German, Latin, Arts

OTHER ACTIVITIES

Referee

- **Referee for Val d'Aosta region** – Regional projects evaluation in the PNRR framework, programme “ENERGIA RINNOVABILE, IDROGENO, RETE E MOBILITÀ SOSTENIBILE - PRODUZIONE IN AREE INDUSTRIALI DISMESSE” – Evaluation of green hydrogen production proposals (February -March 2023)
- **Referee for the Research council of Norway** - National projects evaluation in the ENERGIX-programme (November 2016) - Topics related with hydrogen production technologies

Editorial activities

- **Guest editor for “International Journal of Hydrogen Energy”** – Special issue “Hydrogen Separation, Production and Storage” (January 2020 – ongoing)
- **Peer Reviewer for International Journals** (Int. J. Hydrogen Energy, Int. J. Energy Storage, Int. J. Natural Gas, Int. J. Greenhouse Gases, Applied Energy)
- **Peer Reviewer for National and International Conferences** (ATI, WHEC, EUBCE, EFC)

Memberships

- **Member of AIMSEA** (Associazione Italiana delle Macchine a fluido e dei Sistemi per l'Energia e l'Ambiente)
- **Member of H2IT** (Associazione Italiana Idrogeno e Celle a Combustibile)

Institutional activity

- Member of Master graduation commissions in Energy Engineering and Mobility Engineering (Politecnico di Milano)
- Member of CCS of Mechanical, Electrical and Mobility Engineering (Politecnico di Milano)

SCIENTIFIC PUBLICATIONS

Statistics

- Google Scholar (May 2024): 67 documents, 1329 citations, h-index 18
- SCOPUS (May 2024, [link here](#)): 48 documents, 1046 citations by 918 documents, h-index 15
- WoS (May 2024): 26 documents, 711 citations by 649 documents, h-index 13

Peer-reviewed journals

- F. Rajaei, **G. Guandalini**, M.C. Romano, J. Ritvanen, “*Techno-economic evaluation of biomass-to-methanol production via circulating fluidized bed gasifier and solid oxide electrolysis cells: A comparative study*”, **Energy Conversion and Management**, 301, art. no. 118009, 2024. DOI: 10.1016/j.enconman.2023.118009
- E. Crespi, **G. Guandalini**, L. Mastropasqua, S. Campanari, J. Brouwer, “*Experimental and theoretical evaluation of a 60 kW PEM electrolysis system for flexible dynamic operation*”, **Energy Conversion and Management**, 277, art. no. 116622, 2023. DOI: 10.1016/j.enconman.2022.116622
- E. Crespi, P. Colbertaldo, **G. Guandalini**, S. Campanari, “*Energy storage with Power-to-Power systems relying on photovoltaic and hydrogen: modelling the operation with secondary reserve provision*”, **Journal of Energy Storage**, 55, art. no. 105613, 2022. DOI: 10.1016/j.est.2022.105613
- M. Ugolini, L. Recchia, **G. Guandalini**, G. Manzolini, “*Novel Methodology to Assess Advanced Biofuel Production at Regional Level: Case Study for Cereal Straw Supply Chains*”, **Energies**, 15 (19), art. no. 7197, 2022. DOI: 10.3390/en15197197
- A. Poluzzi, **G. Guandalini**, M.C. Romano, “*Flexible methanol and hydrogen production from biomass gasification with negative emissions*”, *Sustainable Energy and Fuels*, 6 (16), pp. 3830 –

