



Lorenzo Rinaldi

Curriculum Vitae (last update: June 2024)

1. PERSONAL INFORMATION

Name, Surname: Lorenzo, Rinaldi
Born: 02-03-1994, Tradate (VA), Italy
Based in: Tradate (VA), Italy
E-mail: lorenzo.rinaldi@polimi.it
lorenzo.rinaldi@enextgen.it
Languages: Italian (mother tongue)
English (Certified C1 level, Cambridge ESOL FCE Grade A)
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2. EDUCATION

Nov2020 – Jun2024 **PhD in Energy and Nuclear Science and Technology**
Department of Energy, Politecnico di Milano, Italy
Thesis title: *Development of an integrated modelling framework to assess environmental, energy security and economic implications of global energy transition scenarios*
Supervisor: Prof. Matteo Vincenzo Rocco

Sep2016 - Apr2019 **Master of Science in Energy Engineering**
Politecnico di Milano, score 104/110
Thesis title: *Multi-Year Capacity-Expansion Modelling of Hybrid Microgrid within a Comprehensive Design Framework (with application to Chile)*
Supervisor: Prof. Emanuela Colombo

Sep2013 – Sep2016 **Bachelor of Science in Energy Engineering**
Politecnico di Milano, score 98/110

3. BRIEF PROFESSIONAL BIOGRAPHY

I am a Post-Doctoral researcher at the Sustainable Energy Systems Analysis and Modelling (SESAM) group at the Department of Energy, Politecnico di Milano.

My research is concentrated on multi-scale energy systems modelling for energy transition scenario analysis, with a particular focus on economic and energy models soft-link integration. The underlying rationale behind the need for such integration is explained by the fact that most energy scenarios, traced by authoritative institutions and research studies, often miss in capturing the details of the economic

framework within which the energy sector is included, neglecting perturbations on related industrial sectors as well as critical raw materials supply chain and availability.

I am also active in the field of rural electrification pathways analysis, specifically through minigrid design and planning . Particular attention on this topic is given to development and design of optimal techno-economic solutions for remote contexts, accounting for time-evolving load consumption and allowing for capacity expansion of the installed solution, in order to better capture development dynamics.

I have a deep expertise in Python programming language and I am an active contributor on various open-source projects.

In December 2023, I co-founded eNextGen, a start-up company, spin-off of Politecnico di Milano, aiming at providing firms and private consumers with a new comprehensive vision about sustainability. eNextGen offers tools and products for footprinting analysis, environmental and economic impact assessment of goods and services in both static- and scenario-based perspectives.

4. PROFESSIONAL EXPERIENCE

4.1. CURRENT POSITIONS

- Jun2024 - Ongoing **Post-Doctoral Researcher**
 Department of Energy, Politecnico di Milano, Italy
 Field: *Integrated energy and economic modelling; analysis and impact evaluation of energy transition scenarios.*
- Dec2022 – Ongoing **R&D Manager, Analyst, Trainer and Co-founder**
 eNextGen, Via Principe Eugenio 9, 20155, Milano, Italy.
 eNextGen is a start-up company, spin-off of Politecnico di Milano

4.2. PREVIOUS POSITIONS

- Nov2020 – Jun2024 **Doctoral Researcher**
 Department of Energy, Politecnico di Milano, Italy
- May2019 – Oct2020 **Research Fellow (Assegnista di ricerca)**
 Department of Energy, Politecnico di Milano, Via Lambruschini 4 – 20156, Milano, Italy
 Research title: “*Valutazione di impatto di scenari di sviluppo in contesti africani. Sviluppo di un modello integrato di valutazione*”

5. FUNDED & CONSULTANCY PROJECTS

Details of these projects are not disclosable.

