

Curriculum Vitae

Scientific Research and Professional Activities

Prof. Dr. Nicola Frison

Updated to September 2026

Nicola Frison: Curriculum Vitae

1 Personal Details

Prof. Dr. Nicola Frison

Born in Montagnana (Italy), February 21st, 1985
Associate Professor, SSD ICHI-02/A – Chemical Plants
(formerly ING-IND/25)
University of Verona
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2 Education

PhD in Environmental Science, University Ca' Foscari of Venice, 2015. Final dissertation: **“Novel biological sustainable solutions to optimize bioresource recovery and energy efficiency from downstream of anaerobic treatments”**.

Interuniversity Master of Engineering (2nd level, post-lauream), “Chemical Engineering for Environment”, Universities of Verona, Venice, Padova, Udine, Trieste and Bologna. Final dissertation: **“Nitrogen removal from anaerobic digestate through the via-nitrite pathway in Sequencing Batch Reactor”**, 2011.

M.Sc. in Environmental Science, University Ca' Foscari of Venice, final grade 110/110. Final dissertation: **“Energy recovery from organic waste in the agro-industrial sector: case studies in Veneto Region”**, 2010.

B.Sc. in Land Use and Planning, University of Padua, final grade 106/110. Final dissertation: **“Hydrological Monitoring of a small alpine basin”**, 2007.

3 Attendance at specialised courses

Nicola Frison attended the 3rd Summer School (2nd edition) “Innovative technologies for urban wastewater treatment plants: short, intensive and highly specialised course focussed on innovative technologies emerging nowadays for the treatment of municipal wastewaters” on behalf of NOVEDAR_Consolider (CSD2007-00055), Santiago de Compostela (Spain), from 28th June to 4th June 2012.

Nicola Frison attended the 1st Training School Water 2020 “Energy recovery in anaerobic processes in wastewater and sludge processing” on behalf of COST Action ES1202, Gliwice (PL), from 23rd to 28th September 2013.

4 Professional Appointments

From May 2022 to date, Nicola Frison is associate professor at the Department of Biotechnology of the University of Verona (SSD ING-IND/25, now ICHI-02/A – Chemical Plants, following the 2024 reorganisation of scientific-disciplinary sectors). Within the research activities, he established a research team focusing mainly on the recovery of bio-based compounds from organic waste and wastewater, extraction of volatile fatty acids, microbial protein production (including purple

phototrophic bacteria), polyhydroxyalkanoates and biological conversion of CO₂. He is a member of the research group “Chemical Engineering for the Environment and Bioprocesses”, which runs the Laboratory of Chemical Plants for the Environment and Bio-Processes (LABICAB).

From March 2019 to May 2022, Nicola Frison was assistant professor RTD type B (SSD ING-IND/25) at the Department of Biotechnology, working on the development of biological processes and biorefineries from organic waste and wastewater for the recovery of high added-value bio-based products.

From March 2017 to May 2019, Nicola Frison was assistant professor (RTD type A, SSD ING-IND/25) at the Department of Biotechnology, dealing with the integration of innovative biological systems in existing wastewater treatment plants for the valorisation of municipal wastewater and sewage sludge, recovery of phosphorus and biopolymers (polyhydroxyalkanoates).

October 2016 to May 2019, post-doc at the University of Verona financed by the SMART-Plant project (European Commission H2020), dealing with the design of the innovative biological pilot system for the production of polyhydroxyalkanoates and struvite recovery from municipal wastewater.

October 2015, post-doc researcher at the University of Verona financed by the ENERWATER project (European Commission H2020), dealing with the energy optimisation of the biological nutrient removal processes for wastewater treatment.

2014, post-doc researcher at the University of Verona financed by the LIVEWASTE project (LIFE12 ENV/CY/000544), dealing with the design, supervision and optimisation of a Sequencing Batch Reactor for the biological nutrient removal from zootechnical anaerobic digestate in Cyprus.

2011, post-doc researcher at the University of Verona: the research line focused on the interaction between the anaerobic digestion of fermentable biowaste and the side-stream biological nutrient removal (financed project: VALORGAS – Valorisation of food waste to biogas, FP7 n. 241334).