3851, 2022. DOI: 10.1039/d2se00661h

- E. Crespi, **G. Guandalini**, G.N. Cantero, S. Campanari, “Dynamic Modeling of a PEM Fuel Cell Power Plant for Flexibility Optimization and Grid Support”, **Energies**, 15 (13), art. no. 4801, 2022. DOI: 10.3390/en15134801
- A. Poluzzi, **G. Guandalini**, S. Guffanti, C. Elsidio, S. Moioli, P. Huttenhuis, G. Rexwinkel, E. Martelli, G. Groppi, M.C. Romano, “Flexible Power & Biomass-to-Methanol plants: Design optimization and economic viability of the electrolysis integration”, **Fuel**, no. 310, 2022. DOI: 10.1016/j.fuel.2021.122113
- A. Poluzzi, **G. Guandalini**, S. Guffanti, M. Martinelli, S. Moioli, P. Huttenhuis, G. Rexwinkel, J. Palonen, E. Martelli, G. Groppi, M.C. Romano, “Flexible Power and Biomass-To-Methanol Plants With Different Gasification Technologies”, **Frontiers in Energy Research**, 9, art. no. 795673, 2022. DOI: 10.3389/fenrg.2021.795673
- A. Poluzzi, **G. Guandalini**, F. d’Amore, M.C. Romano, “The Potential of Power and Biomass-to-X Systems in the Decarbonization Challenge: a Critical Review”, **Current Sustainable/Renewable Energy Reports**, 8 (4), pp. 242-252, 2021. DOI: 10.1007/s40518-021-00191-7
- E. Crespi, P. Colbertaldo, **G. Guandalini**, S. Campanari, “Design of hybrid power-to-power systems for continuous clean PV-based energy supply”, **Int. J. Hydrogen Energy**, no. 46 (26), pp. 13691-13708, 2021. DOI: 10.1016/j.ijhydene.2020.09.152
- E. Crespi, **G. Guandalini**, S. Gößling, S. Campanari, “Modelling and optimization of a flexible hydrogen-fueled pressurized PEMFC power plant for grid balancing purposes”, **Int. J. Hydrogen Energy**, 46 (24), pp. 13190-13205, 2021. DOI: 10.1016/j.ijhydene.2021.01.085 (OPEN ACCESS)
- A. Poluzzi, **G. Guandalini**, M.C. Romano, “Potential carbon efficiency as a new index to track the performance of biofuels production processes”, **Biomass and Bioenergy**, 142, art. no. 105618, 2020. DOI: 10.1016/j.biombioe.2020.105618
- M. Astolfi, **G. Guandalini**, M. Belloli, A. Hirn, P. Silva, S. Campanari, “Preliminary design and performance assessment of an underwater compressed air energy storage system for wind power balancing”, **J Engineering for Gas Turbines and Power**, 142 (9), art. no. 091001, 2020. DOI: 10.1115/1.4047375
- S. Lombardi, L. Tribioli, **G. Guandalini**, P. Iora, “Energy performance and well-to-wheel analysis of different powertrain solutions for freight transportation”, **Int. J. Hydrogen Energy**, 45 (22), pp. 12535-12554, 2020. DOI: 10.1016/j.ijhydene.2020.02.181
- S. Campanari, **G. Guandalini**, J. Coolegem, J. Ten Have, P. Hayes, A.H. Pichel, “Modeling, Development, and Testing of a 2 MW Polymeric Electrolyte Membrane Fuel Cell Plant Fueled with Hydrogen from a Chlor-Alkali Industry” **J Electrochemical Energy Conversion and Storage**, 16 (4), art. no. 041001, 2019. DOI: 10.1115/1.4042923
- **G. Guandalini**, M.C. Romano, M. Ho, D. Wiley, E. S. Rubin, J.C. Abanades, “A sequential approach for the economic evaluation of new CO2 capture technologies for power plants” **Int J of Greenhouse Gas Control**, 84, pp. 219-231, 2019. DOI: 10.1016/j.ijggc.2019.03.006
- P. Colbertaldo, **G. Guandalini**, S. Campanari, “Modelling the integrated power and transport energy system: The role of power-to-gas and hydrogen in long-term scenarios for Italy” **Energy**, 154, pp. 592-601, 2018. DOI: 10.1016/j.energy.2018.04.089
- **G. Guandalini**, P. Colbertaldo, S. Campanari, “Dynamic modeling of natural gas quality within transport pipelines in presence of hydrogen injections”, **Appl. Energy**, no. 185 (2), pp. 1712-1723, Jan. 2017. DOI: 10.1016/j.apenergy.2016.03.006
- **G. Guandalini**, M. Robinius, T. Grube, S. Campanari, D. Stolten, “Long-term power-to-gas potential from wind and solar power: A country analysis for Italy”, **Int. J. Hydrogen Energy**, no. 42 (19), pp. 13389-13406, 2017. DOI: 10.1016/j.ijhydene.2017.03.081
- **G. Guandalini**, S. Campanari, G. Valenti, “Comparative assessment and safety issues in state-of-the-art hydrogen production technologies”, **Int. J. Hydrogen Energy**, vol. 41 (42), pp. 18901-20,