Period	Position	Project commissioner Engagement role
Apr 2024 - Ongoing	Analyst, eNextGen	<i>Commissioner:</i> Energia Corrente <i>Role:</i> Data analyst
Mar 2024 – May 2025	Post-Doctoral Researcher, POLIMI	<i>Commissioner:</i> Edison S.P.A <i>Role:</i> Model development and implementation, data collection, scenarios definition, deliverables drafting

Oct 2023 – May 2024	Analyst, eNextGen	<i>Commissioner:</i> Ambro Logistica, RPierre Digital <i>Role:</i> Analyst, model development, data curation and report drafting
Oct 2022 – May 2023	Doctoral Researcher, POLIMI	<i>Commissioner:</i> Edison S.P.A <i>Role:</i> Model development and implementation, data collection, scenarios definition, deliverables drafting
Jun 2021 – Jun 2022	Doctoral Researcher, POLIMI	<i>Commissioner:</i> Ernst & Young (EY) <i>Partners:</i> IRPET, HEAS AG/SA <i>Role:</i> Model development and operation, data collection, scenarios definition, deliverables drafting
Mar 2019 – Nov 2021	Doctoral Researcher, POLIMI (prev. Research Fellow, POLIMI)	<i>Commissioner:</i> Enel Foundation <i>Partners:</i> SDA Bocconi School of Management

6. RESEARCH PROJECTS

Period	Position	Project description
Mar 2024 – Jun 2025	Doctoral Researcher, POLIMI	<i>Title:</i> Fundamental decarbonisation through sufficiency by lifestyle changes (FULFIL) <i>Type:</i> Horizon 2020 Grant n. 101003656 <i>Commissioner:</i> European Commission <i>Partners:</i> Fraunhofer, Wuppertal Institut, EURAC, Jacques Delors Institute, International Network for Sustainable Energy – Europe, Politecnico di Milano, nègaWatt Association, Zala briviba <i>Topic:</i> Exploring the contribution of lifestyle changes and citizen engagement in decarbonising Europe and fulfilling the goals of the Paris Agreement <i>Role:</i> Model implementation and draft of Deliverable 6.2 <i>Links:</i> Website
Oct 2023 - Nov 2023	Doctoral Researcher, POLIMI	<i>Title:</i> AMBassadors for sustainable transition (AMBITION) <i>Type:</i> Capacity Building <i>Funder:</i> Erasmus+ Programme <i>Partners:</i> Politecnico di Milano, RWTH Aachen University, TU Delft, Chalmers University of Technology, Strathmore University, Kwame Nkrumah University of Science & Technology, ETH Zurich, Green Growth Africa <i>Topic:</i> Joint Honours Programme for PhD students, towards the sustainable transition in Europe and Africa <i>Role:</i> Lecturer in an Innovation School <i>Links:</i> Website
Oct 2023 - Sep 2025	Post-Doctoral Researcher, POLIMI	<i>Title:</i> Multi-sectoral Integrated Modeling platform for planning national energy transition pathways (MIMO)

	(prev. Doctoral Researcher, POLIMI)	<p><i>Type:</i> Progetto di Ricerca di Interesse Nazionale Grant n. 2022ZHR8WC</p> <p><i>Funder:</i> Ministero dell'Università e Ricerca (MUR)</p> <p><i>Partners:</i> <u>Politecnico di Milano</u>, Università degli Studi di Firenze, Università di Macerata, IRPET</p> <p><i>Topic:</i> Formulation of a soft/hard-linked energy-economy model to design and assess the impact of future energy transition pathways for the Italian context</p> <p><i>Role:</i> Analyst and modeller, data curation and scenario definition</p>
Sep 2022 - Aug 2025	Post-Doctoral Researcher, POLIMI (prev. Doctoral Researcher, POLIMI)	<p><i>Title:</i> Expanding Integrated Assessment Modelling: Comprehensive and Comprehensible Science for Sustainable, Co-Created Climate Action (IAM COMPACT)</p> <p><i>Type:</i> Horizon Europe Grant n. 101056306</p> <p><i>Funder:</i> European Commission</p> <p><i>Partners:</i> Addis Ababa University, Aalto Korkeakouluusaatio SR, Aalborg Universitet, Asociacion BC3 Basque Centre for Climate Change, Bruegel, Fundacion CARTIF, Cicero Senter for Klimaforskning Stiftelse, E3 Modelling AE, Indian Institute of Management, Imperial College London, Kyiv Economics Institute, KTH, <u>National Technical University of Athens</u>, Politecnico di Milano, Rajarata University of Sri Lanka, Tsinghua University, Technical University of Mombasa, University of Piraeus Research Center, University System of Maryland, Universidad De Valladolid, Wuppertal Institute</p> <p><i>Topic:</i> Multi-scale modelling platforms integration for policy support in EU transition</p> <p><i>Role:</i> Project manager for POLIMI, model and linking strategies development, capacity building</p> <p><i>Links:</i> Website</p>
Mar 2020 – Dec 2021	Doctoral Researcher, POLIMI (prev. Research Fellow, POLIMI)	<p><i>Title:</i> FIVE of Olympics' Flag</p> <p><i>Type:</i> Polisocial Award 2019</p> <p><i>Funder:</i> Politecnico di Milano</p> <p><i>Partners:</i> Comune di Milano, Città Metropolitana di Milano, Urban@IT, OMERO, Provincia Autonoma di Trento</p> <p><i>Topic:</i> Ex-ante socio-economic and environmental impact evaluation of Olympics event by means of an integrated tool based on system dynamics and input-output models</p> <p><i>Role:</i> Model conceptualization, deliverables drafting, creating networks</p>
Mar 2019 – Dec 2023	Doctoral Researcher, POLIMI (prev. Research Fellow, POLIMI)	<p><i>Title:</i> Piano per il Monitoraggio dell'iniziativa Illumina: accesso all'energia e empowerment delle donne</p> <p><i>Type:</i> AID 11387</p> <p><i>Funder:</i> Agenzia Italiana di Cooperazione e Sviluppo</p> <p><i>Partners:</i> Politecnico di Milano, AVSI, COSV</p> <p><i>Topic:</i> Monitoring and evaluation of rural electrification program in Mozambique</p>