5 Institutional responsibilities

- 2025 to date: Rector’s Delegate (Referente della Rettrice) for Sustainability, University of Verona.
- 2025 to date: President of the Sustainable Universities Network body (Rete delle Università Sostenibili – RUS) of the University of Verona; previously Vice-President of the University RUS Committee.
- 2017 to date: Member of the Department of Biotechnology Council.
- Member of the Board of Professors of the PhD programme in Biotechnology and of the PhD programme in Molecular, Industrial and Environmental Biotechnology (Department of Biotechnology).
- Member of the Teaching Board of Biotechnology (Department of Biotechnology) and of the Teaching Board of Law (Department of Legal Sciences).
- 2019-2020-2021: Secretary of the Departmental Board of Biotechnology.
- 2019: Member of the committee for the establishment of a new Master’s Degree Programme (LM69) in “Sustainable Management of grape and wine identity”.
- 2021 to date: Member of the Third Mission Quality Assurance Committee of the Department of Biotechnology.
- 2021 to date: Member of the review committee for the Bachelor of Science in Biotechnology (L2) degree programme.
- 2021 to date: Member of the Quality Assurance Group of the L2 degree programme in Biotechnology.

- 2022 to date: Member of the technical committee for the development of the sustainability reports of the University of Verona.

6 Teaching activity

Nicola Frison has held or holds the following courses at the University of Verona:

Academic year	Degree course	Teaching	CFU
2016/2017	Agri-food Biotechnology (LM7)	Bio-processing of agro-food waste	6
2017/2018	Biotechnology (L2)	Fundamentals of environmental biotechnology processes and plants with laboratory	5+1
2018/2019	Biotechnology (L2)	Fundamentals of environmental biotechnology processes and plants with laboratory	5+1
2019/2020	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater	6
2019/2020	Biotechnology (L2)	Fundamentals of environmental biotechnology processes and plants with laboratory	5+1
2019/2020	Biotechnology (L2)	Fundamentals of biotechnological processes and plants laboratory	1
2020/2021	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater	6
2020/2021	Biotechnology (L2)	Fundamentals of environmental biotechnology processes and plants with laboratory	5+1
2020/2021	Biotechnology (L2)	Fundamentals of biotechnological processes and plants laboratory	1
2021/2022	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater	6
2021/2022	Biotechnology (L2)	Bioreactors with laboratory	5+1
2022/2023	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater with practices	5+1
2022/2023	Biotechnology (L2)	Bioreactors with laboratory	5+1
2022/2023	Biotechnology (L2)	Biotechnologies for the circular bioeconomy (module)	2
2022/2023	Law for technologies and sustainable innovation (LM/SC-GIU)	Biotechnological innovations for sustainable development	1
2023/2024	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater with practices	5+1
2023/2024	Biotechnology (L2)	Bioreactors with laboratory	5+1
2023/2024	Biotechnology (L2)	Biotechnologies for the circular bioeconomy (module)	2
2023/2024	Law for technologies and sustainable innovation (LM/SC-GIU)	Biotechnological innovations for sustainable development	1

Academic year	Degree course	Teaching	CFU
2023/2024	Professional course "Criminal protection of the environment, landscape and territory"	Water pollution (module 1)	0.5
2024/2025	Biotechnology for bioresources and sustainable development (LM8)	Biological treatment of wastewater with practices	5+1
2024/2025	Biotechnology (L2)	Bioreactors with laboratory	5+1
2024/2025	Biotechnology (L2)	Biotechnologies for the circular bioeconomy – Elements of bioeconomy and policies (module)	2
2024/2025	Law for technologies and sustainable innovation (LM/SC-GIU)	Biotechnological innovations for sustainable development	1
2025/2026	Biotechnology for bioresources and sustainable development (LM8)	Biorefineries	6
2025/2026	Biotechnology (L2)	Bioreactors with laboratory	5+1
2025/2026	Biotechnology (L2)	Biotechnologies for the circular bioeconomy – Elements of bioeconomy and policies (module)	2
2025/2026	Law for technologies and sustainable innovation (LM/SC-GIU)	Biotechnological innovations for sustainable development	1

Doctoral dissertation evaluator

- Candidate: Silvia Palmieri. Title: Valorizzazione di sottoprodotti industriali a base biologica per applicazioni innovative in ingegneria. Supervisor: Francesca Tittarelli, Università Politecnica delle Marche, PhD programme in Industrial Engineering.
- Candidate: Giampietro Chinellato. Title: Optimization of semi-dry anaerobic digestion for a wider diffusion of the food waste treatment for energy recovery. Technical and economic evaluation. Supervisor: Cristina Cavinato, Università Ca' Foscari Venezia, PhD programme in Environmental Sciences.
- Candidate: Nagore Guerra Gorostegui. Title: Obtaining new-generation fuels and bio-based fertilisers from sludges through biodrying and advanced composting technologies to enhance the overall resource recovery of the water sector. Supervisors: Sergio Ponsá and Belén Puyuelo, BETA Technological Center, University of Vic, Spain.