Nov. 2016. 10.1016/j.ijhydene.2016.08.015 (OPEN ACCESS)

- **G. Guandalini**, S. Campanari, and M. C. Romano, "Power-to-gas Plants and Gas Turbines for Improved Wind Energy Dispatchability: Energy and Economic Assessment," **Appl. energy**, no. 147 (1), pp. 117-130, June 2015. DOI: 10.1016/j.apenergy.2015.02.055
- J. Milewski, **G. Guandalini**, and S. Campanari, "Modeling An Alkaline Electrolysis Cell Through Reduced-order And Loss-estimate Approaches", **J. Power Sources**, vol. 269, pp. 203–211, Dec. 2014. DOI: 10.1016/j.jpowsour.2014.06.138

Book chapters

- S. Campanari, **G. Guandalini**, "Fuel cells: Opportunities and challenges" In: A. Basile, G. Centi, M. De Falco, G. Iaquaniello, "Catalysis, Green Chemistry and Sustainable Energy", Elsevier, 2019. DOI: 10.1016/B978-0-444-64337-7.00018-5. ISBN: 978044444643377. ISSN: 0167-2991
- S. Campanari, P. Colbertaldo, **G. Guandalini**, "Renewable power-to-hydrogen systems and sector coupling power-mobility", In: M. Van de Voorde, "Volume 1: Hydrogen Production and Energy Transition", De Gruyter, 2021. ISBN: 9783110596250 (in press, expected September 2021).

Conference proceedings

- M. Ficili, P. Colbertaldo, **G. Guandalini**, S. Campanari, "Design and partial-load operation of a reversible Solid Oxide Cell system with molten salts thermal storage", Journal of Physics: Conference Series, 2385 (1), art. no. 012022, 2022. DOI: 10.1088/1742-6596/2385/1/012022 (OPEN ACCESS)
- P. Colbertaldo, **G. Guandalini**, "Techno-economic assessment of enhanced Biogas&Power-to-SNG processes with high-temperature electrolysis integration", Journal of Physics: Conference Series, 2385 (1), art. no. 012045, 2022. DOI: 10.1088/1742-6596/2385/1/012045 (OPEN ACCESS)
- P. Colbertaldo, **G. Guandalini**, S. Campanari, "Development of benchmark scenarios for sector coupling in the Italian national energy system for 100% RES supply to power and mobility", E3S Web of Conferences, 312, art. no. 01003, 2021. DOI: 10.1051/e3sconf/202131201003 (OPEN ACCESS)
- E. Crespi, L. Mammoliti, P. Colbertaldo, P. Silva, **G. Guandalini**, "Sizing and operation of energy storage by Power-to-Gas and Underwater Compressed Air systems applied to offshore wind power generation", E3S Web of Conferences, 312, art. no. 01007, 2021. DOI: 10.1051/e3sconf/202131201007 (OPEN ACCESS)
- E. Crespi, **G. Guandalini**, S. Campanari, "Simulations of a flexible 100 kW PEM Fuel Cell power plant for the provision of grid balancing services" E3S Web of Conferences, 238, art. no. 04003, 2021. DOI: 10.1051/e3sconf/202123804003 (OPEN ACCESS)
- P. Colbertaldo, **G. Guandalini**, S. Campanari, E. Crespi, "Balancing a high-renewables electric grid with hydrogen-fuelled combined cycles: A country scale analysis", Proceedings of the ASME Turbo Expo, 6, art. no. v006t09a006, 2020. DOI: 10.1115/GT2020-15570
- M. Ugolini, L. Recchia, N. Migliorini, G. Manzolini, **G. Guandalini**, M. Milani, "European regions suitability for advanced biofuel production. Cases scenarios for residual biomass supply chains" European Biomass Conference and Exhibition Proceedings, pp. 22-29, 2020.
- M. Astolfi, **G. Guandalini**, M. Belloli, A. Hirn, P. Silva, S. Campanari, "Preliminary design and performance assessment of an underwater CAES system (UW-CAES) for wind power balancing", Proceedings of the ASME Turbo Expo, 2019. DOI: 10.1115/GT2019-91048
- **G. Guandalini**, S. Campanari, "Well-to-wheel driving cycle simulations for freight transportation: Battery and hydrogen fuel cell electric vehicles" 2018 International Conference of Electrical and Electronic Technologies for Automotive, AUTOMOTIVE 2018, art. no. 8493216, 2018. DOI: 10.23919/EETA.2018.8493216
- S. Campanari, **G. Guandalini**, J. Coolegem, J. Ten Have, P. Hayes, A.H. Pichel, "Modeling,