		<i>Role:</i> Project management, surveys preparation, data analysis, logistics, deliverables drafting
Mar 2019 – May 2020	Research Fellow, POLIMI	<p><i>Title:</i> Boa_Ma_Nha Maputo!</p> <p><i>Type:</i> Polisocial Award 2018</p> <p><i>Funder:</i> Politecnico di Milano</p> <p><i>Partners:</i> Politecnico di Milano, Eduardo Mondlane University (Maputo), AICS Maputo</p> <p><i>Topic:</i> Context and scenario analysis for development of Maputo region, Mozambique</p> <p><i>Role:</i> Model conceptualization, deliverables drafting, creating networks</p> <p><i>External links:</i> Website</p>

7. TRAINING AND TEACHING ACTIVITY

Period	Position	Course description
May 2024	Trainer, eNextGen	<p><i>Title:</i> LCA and Sustainability assessment</p> <p><i>Type:</i> Training course for companies</p> <p><i>Commissioner:</i> Tecno Habitat</p> <p><i>Topics:</i> Theory of Supply-and-Use framework and Life-cycle assessment LCA database theory and management</p> <p><i>Venue:</i> Milan, Italy</p>
Jan 2024 – Feb 2024	Lecturer (while Doctoral Researcher, POLIMI)	<p><i>Title:</i> Input-Output-based Life-Cycle Assessment with MARIO</p> <p><i>Type:</i> High-Level Summer School for Energy Expert</p> <p><i>Commissioner:</i> Climate Compatible Growth, EMP-LAC</p> <p><i>Venue:</i> Universidade Federal Fluminense, Niteroi, Brasil</p> <p><i>External link:</i> Website</p>
Nov 2023 - Ongoing	Lecturer (while Doctoral Researcher, POLIMI)	<p><i>Title:</i> Input-output analysis and modelling with MARIO</p> <p><i>Type:</i> MOOC</p> <p><i>Link to the course:</i> www.open.edu</p>
Nov 2023	Lecturer (while Doctoral Researcher, POLIMI)	<p><i>Title:</i> <i>Integrated Energy and cross-sectorial modelling for the sustainable transition</i></p> <p><i>Course:</i> Sustainable Innovation School for the Ambition Erasmus+ Project</p> <p><i>Venue:</i> Strathmore University, Nairobi, Kenya</p>
Sep 2023 – Dec 2023	Tutor and project supervisor (while Doctoral Researcher, POLIMI)	<p><i>Title:</i> Energy Accounting and Impact Assessment Methods</p> <p><i>Type:</i> Master of Science in Energy Engineering</p> <p><i>Professor:</i> Matteo Vincenzo Rocco</p> <p><i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy</p>
Aug 2023 – Sep 2023	Trainer	<p><i>Title:</i> <i>IAM COMPACT workshop on Modelling tools for sustainable development</i></p> <p><i>Type:</i> Capacity building</p>