6.1 Teaching at foreign universities

- Invited lecture (1 hour), Master's programme "Environmental Engineering", University of Barcelona (21/11/2019).
- Environmental Technologies course, Bachelor's Degree in Chemical Engineering, University of Barcelona. Lecture: "Carbon to biopolymer recovery from raw materials: how long do we still have to wait?" (11/12/2018).
- Master of Environmental Engineering and Water Treatment, University of Barcelona. Lecture: "New targets for wastewater treatment plant: from energy consuming to biorefinery" (12/12/2018).
- Energy Management course, Bachelor of Environmental Science, University of Barcelona. Lecture: "Energy-efficient WWTP to WRRF towards the circular economy concept" (12/12/2018).

- Master’s programme “Water Engineering”, Brunel University London (UK), Department of Civil Engineering: fundamentals of municipal wastewater and sewage sludge treatment, anaerobic treatments and exercises, 2016.

6.2 Teaching in specialised courses on municipal and industrial wastewater treatment

- May 2014: respirometric methods module for treatment capacity assessment of sewage treatment plants and practical laboratory applications, 2nd-level Master’s degree in “Chemical Engineering of Water Purification and Renewable Energy”.
- November 2014 – January 2015: tutoring for practical laboratory activities, course Fundamentals of Chemical Plants and Bioprocesses, University of Verona.
- October 2015 – February 2016: lecturer for the specialised courses “Industrial Wastewater Treatment” and “Advanced Processes for Wastewater Treatment”, Federation of Scientific and Technical Associations (FAST) (coordinator Prof. Renato Vismara, Politecnico di Milano). Lectures: Emerging pollutants: evidence and regulations; The purification of hazardous substances at low levels: ozone, activated carbon, etc.
- Training seminar (2 hours) “Water: wastewater advanced treatment and energy recovery”: “Fermentation (acidogenic and alkaline) for the valorisation of organic substrates (primary, mixed and OFMSW sludge) and the treatment of urban wastewater. Theory, sizing and real-world case studies” and “UASB/EGSB for high organic load wastewater treatment. Theory, sizing and real case studies”, ETC Engineering (21/05/2018).
- Training seminar (2 hours) “Water: wastewater advanced treatment and energy recovery”: “Recovery and reuse of VFA and biopolymers: regulatory aspects, mass balances, case studies, future prospects”, ETC Engineering (09/04/2019).

7 Research experience

The research activities carried out by Nicola Frison at the Department of Biotechnology are or have been part of European, national and regional research projects and programmes, in particular:

- Digital Twin for cost-efficient treatments of wastewater in Anaerobic Reactors (from December 2023) – Euroka EUROSTAR;
- PRIN 2022 PHARPLE – Sustainable PHA recovery from agri-food waste via purPLE non-sulfur bacteria mixed cultures (Italian Ministry of University and Research, from September 2023);
- LIFE DIMITRA – Valorising anaerobic digestates into bio-fertilisers for climate-friendly agriculture (LIFE programme, from September 2023);
- REFRAME – Resource rEcovery FRom novel Assisted MEtabolism (H2020 MSCA, from September 2023);
- ELLIPSE – Efficient and novel waste streams co-processing to obtain bio-based solutions for packaging and agricultural sectors (from May 2023) – Circular Bio based Europe – Horizon Europe;
- Production of algal fertilisers and biostimulants from zootechnical digestates for an agricultural system with reduced environmental impact (from December 2022);
- 2b-NITRICA – Bio-based production of nitric acid from anaerobic digestate (Joint Research call 2021, co-funded by University of Verona and FUTURA CONCIMI);
- CIRCULAR BIOCARBON – Turning carbon of complex organic urban waste streams into value-added products (Bio-Based Industries Joint Undertaking, Grant Agreement 101023280);
- EcoDPI – Ecodesign and recycling of PPE in a circular industrial supply chain (POR/FESR, Veneto Region);