development and preliminary testing of a 2 MW PEM fuel cell plant fueled with hydrogen from a chlor-alkali industry", ASME 2018 12th International Conference on Energy Sustainability, ES 2018, DOI: 10.1115/es2018-7340

- **G. Guandalini**, S. Foresti, S. Campanari, J. Coolegem, J. Ten Have, "*Simulation of a 2 MW PEM Fuel Cell Plant for Hydrogen Recovery from Chlor-Alkali Industry*", Energy procedia, n° 105, pp. 1839-1846, 2016. DOI: 10.1016/j.egypro.2017.03.538 (OPEN ACCESS)
- S. Campanari, **G. Guandalini**, F. Beretta, G. Manzolini, "*Comparison of battery and hydrogen fuel cell vehicles for freight transportation through WTW driving cycle simulations*", WHEC Conference Proceedings, Paper 578, June 2016.
- **G. Guandalini**, T. Grube, S. Campanari, D. Stolten, "*Long-term power-to-gas potential for recovering excess energy from renewables: Italian case*", WHEC Conference Proceedings, Paper 449, June 2016.
- **G. Guandalini**, S. Foresti, S. Campanari, J. Coolegem and J. ten Have, "*Modeling of 2-MW co-generative PEM fuel cell for hydrogen recovering from Chlorine industry*", WHEC Conference Proceedings, Paper 383, June 2016.
- **G. Guandalini**, S. Foresti, S. Campanari, J. Coolegem, J. ten Have, "*Modeling of a MW scale PEM fuel cell power plant integrated in industrial chlor-alkali process*", EFC Conference, Paper EFC15133, December 2015.
- **G. Guandalini**, P. Colbertaldo, S. Campanari, "*Dynamic Quality Tracking of Natural Gas and Hydrogen Mixture in a Portion of Natural Gas Grid*", Energy Procedia, no. 75, pp. 1037-1043, 2015. DOI: 10.1016/j.egypro.2015.07.376 (OPEN ACCESS)
- **G. Guandalini**, S. Campanari, "*Wind power plant and power-to-gas system coupled with natural gas grid infrastructure: techno-economic optimization of operation*", ASME TurboExpo 2015, Paper GT2015-42229, June 2015. DOI: 10.1115/GT2015-42229
- **G. Guandalini**, M.C. Romano, S. Campanari, "*Comparison Of Gas Turbines And Power-to-gas Plants For Improved Wind Park Energy Dispatchability*", ASME TurboExpo 2014, Paper GT2014-26838, June 2014. DOI: 10.1115/GT2014-26838
- J. Milewski, **G. Guandalini**, S. Campanari, "*A reduced-order approach to alkaline electrolysis modeling*", EFC Conference, Paper EFC13209, December 2013.

CONFERENCES and SEMINARS

Conferences

- **EUBCE – European Biomass Conference and Exhibition** (2019, Lisbon, Portugal) – 1 oral presentation ("Methane reforming and water electrolysis system integrated in a DME synthesis plant from biomass based on Sorption-Enhanced technologies")
- **EFC - European Fuel Cell conference** (2019, Naples, Italy) - 1 oral presentation ("Sizing of integrated solar photovoltaic and electrolysis system for clean hydrogen production")
- **Automotive** (2018, Milano, Italy) – 1 oral presentation ("Well-to-Wheel driving cycle simulations for freight transportation: battery and hydrogen fuel cell electric vehicles")
- **WHEC - World Hydrogen Energy Conference** (2016) - 2 oral presentations ("Long-term power-to-gas potential for recovering excess energy from renewables: Italian case", "Comparison of battery and hydrogen fuel cello vehicles for freight transportation through WtW driving cycle simulation")
- **SmartMobility World** (2016, Milano, Italy) – 1 invited oral presentation ("La

produzione di idrogeno: situazione attuale e prospettive sostenibili”)