	(while Doctoral Researcher, POLIMI)	<i>Venue:</i> Mombasa, Kenya
Jul 2023	Lecturer (while Doctoral Researcher, POLIMI)	<i>Title:</i> Input-Output-based Life-Cycle Assessment with MARIO <i>Type:</i> High-Level Summer School for Energy Expert <i>Commissioner:</i> Climate Compatible Growth, ICTP Joint Summer School <i>Venue:</i> ICTP, Trieste, Italy <i>External link:</i> Website
Jan 2023 - Ongoing	Lecturer (while Doctoral Researcher, POLIMI)	<i>Title:</i> Measuring the impact of the Energy Transition <i>Type:</i> MOOC <i>Link to the course:</i> www.pok.polimi.it
Nov 2022	Trainer (while Doctoral Researcher, POLIMI)	<i>Title:</i> Workshop on surveying and energy access <i>Type:</i> Capacity building <i>Venue:</i> COSV headquarters, Mocuba, Zambezia, Mozambique
Sep 2022 – Dec 2022	Tutor and project supervisor (while Doctoral Researcher, POLIMI)	<i>Title:</i> Energy Accounting and Impact Assessment Methods <i>Type:</i> Master of Science in Energy Engineering <i>Professor:</i> Matteo Vincenzo Rocco <i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy
Jul 2022	Trainer (while Doctoral Researcher, POLIMI)	<i>Title:</i> Workshop on surveying and energy access <i>Type:</i> Capacity building <i>Venue:</i> AVSI headquarters, Pemba, Cabo Delgado, Mozambique
Apr 2021	Lecturer (while Doctoral Researcher, POLIMI)	<i>Title:</i> <i>Energy Outlook - Production, Consumption and Geopolitics</i> <i>Course:</i> Master ENEL – Smart Grid <i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy
Feb 2021 – Jul 2021	Tutor and project supervisor (while Doctoral Researcher, POLIMI)	<i>Title:</i> Advanced Thermodynamics and Thermoconomics <i>Type:</i> Master of Science in Energy Engineering <i>Professor:</i> Emanuela Colombo <i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy
Sep 2020 – Dec 2020	Tutor and project supervisor (while Research Fellow, POLIMI)	<i>Title:</i> Engineering and Cooperation for Development <i>Type:</i> Master of Science in Energy Engineering <i>Professor:</i> Emanuela Colombo <i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy
Sep 2019 – Dec 2019	Tutor and project supervisor (while Research Fellow, POLIMI)	<i>Title:</i> Engineering and Cooperation for Development <i>Type:</i> Master of Science in Energy Engineering <i>Professor:</i> Emanuela Colombo <i>Venue:</i> Politecnico di Milano, Campus Bovisa, Milan, Italy

MSC THESES SUPERVISED

"I authorize the processing of my personal data in accordance with GDPR 2016/679 of April 27, 2016 (European Regulation concerning the protection of individuals with regard to the processing of personal data)."