- CIRCforBIO – A circular economy system for multi-source biomass conversion to added value products (LIFE18 CCM/GR/001180);
- Wast4Bioplast – Turning wastewater into valuable bioplastics;
- SMART-Plant – Scale-up of low-carbon footprint material recovery techniques in existing wastewater treatment plants (Horizon 2020);
- Pioneer_STP – The Potential of Novel Processes to Improve Sustainability of Sewage Treatment Plants;
- JP2015 – Scale-up of innovative biotechnologies for nitrogen removal and material recovery for the eco-upgrading of existing wastewater treatment plants;
- IntCATCH (Horizon 2020, Grant Agreement 690323);
- ENERWATER (Horizon 2020, Grant Agreement 644771);
- LIVEWASTE (LIFE+, LIFE12 ENV/CY/000544);
- VALORGAS (FP7, Grant Agreement 241334).

The research activities of Nicola Frison have focused on the following two main topics:

1) Advanced and innovative biological processes for wastewater treatment:

- Design, implementation, verification and validation of advanced biological processes for nitrogen and phosphorus removal via nitrite from nitrogenous wastewater (e.g. anaerobic digestate of sewage sludge, zootechnical effluents) in pilot, demonstration and full-scale Sequencing Batch Reactors (SBR);
- Treatment of low-strength wastewater for nitrogen and phosphorus removal via nitrite (e.g. nitrification and denitrification, deammonification);
- Anaerobic treatment of high- and low-strength organic wastewater for COD removal and biogas production (e.g. Upflow Anaerobic Sludge Blanket), including winery wastewater.

2) Resource recovery from organic waste and wastewater:

- Production of microbial proteins (single-cell proteins, e.g. from purple non-sulfur bacteria) and polyhydroxyalkanoates (PHA) from mixed and pure cultures;
- Volatile fatty acids (VFAs) production and recovery through acidogenic fermentation of putrescible organic matter (e.g. sewage sludge, OFMSW, winery wastewater), including membrane-contactor-based extraction;
- Cellulose and phosphorus recovery (e.g. struvite) from sewage sludge and zootechnical effluents; valorisation of anaerobic digestate into bio-fertilisers and algal biostimulants.

Nicola Frison was also involved in the following research topics:

- Fate and effects of pharmaceuticals on biological processes for nitrogen and phosphorus removal;
- Real-time control, automation and monitoring of biological processes for nitrogen and phosphorus removal;
- Technologies for the removal of emerging compounds in municipal and industrial wastewater.

7.1 Research period abroad

Nicola Frison was granted a “Short Term Scientific Mission (STSM)” by COST Action ES1202. Host institute: REQUIMTE/CQFB, Department of Chemistry, Faculty of Science and Technology, New University of Lisbon. Local supervisor: Prof. Adrian Oehmen. Period: October to December 2013.

The objective of the STSM was the **investigation and optimisation of the biological phosphorus removal via nitrite and biopolymer production treating anaerobic supernatant from sewage sludge digestion**. The resulting scientific publications were:

- N. Frison, E. Katsou, S. Malamis, A. Oehmen, F. Fatone. Development of a novel process integrating the treatment of sludge reject water and the production of polyhydroxyalkanoates (PHAs). ENVIRONMENTAL SCIENCE AND TECHNOLOGY, vol. 49, 10877–10885.
- N. Frison, E. Katsou, S. Malamis, A. Oehmen, F. Fatone. Nutrient removal via nitrite from reject water and polyhydroxyalkanoate (PHA) storage during nitrifying conditions. JOURNAL OF CHEMICAL TECHNOLOGY AND BIOTECHNOLOGY, DOI 10.1002/jctb.4487.
- N. Frison, E. Katsou, S. Malamis, F. Fatone, A. Oehmen. A novel PHA production and nitrification process for treating anaerobic supernatants. Proceedings of the 2nd IWA Specialized International Conference ecoSTP2014, Verona (Italy), 23-25 June 2014.

7.2 Scientific production

Nicola Frison is author or co-author of 89 publications in peer-reviewed journals, cited around 2500 times, with an H-index of 35 (Scopus, September 2026) – update from Scopus/WoS; ResearchGate reports 96 research items and about 3,800 citations. His papers are mainly in the fields of Environmental Sciences, Chemical Engineering, Chemistry, Engineering and Energy.