- **ASME TurboExpo** (2015, Montreal, Canada) - 1 oral presentation (“Wind power plant and power-to-gas system coupled with natural gas grid infrastructure: techno-economic optimization of operation”, GT2015-42229)
- **EFC - European Fuel Cell conference** (2015, Naples, Italy) - 1 oral presentation (“Modelling of a MW scale PEM fuel cell power plant integrated in industrial chlor-alkali process”) / 1 poster
- **ASME TurboExpo** (2014, Duesseldorf, Germany) - 1 oral presentation (“Comparison of gas turbines and power-to-gas plants for improved wind park energy dispatchability”, GT2014-26838)
- **EFC - European Fuel Cell conference** (2013, Naples, Italy) - 1 poster
- **Hypothesis 10** (2013, Edinburgh, UK) - 2 oral presentations (“Power-to-gas technologies in high renewable scenarios: a preliminary study”, “A review of advanced low-temperature water electrolysis modelling”)

Seminars

- **Final public workshop of CONVERGE project** (18th May 2022, Petten, NL) – Workshop organization and management, presentation on project overview
- **Final public workshop of FLEDGED project** (2020, online) – Workshop organization and management, presentation on project overview
- **Seminars for AiCARR** (2015/2019) – Micro-cogeneration technologies overview
- **Seminar for ETICO project** (2013/2014) – Power-to-gas and hydrogen technologies

ABILITAZIONE SCIENTIFICA NAZIONALE

Abilitazione Scientifica Nazionale (ASN) conseguita in data 28 maggio 2022 per le funzioni di professore universitario di seconda fascia nel Settore Concorsuale 09/C1 - MACCHINE E SISTEMI PER L'ENERGIA E L'AMBIENTE.

PARTICIPATION in FUNDED PROJECTS

EU projects

- **H2TRUST** (FP7 - Jun 2013/Mar 2015) – Development of H2 Safety Expert Groups and due diligence tools for public awareness and trust in hydrogen technologies and applications
Role: Assessment of hydrogen safety SoA and dissemination, simulation of hydrogen production plants (Aspen) (technical)
- **DEMCOPEM** (FP7 - Jan 2015/Dec 2018) – Demonstration of a combined heat and power 2 MWe PEM fuel cell generator for hydrogen recovery from a chlor-alkali chemical plant
Role: WP co-responsible for process modelling, data analysis and validation (WP leader), Implementation of simulation with Aspen suite and in-house data analysis tools (technical)
- **FLEDGED** (H2020 - Nov 2016/Oct 2020) - Flexible dimethyl ether production from biomass gasification with sorption-enhanced processes
Role: WP leader for communication and dissemination of scientific results, support in project management (WP management), process simulation with Aspen suite (technical), website development and management
- **GRASSHOPPER** (H2020 - Jan 2018/Mar 2022) - Demonstrative project for a 100 kW PEM fuel cell for electric grid balancing and hydrogen recovery
Role: WP responsible for process simulation and data analysis (WP leader), supervisor of Polimi activities in the project.
- **CONVERGE** (H2020 - Jan 2018/Dec 2022) – Carbon valorization in energy-efficient green fuels: methanol synthesis from biomass through intensified process
Role: project coordinator (from June 2021), process simulation and optimization with Aspen suite (technical)
- **BUTTERFLY** (Horizon Europe - Jul 2023/ongoing) – Biomass Utilized To The Extended portfolio of Renewable Fuels with Large Yields: flexible biomass-to fuel conversion plant development for multi-feedstock, multi-product, hydrogen-enhanced operation
Role: WP leader of simulation and techno-economic evaluations WP (management), process simulation and optimization with Aspen suite (technical), supervisor of PhD

National projects

- **HERMES** (PRIN - 2019/2023) – Design and optimization of Multi-Energy System based on hydrogen technologies and reversible SOC system.
Role: fuel cell simulation, process integration and optimization with Aspen suite and in-house codes (technical)
- **HyCenta** (Austrian project – 2023/ongoing) – HyEmpire WP: development and testing of electrochemical hydrogen compression for industrial applications
Role: EHC simulation, process integration and technoeconomic evaluations (technical)