A.Y	Student(s)	Supervisors	Title
22-23	Barberis Vignola, Mattia Fabroni, Carolina	Prof. M.V. Rocco Dr. L. Rinaldi	Assessing critical material demand and recycling for green energy technologies until 2100: a dynamic waste input-output analysis
22-23	Ghezzi, Debora	Prof. M.V. Rocco Dr. L. Rinaldi	Towards a Cleaner Steel Industry: Assessing the Environmental and Economic Impacts of Decarbonising the Steel Sector in the European Union
22-23	Merlino, Francesco	Prof. E. Colombo Dr. D. Shendrikova Dr. L. Rinaldi	Geopolitical affinity index among potential EU natural gas suppliers
22-23	Carmagnani, Tommaso	Prof. M.V. Rocco Dr. L. Rinaldi	Unveiling the potential of nuclear power in Italy's decarbonization through energy-system modeling
22-23	Fumagalli, Tommaso Gian Giacomo Sommariva	Prof. E. Colombo Dr. L. Rinaldi G. Crevani	Implementation and validation of a multidimensional Needs- to- Strategy Energy Planning tool for developing country
21-22	Mainardi, Emanuele	Prof. M.V. Rocco Dr. N. Golinucci Dr. L. Rinaldi	Investigating Interconnectedness in Europe's Energy Transition: An Input-Output Approach
21-22	Amadio, Matilde	Prof. E. Colombo Dr. L. Rinaldi	Fostering rural electrification through high time definition load demand calibration: the case-study of Matembwe
20-21	Gotti, Federico	Prof. M.V. Rocco Dr. L. Rinaldi	Critical raw materials for wind and solar PV energy applications: state of the art, future opportunities and critical issues
20-21	Guerrieri, Giulia	Prof. M.V. Rocco Dr. L. Rinaldi Dr. N. Golinucci	Assessing economic viability of battery electric vehicle integration in residential context.
20-21	Belloni, Luca Ferrucci, Tommaso	Prof. E. Colombo Dr. N. Stevanato Dr. L. Rinaldi	Construction of a harmonized Database and training of machine learning models for off-grid demand estimation
20-21	Farzanehnia, Amin	Prof. E. Colombo Dr. L. Rinaldi	Model-based investigation of an industrial microgrid with highly variable loads
20-21	El Yaziji, Ibtissam	Prof. M.V. Rocco Dr. L. Rinaldi	Analysis of future energy scenarios for Mozambique based on an integrated energy-economy system optimization model
19-20	Omer, Yassin	Prof. E. Colombo Dr. L. Rinaldi, G. Guidicini	Modelling with multi-year optimisation of off-grid system for rural electrification. The case of Guli village in Sudan
18-19	Di Leo, Giulia	Prof. M.V. Rocco Dr. L. Rinaldi	Comprehensive impact assessment of road transport sector transition scenarios : application to Italy

8. PUBLICATIONS

ARTICLES

- J1. **Rinaldi L**, Ghezzi D, Colombo E, Rocco MV, *Assessing environmental and market implications of steel decarbonisation strategies: a hybrid input-output model for the European Union*, Environmental Research Letters, under review (open access)
- J2. Stevanato N, Fioriti D, Ferrucci T, Belloni L, **Rinaldi L**, Poli D, Colombo E, *Data-Driven Analysis for the Characterization of Household Appliance Ownership and Use in Sub-Saharan Africa*, Renewable and Sustainable Energy Reviews, under review (open access)
- J3. **Rinaldi L**, Golinucci N, Guerrieri G, Sanvito FD, Rocco MV, Colombo E, *When are battery electric vehicles economically convenient? A sensitivity analysis based on multi-carrier residential energy system renovation modelling in Italy*, Energy Reports, 2024, [10.1016/j.egy.2024.01.025](https://doi.org/10.1016/j.egy.2024.01.025), (open access)
- J4. Nikas A, Frilingou N, Heussaff C, Fragkos P, Mittal S, Sampedro J, Giarola S, Sasse JP, **Rinaldi L**, Doukas H, Gambhir A, Giannousakis A, Golinucci N, Koasidis K, Rocco MV, Trutnevte E, Xexakis G, Zachmann G, Zisarou E, Colombo E, Hawkes A, Yarlagadda B, Binsted M, Iyer G, van de Ven DJ, *Three different directions in which the European Union could replace Russian natural gas*, Energy, 2024, [10.1016/j.energy.2024.130254](https://doi.org/10.1016/j.energy.2024.130254), (open access)
- J5. Tahavori MA, Golinucci N, **Rinaldi L**, Rocco MV, Colombo E, *MARIO: a versatile and user-friendly software for building Input-Output models*, Journal of Open Research Software, 2023, [10.5334/jors.473](https://doi.org/10.5334/jors.473), (open access)
- J6. **Rinaldi L**, Rocco M.V, Colombo E, *Assessing Critical Materials Demand in Global Energy Transition Scenarios Based on the Dynamic Extraction and Recycling Input-Output Framework (Dynerio)*, Resources Conservation & Recycling, 2023, [10.1016/j.resconrec.2023.106900](https://doi.org/10.1016/j.resconrec.2023.106900), (open access)
- J7. Stevanato N, **Rinaldi L**, Pistolese S, Balderrama S, Quoilin S, Colombo E *Modelling of a Village-Scale Multi-Energy System for the Integrated Supply of Electrical and Thermal Energy*, Applied Sciences, 2020, doi.org/10.3390/app10217445, (open access)
- J8. Stevanato N, Lombardi F, Guidicini G, **Rinaldi L**, Balderrama S, Pavicevic M, Quolin S, Colombo E *Long-term sizing of rural microgrids: accounting for load evolution through multi-step investment plan and stochastic optimization*, Energy for Sustainable Development, 2020, [10.1016/j.esd.2020.07.002](https://doi.org/10.1016/j.esd.2020.07.002)