7.3 Publications with impact factor

2026

Miotti, T., Perozeni, F., Peli, M., Bellamoli, F., Lo Coco, R., Frison, N., Zamboni, A., Felis, G.E., Ballottari, M. (2026). Valorization of anaerobic digestate as nutrients source for *Chlorella vulgaris* to produce biostimulants: analysis of photosynthetic response and microbiome composition. ALGAL RESEARCH.

Pezzuto, M., Lo Coco, R., Bolzonella, D., Frison, N. (2026). Winery wastewater valorisation into microbial protein: growth of purple phototrophic bacteria with caproate-rich VFAs effluent from a UASB reactor.

2025

Lo Coco, R., Pezzuto, M., Jelic, A., Cazzaniga, S., Frison, N. (2025). Novel continuous production of single-cell proteins from purple non-sulfur bacteria using gaseous volatile fatty acids by closed-loop membrane contactor system. BIORESOURCE TECHNOLOGY..

Magonara, C., Montagnese, E., Bertasini, D., ..., Frison, N., ..., Pesante, G. (2025). Mixed-culture polyhydroxyalkanoate production with variable hydroxyvalerate content from agri-food residues. ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH,.

Rizzioli, F., Cirilli, M., Frison, N., ..., Battista, F. (2025). Nutrient recovery from anaerobic digestate by different combination of pressure driven membranes. JOURNAL OF CLEANER PRODUCTION, vol., article no..

2024

Pesante, G., Tesoriero, C., Cadoria, E., Andreolli, M., Lampis, S., Vettori, A., Frison, N. (2024). Valorisation of agricultural residues into *Thauera* sp. Sel9 microbial proteins for aquaculture. ENVIRONMENTAL TECHNOLOGY & INNOVATION, vol., article no..

Lo Coco, R., Jelic, A., Järvelä, E., Frison, N. (2024). Recovery of bio-based volatile fatty acids from anaerobically treated winery wastewater using a closed-loop liquid-liquid hydrophobic membrane contactor system. CHEMICAL ENGINEERING JOURNAL.

Pesante, G., Bolzonella, D., Jelic, A., Frison, N. (2024). Upgrading biogas plants to produce microbial proteins for aquaculture feed. JOURNAL OF CLEANER PRODUCTION, no..

Bertasini, D., Battista, F., Mancini, R., Frison, N., Bolzonella, D. (2024). Hydrogen and methane production through two stage anaerobic digestion of straw residues. ENVIRONMENTAL RESEARCH, 247, 118101.

Singla Just, B., Binder, P.M., Guerra, N., ..., Robles Aguilar, A.A. (2024). Phosphorus release dynamics from ashes during a soil incubation study: effect of feedstock characteristics and combustion conditions. *AGRONOMY*,

Jimenez, R., Garrote, L., Hidalgo, D., ..., Bauer, L. (2024). ELLIPSE: efficient and novel waste streams co-processing to obtain bio-based solutions for personal care and agricultural sectors. *ENVIRONMENTAL ENGINEERING AND MANAGEMENT JOURNAL*,.

2023

Ibáñez López, M.E., Frison, N., Bolzonella, D., García-Morales, J.L. (2023). Enhancing anaerobic digestion with an UASB reactor of the winery wastewater for producing volatile fatty acid effluent enriched in caproic acid. *FERMENTATION*,..

Piubello Orsini, L., Leardini, C., Danesi, L., ..., Frison, N. (2023). Circular economy in the water and wastewater sector: tariff impact and financial performance of SMARTechs. *UTILITIES POLICY*.

Bastianelli, C., Pesante, G., Ambrosini, S., ..., Frison, N. (2023). Upcycling of PHA-producing bacteria for biostimulants production and polyhydroxyalkanoates recovery. *SCIENCE OF THE TOTAL ENVIRONMENT*,

Binder, P.M., Frison, N., Guerra, N., ..., Ponsá Salas, S. (2023). Innovative multiple resource recovery pathways from EBPR wastewater treatment-derived sludge. *BIOMASS CONVERSION AND BIOREFINERY*,

Bertasini, D., Battista, F., Rizzioli, F., Frison, N., Bolzonella, D. (2023). Decarbonization of the European natural gas grid using hydrogen and methane biologically produced from organic waste: a critical overview. *RENEWABLE ENERGY*.