INDUSTRIAL PROJECTS

Industrial projects

- **Hydrogen JRP** (2023/ongoing) - Novel concepts in Energy Storage technologies potentially overlapping with hydrogen-based options
Role: SoA definition, technical data evaluation (technical)

- **ENI** (2022) – Bollettini tecnologici: Storage and Renewable Energies
Role: SoA definition, technical data evaluation (technical)
- **IMI Remosa** (2021/2022) – Solution for Ca-looping technology with dual fluidized beds at different pressures. Patent under evaluation.
Role: modelling activities (technical)
- **SNAM** (2021/2022) – Technologies for hydrogen separation from H₂-NG mixtures and applications linked with green hydrogen blending in the infrastructure
Role: SoA definition, technical data evaluation (technical)
- **PLT Energia** (2021/2022) – Analysis of integration of a P2G system in a wind park
Role: techno-economic optimization of electrolysis unit and operation (technical), supervision
- **Italgen** (2021/2024) – Analysis of integration of P2G systems in efficient electric grids with self-consumption
Role: techno-economic optimization of electrolysis unit and operation (technical), supervision
- **2iReteGas** (2021/2022) – Performance evaluation and process optimization for pressure reduction and heating systems in the natural gas grid
Role: data analysis, pressure reduction units and grid modelling (technical), project management, project responsible
- **SNAM** (2020) – Comparative assessment of electrolysis units
Role: SoA definition, technical data evaluation (technical)
- **RETI+/Gelsia** (2019) – Assessment of P2G to supply 100% ‘green’ PV energy to constant load
Role: techno-economic optimization of electrolysis unit and operation (technical), supervision
- **ENI** (2019) – Assessment of state-of-the-art and perspectives of hydrogen production, storage and final use
Role: SoA definition, technical data evaluation (technical)
- **2iReteGas** (2019/ongoing) – Dynamic simulation of gas distribution infrastructure for the definition of strategies for alternative gas injection
Role: natural gas grid modelling (technical), project management, project responsible
- **ENI** (2018) – Techno-economic analysis of options for hydrogen transport
Role: SoA definition, distribution systems assessment (technical)
- **SNAM** (2014/15) - Dynamic simulation of the Italian natural gas grid with commercial software (SIMONE) and analysis of performances. Definition of methodologies for correct estimates of the grid status (linepack, gas composition)
Role: data analysis and system simulation (technical), Master thesis supervision
- **SAPIO/NITIDOR** (2013/14) - Test of an alkaline electrolyser in Energy Department laboratories. Analysis of the performances and modelling of the system.
Role: operation of alkaline electrolyser for experimental campaigns, modelling and simulation of the system (technical)

PATENTS

Under evaluation
(IT/International)

- **Impianto a doppio letto fluido con differenziale di pressione** (priorità italiana n. 102022000022581, data di deposito: 3/11/2022) – Romano/Guandalini/Argiolas

DIDACTIC ACTIVITIES

Lecturer

- *A.A. 2025/2026 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 50 students – English language)
- *A.A. 2024/2025 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 50 students – English language)
- *A.A. 2023/2024 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 60 students – English language)
- *A.A. 2022/2023 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 50 students – English language)
- *A.A. 2021/2022 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 90 students – English language)
- *A.A. 2020/2021 - Energy and emissions in transportation systems* (055652 – 10 CFU – ING-IND/09 – LM - Master Course in Mobility Engineering – about 50 students – English language)
- *A.A. 2019/2020 - Energy and emissions in transportation systems* (052714 – 5 CFU – ING-IND/09 – LM - Master Course in Mechanical/Electrical Engineering – about 10 students – English language)
- *A.A. 2018/2019 - Energy and emissions in transportation systems* (052714 – 5 CFU – ING-IND/09 – LM - Master Course in Mechanical/Electrical Engineering – about 10 students – English language)

Lecturer
(assistant)

