

DONATELLA BARISANO - CURRICULUM VITAE

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Professional experience

Donatella Barisano is a senior researcher at ENEA. She works at the Trisaia Research Center, focusing on the energy recovery of residual biomass and biogenic waste fractions. Her primary research areas concern the study and development of thermochemical gasification processes. She has worked on processes using both fixed-bed and fluidized-bed technologies, considering various applications of syngas—including energy applications (both direct use with conventional burners and advanced burners, such as ICE and SOFC) and as a feedstock for the production of liquid and gaseous biofuels (including H₂). She is currently working on the development of an intensified gasification process for the production of hydrogen-rich, N₂-free producer gas using a fluidized bed technology with a specific configuration.

She has served, and continues to serve, as scientific lead on national and EU projects related to the production of electricity and biofuels from biomass (e.g., Electric System Research, EMERA, SPRING G2E, BLAZE, UNIFHY, UNIQUE). Invited speaker at international and national conferences, lecturer in master's programs for young researchers, and ENEA tutor for thesis and doctoral dissertations. Invited chairperson at numerous editions of the EUBCE international conference. Reviewer for peer-reviewed international journals published by Elsevier, ACS Publications, Springer, and MDPI.

She is the national contact person for Task 33, "Gasification of Biomass and Waste," of the IEA (International Energy Agency). She is the author and co-author of several articles published in peer-reviewed international journals and conference proceedings. She served as the UNI representative on the TF 143 working group for the development of the CEN/TS 15439 technical specification "Biomass gasification - Tar and particles in product gases - Sampling and analysis." She is a co-holder of utility patents on fixed-bed and fluidized-bed gasification reactors.

Research focus

Use of biomass, the biogenic fractions of municipal solid waste (MSW), and other non-hazardous waste for energy purposes through advanced thermochemical processes for the production of electricity and/or heat, as well as for the production of biofuels, liquid and gaseous biofuels, and biobased products;

Research and development of advanced thermochemical processes; design and support for the construction of facilities ranging from laboratory-scale to prototype and pilot-scale; scale-up of related technologies to pre-commercial scale for the production of electricity and/or heat, as well as for the production of biofuels, liquid and gaseous biofuels, and biobased products;

Development of innovative and intensified methods for dry conditioning—via CO₂ capture and H₂ enrichment—of gas streams from thermochemical processes using primary (in-bed) and secondary (downstream) approaches, with implementation at bench-scale and prototype-scale;

Development of innovative methods for the purification and conditioning of gas streams from thermochemical processes through dry (in-bed and downstream) and wet approaches, with implementation at bench-scale and prototype levels;

Research and development of processes for the production of advanced liquid and gaseous biofuels (H₂, BioSNG, MeOH, DME, FT fuels) and synthetic chemicals for low-GHG-emission applications;

Energy recovery from lignocellulosic biomass, biogenic fractions of municipal solid waste (MSW), and other non-hazardous carbon-containing residues through hydrothermal pretreatment of the matrices for the fractionation and recovery of macro-components (cellulose, hemicellulose, and lignin), and for biochemical conversion;

Development of procedures for the characterization of matrices (including by-products), as well as for the sampling and characterization of gaseous and liquid process streams.

Selected Publications and Conference Contributions

Production of methanol and electricity from biogenic waste integrating hydrothermal carbonization, sorption enhanced gasification, hot gas conditioning, plasma CO₂ conversion and SOFC. E. Bocci, A.A. Papa, V. Marcantonio, A. Di Carlo, A. Vitale, E. Di Bisceglie, U. Pasqual Laverdura, D. Barisano, N. Lisi, T.A. Centeno et al. *Energy Reports*, Volume 14, December 2025, Pages 4136-4146; <https://doi.org/10.1016/j.egy.2025.11.006>

A Novel Integrated Biorefinery for the valorization of residual Cardoon biomass through technologies overview and process simulation. Vittoria Fatta, Aristide Giuliano, Maria Teresa Petrone, Francesco Nanna, Antonio Villone, Donatella Barisano, Roberto Albergo, Federico Liuzzi, Diego Barletta, Isabella De Bari. *Energies* 2025, 18(4), 973; <https://doi.org/10.3390/en18040973>.

Investigation of an intensified thermo-chemical experimental set-up for hydrogen production from biomass: gasification process integrated to a portable purification system—Part II. Barisano*, D.; Canneto, G.; Nanna, F.; et al. *Energies* 2022, 15, 4580. <https://doi.org/10.3390/en15134580>

Investigation of an Intensified Thermo-Chemical Experimental Set-Up for Hydrogen Production from Biomass: Gasification Process Performance—Part I. D. Barisano*, G. Canneto, F. Nanna, A. Villone, E. Fanelli, et al. *Processes* 2021, 9(7), 1104; <https://doi.org/10.3390/pr9071104>

Green hydrogen through biomass gasification. In: *Pianeta Idrogeno e Speciale Progetti ENEA*, n. 1 Gennaio - Aprile 2021, pp. 101 – 106, Energia, ambiente e innovazione. DOI 10.12910/EAI2021-020

Bioremediation of Wastewater Stream from Syngas Cleaning via Wet Scrubbing. L. Bianco*, E. D'Amico, A. Villone, F. Nanna, D. Barisano*. *Chemical engineering transactions*, Volume 80, pages: 31-36. <https://doi.org/10.3303/CET2080006>

Towards Methanol Economy: A Techno-environmental Assessment for a Bio-methanol OFMSW/Biomass/Carbon Capture-based Integrated Plant. Giuliano, A; Catizzone, E; Barisano, D; Nanna, F; Villone, A ; De Bari, I; Cornacchia, G; Braccio, G. *International journal of heat and technology*, Volume 37, Issue 3, Pages: 665-674. <https://doi.org/10.18280/ijht.370301>

Steam Biomass gasification with in situ CO₂ capture for advanced syngas applications. D. Barisano, F. Nanna, A. Villone, L. Del Zotto; T. A. Centeno; E. Bocci. Oral presentation at the 32nd European Biomass Conference and Exhibition, 24-27 June 2024, Marseille, France.

Biomass availability and suitability for the plant – BLAZE Project. Parallel Event: High efficiency and low emissions CHP technologies from biogenic residues. Oral Presentation at the 31st European Biomass Conference and Exhibition, 5-9 June, Bologna, Italy.

Towards the implementation of the BLAZE technology for CHP applications: preliminary gasification tests at a bench scale bubbling fluidized bed reactor. D. Barisano, F. Nanna, A. Villone, E. Catizzone, C. Freda,

F. Cosentino, D. Carboni, F. Di Benedetto, E. Bocci. 28th European Biomass Conference and Exhibition, 6-9 July, Virtual.

Biomass gasification: an overview about the EU experience. International Conference on Energy, Environment and Material Sciences (ICE2M-2019) Madan Mohan Malaviya University of Technology, December 1-3, 2019, Gorakhpur (U.P.), India. Invited speaker

Biomass to power generation and biofuels production through thermochemical gasification processes. Barisano D. International Conference on Challenges in Sustainable Development from Energy & Environment Perspective (CSDEEP-2017), Madan Mohan Malaviya University of Technology, March 24th – 25th 2017, Gorakhpur (U.P.), India. Paper in the conference proceedings. Invited speaker.