CONFERENCE PAPERS

- C1. Conte M, **Rinaldi L**, Tonini F, Fumagalli T, Lorenzin G, Piras P, Sommariva G, Rocco MV, Colombo E, *Investigating the economic and environmental impacts of a technological shift towards hydrogen-based solutions for steel manufacture in high-renewable electricity mix scenarios for Italy*, in proceedings of the 7th AIGE/IIETA International Conference and 16th AIGE Conference, Parma, Italy, Jun 8-9, 2022. Available at IOP Conference Series: Earth and Environmental Science doi.org/10.1088/1755-1315/1106/1/012008

BOOKS CHAPTERS

- B1. **Rinaldi L**, Chiarelli D.D, *Energy-food challenges and future trends in Mozambique and in the Maputo Province*, in *Territorial Development and Water-Energy-Food Nexus in the Global South*, Springer, Research for Development, pp 119-131, 2022, [10.1007/978-3-030-96538-9_8](https://doi.org/10.1007/978-3-030-96538-9_8)

B2. Rocco M.V, **Rinaldi L**, *Energy: An essential asset for the development of African continent*, in *Territorial Development and Water-Energy-Food Nexus in the Global South*, Springer, Research for Development, pp 179-184, 2022, [10.1007/978-3-030-96538-9_12](https://doi.org/10.1007/978-3-030-96538-9_12)

SOFTWARE AND DATABASE

S1. Rocco MV, **Rinaldi L**, Vinciguerra A, Baiocco V, *Python based Engineering Systems Modelling (pyESM)*, <https://github.com/pyESM-project/pyesm>

S2. **Rinaldi L**, Ghezzi D, *Exiobase HYBRID extended to model innovative steelmaking routes for EU*, [10.5281/zenodo.10843374](https://zenodo.org/record/10843374)

S3. Tahavori M.A, **Rinaldi L**, Golinucci N, *Multi-functional Analysis of Regions through Input-Output (MARIO)*, [10.5281/zenodo.5879382](https://zenodo.org/record/5879382), <https://github.com/it-is-me-mario/MARIO>

9. PARTICIPATION TO SCIENTIFIC CONFERENCES

Dates	Venue	Event	Contribution(s)
2024, Oct 24-26	Urbino, Italy	65 ^a RSA – Società Italiana di Economia	Presentation in special session
2024, Jul 1-5	Santiago, Chile	30th International Input-Output Association Conference	Presentation in special session Teacher at ISIOA
2024, Jun 3-5	Caserta, Italy	9th AIGE/IIETA International Conference	Paper author
2023, Sep 14-16	Genova, Italy	XXXVI Congresso della Società Italiana di Scienza Politica	Paper author
2023, Jun 25-30	Alghero, Italy	29th International Input-Output Association Conference	Presentation in special session
2022, Aug 28- Sep 2	Langkawi, Malaysia	28th International Input-Output Association Conference	Presentation in parallel session
2022, Jul 13-15	Online	Scipy Conference 2022	Poster author
2022, Jun 8-9	Parma, Italy	7th AIGE/IIETA International Conference	Paper author
2021, Sep 22-24	Reggio Calabria, Italy	X Convegno dell'Associazione Rete Italiana LCA	Paper author
2021, Jun 21	Online	International Industrial Ecology Day 2021	Presentation
2020, Jan 15-17	Berlin, Germany	10th OPENMOD Workshop	Poster author
2019, Sep 1-6	Dubrovnik, Croatia	14th SDEWES Conference	Paper author