- *Sistemi energetici e impatto ambientale* (2015/2021 - prof. Campanari - Bachelor courses – Energy Engineering - Support didactic work - front lessons - 5 semesters)
- *Macchine e sistemi energetici* (2014/2017 - prof. Bonalumi - Bachelor courses – Management Engineering - Support didactic work - front lessons - 2 semesters)
- *Energy conversion A* (2016/2018 - prof. Valenti - Master courses – Energy Engineering - Support didactic work - front lessons - 2 semesters – English language)
- *Sistemi energetici* (2013/2016 - prof. Giuffrida - Bachelor courses – Mechanical Engineering - Support didactic work - front lessons - 3 semesters)
- *Laboratorio di Energetica* (2013/2016 - prof. Ravidà - Bachelor courses – Energy Engineering - Support didactic work - front lessons/laboratory - 3 semesters)

Post-graduate courses

- Front lessons at master ENI Innovation (2018/2020, 2022/2023, Politecnico di Milano) – hydrogen production and storage technologies, power-to-gas technologies and application to mobility – Project work supervision as academic tutor
- Front lessons at master “MEM – Master in Energy Management” (2024, GSOM), - alternative fuels in the energy transition (Sustainable Mobility module).
- Front lessons at master “Clean Energy Academy” (2022, MIP), supported by Pietro Fiorentini – gas grid infrastructure and hydrogen
- Front lessons at master RIDEF (2014/2019, Politecnico di Milano) - Biogas upgrading, gas grid infrastructure overview and power-to-gas technologies

Other courses/Seminars

- Summer school “TechCamp”, course on “Green Energy” (2022, 2023, 2024 – Politecnico di Milano) – lessons and practical activities for high school students on energy conversion systems and scenarios of energy transition.
- Presentation of “Mobility Engineering” at Polimi OpenDay 2023

Supervisor of Ph.D. thesis

- “Flexible biomass-to-biofuel plants optimization via digital twins development” (Hamidreza Heydari, 2024/ongoing)
- “Decarbonization of hard-to-abate mobility solutions through alternative energy vectors” (Daniele Brenno Fausti, 2025/ongoing)

Co-supervisor of Ph.D. thesis

- “Hydrogen-based storage systems for electric grid balancing” (Elena Crespi, 2017/2020)
- “Flexible Biomass and Power to Fuel technologies: techno-economic assessment” (Alessandro Poluzzi, 2017/2020)
- “Power-to-Hydrogen for long-term power and transport sector integration” (Paolo Colbertaldo, 2016/2019)

Supervisor and co-supervisor
of M.Sc. thesis**Supervisor (25 thesis):**

- “Hydrogen production from renewable energy: comparison of integrated P2G systems through optimization” (Piras Paolo, 2023)
- “Dynamics of alkaline water electrolyzers: Modelling, Validation and Optimization” (De Fonseca Pimentel Filippo, 2023)
- “Risk control in Hydrogen fueling stations” (Bennici Marco, 2022)
- “Pipe-in-pipe solutions for hydrogen transport employing fibre-reinforced polymers: material assessment and application evaluation” (Vianello Pietro, 2022)
- “Energy Efficiency Testing Methods for Heavy-Duty Vehicles in Chile: A Proposal for Vehicle Classification and Approach of Methodology Development” (Castillo Reyes Marcela Andrea, 2022)
- “Methodology for Dealing with Irradiation Uncertainty in the Design of Power-To-Power Energy Systems” (Schmieder Franziska, 2022)
- “Energy and economic analysis of photovoltaic systems combined with second-life batteries and Vehicle-to-Home in car dealerships” (Lombardi Stefano, 2022)
- Biomethane for heavy-duty transport: a techno-economic analysis of supply chain alternatives (Florio Isabella, 2022)
- “Analysis and modelling of natural gas grids in presence of biomethane and hydrogen injections” (Sapienza Marco, 2022)
- Thermodynamical and mechanical modelling of an artificially excavated LRC facility for Hydrogen storage (Riboldi Davide, 2022)
- “Optimization of a Power-to-Power system coupled with a Photovoltaic Plant for an Industrial Facility” (Manca Rossella, 2022)
- “Integration of opportunity and depot chargers for e-buses optimal operation: economic and environmental assessment” (Lorenzi Benedetta/Cassanmagnago Fabio, 2021)
- “Alternative configurations for thermal integration in a reversible solid oxide (rSOC) system” (Pasini Gianpaolo, 2021)
- “Direct solar photocatalysis as an alternative hydrogen production method - current status and feasibility” (Babayan Morsal, 2021)
- “Techno-Economic assessment of Underwater Compressed Air Energy Storage coupled with offshore floating wind farms” (Galli Chiara, 2021)
- “Levelized Cost of Hydrogen: a techno-economic model development and application to

real life Power to Gas projects” (Ferrari Giovanni, 2021)

- “Energy flows in an urban e-bus depot: optimal fleet charging strategy” (Rombolà Gabriele / Motta Irene, 2020)
- “Optimization of 100kW to MW-size PEM fuel cell power plants for flexible operation through dynamic modeling and simulation” (Cicerchi Costanza, 2020)
- “Dynamic modelling of a PEM Electrolysis System: optimal operation for coupling with Renewable Energy Sources” (Mohlo Simone, 2020)
- “Synthetic methane production in high-RES remote regions: design and techno-economic evaluation of PtG plant” (Bosi Emilio, 2020)
- “Integrated Assessment Model of the International Maritime Sector” (Anna Spedo, 2020, cooperation with group of Industrial Ecology at NTNU, Trondheim)
- “Conversion of a biogas-ICE plan into a flexible and multi-product Power-to-Gas system: Design and techno-economic assessment” (Marcolin Piersilvio, 2019)
- “Analisi tecnico-economica dell’integrazione di tecnologie innovative per la sintesi di metanolo da biomassa” (Trignani Gabriele, 2019)
- “Dynamic operation of the gas distribution network: Modelling decentralized biomethane injections” (Bernini Lorenzo Piero, 2019)
- “Reversible Solid Oxide Cell (rSOC) for renewable energy storage: system analysis and operation coupled with a wind park” (Crevenna Daniele, 2018)

Co-supervisor of other 23 thesis on biofuels, hydrogen technologies, electrolysis system optimization and applications, rSOC cells, UW-CAES, Multi-Energy Systems integration

Ongoing (supervisor/academic tutor):

- Deterioration and predictive maintenance of alkaline electrolysis (cooperation with Engie Belgium)
- Simulation and comparison of heavy-duty vehicles drivetrains by VECTO tool
- Optimization of logistic for biomass to fuel plants: evaluation of optimal plant sizes and multi-feedstock solutions
- Comparison of solutions for hydrogen pipelines
- Simulation and comparison of innovative technologies for Synthetic Natural Gas production (co-supervisor)

PERSONAL SKILLS

Mother tongue(s) Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	Excellent	Excellent	Excellent	Excellent	Excellent
	TOEFL iBT (99/120 - European level B2 - 24/04/2010)				
German	Sufficient	Good	Sufficient	Sufficient	Good
	Zertifikat Deutsch (243.5/300 - European level B1 - 25/05/2006)				

Levels: A1/2: Basic user - B1/2: Independent user - C1/2 Proficient user
Common European Framework of Reference for Languages

Communication skills Good communication skills gained through experience in presentations at conferences, European projects dissemination and management activities, as well as in front lessons for university degree courses and seminars.
Responsible of communication and dissemination activities in the FLEDGED H2020 European project. Project website development and management.

Organisational / managerial skills

- Leadership skills and good sense of teamwork acquired in projects and didactic activities
- Organization and management of WPs in public and industrial projects
- Supervisor of M. Sc. and PhD students

Job-related skills

- Complex energy system simulation through mathematical models
- Data analysis from complex energy systems and performances evaluation
- Techno-economic evaluation and optimization

Computer skills

- OS: Windows, Linux
- Excellent knowledge of MS Office suite (including scripting and VBA automation)
- Excellent knowledge of Fortran, Matlab, VB/VBA and Tcl/Tk programming languages, basic knowledge of Python, C/C++
- Excellent knowledge of software for energy systems simulation (ASPEN suite)
- Good knowledge of database languages (MS Access, SQL)
- Basic knowledge of CAD (SolidEdge, SolidWorks, Inventor) and CFD codes (FLUENT, OpenFOAM)
- Basic knowledge of other word processors (Latex), programming languages (Python) and GIS (QGIS)
- Website design and management: WordPress and HTML

Other skills

- Classical and acoustic guitar player
- Paging and production of communication (high school paper, parish printing office)

Milano, 20/10/2025

In compliance with the Italian legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document for the purposes of the evaluations.