Bolzonella, D., Bertasini, D., Lo Coco, R., ..., Frison, N., ..., Pesante, G. (2023). Toward the transition of agricultural anaerobic digesters into multiproduct biorefineries. *PROCESSES*

Rangel, C., Carvalho, G., Oehmen, A., ..., Frison, N., ..., Reis, M.A.M. (2023). Polyhydroxyalkanoates production from ethanol- and lactate-rich fermentate of confectionary industry effluents. *INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES*,

2022

Noutsopoulos, C., Gkoutzioupa, V., Katsou, E., Frison, N., Fatone, F., Malamis, S. (2022). Integrated selection of PHA-storing biomass and nitrogen removal via nitrite from sludge reject water: a mathematical model. *ENVIRONMENTAL TECHNOLOGY*, 1-14. doi: 10.1080/09593330.2022.2099311

Ribeiro, J.M., Conca, V., Santos, J.M.M., Dias, D.F.C., Sayi-Ucar, N., Frison, N., Oehmen, A. (2022). Expanding ASM models towards integrated processes for short-cut nitrogen removal and bioplastic recovery. *SCIENCE OF THE TOTAL ENVIRONMENT*, 821, 1-10.

Rizzioli, F., Bertasini, D., Bolzonella, D., Frison, N., Battista, F. (2022). A critical review on the techno-economic feasibility of nutrients recovery from anaerobic digestate in the agricultural sector. *SEPARATION AND PURIFICATION TECHNOLOGY*, 306, 122690.

Andreolli, M., Scerbacov, V., Frison, N., Zaccone, C., Lampis, S. (2022). Thauera sp. Sel9, a new bacterial strain for polyhydroxyalkanoates production from volatile fatty acids. *NEW BIOTECHNOLOGY*, 72, 71-79.

Pesante, G., Zuliani, A., Cannone, E., Greco, F., Tesoriero, C., Vettori, A., Frison, N. (2022). Biological conversion of agricultural residues into microbial proteins for aquaculture using PHA-producing mixed microbial cultures. *JOURNAL OF CLEANER PRODUCTION*, 378, 134554.

Critelli, P., Pesante, G., Lupinelli, S., Modesti, M., Zanatta, S., Battista, F., ... Frison, N. (2022). Production and characterisation of PHAs by pure culture using protein hydrolysates as sole carbon source. *ENVIRONMENTAL TECHNOLOGY & INNOVATION*, 28, 102919.

Bagatella, S., Ciapponi, R., Ficara, E., Frison, N., Turri, S. (2022). Production and characterization of polyhydroxyalkanoates from wastewater via mixed microbial cultures and microalgae. *SUSTAINABILITY*, 14(6), 3704.

2021

Foglia, A., Bruni, C., Cipolletta, G., Eusebi, A.L., Frison, N., Katsou, E., Akyol, C., Fatone, F. (2021). Assessing socio-economic value of innovative materials recovery solutions validated in existing wastewater treatment plants. *JOURNAL OF CLEANER PRODUCTION*, 322, 129048.

Rizzoli, F., Battista, F., Bolzonella, D., Frison, N. (2021). Volatile fatty acid recovery from anaerobic fermentate: focusing on adsorption and desorption performances. *INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH*, 60(37), 13701-13709.

Zuliani, L., Serpico, A., De Simone, M., Frison, N., Fusco, S. (2021). Biorefinery gets hot: thermophilic enzymes and microorganisms for second-generation bioethanol production. *PROCESSES*, 9(9), 1583.

Bruni, C., Foglia, A., Eusebi, A.L., Frison, N., Akyol, C., Fatone, F. (2021). Targeted bio-based volatile fatty acid production from waste streams through anaerobic fermentation: link between process parameters and operating scale. *ACS SUSTAINABLE CHEMISTRY & ENGINEERING*, 9(30), 9970-9987.

Frison, N., Andreolli, M., Botturi, A., Lampis, S., Fatone, F. (2021). Effects of the sludge retention time and carbon source on polyhydroxyalkanoate-storing biomass selection under aerobic-feast and anoxic-famine conditions. *ACS SUSTAINABLE CHEMISTRY & ENGINEERING*, 9(28), 9455-9464.

Battista, F., Frison, N., Bolzonella, D. (2021). Can bioplastics be treated in conventional anaerobic digesters for food waste treatment? *ENVIRONMENTAL TECHNOLOGY & INNOVATION*, 22, 101393.

Lorini, L., Martinelli, A., Capuani, G., Frison, N., Reis, M., Sommer Ferreira, B., ... Valentino, F. (2021). Characterization of polyhydroxyalkanoates produced at pilot scale from different organic wastes. *FRONTIERS IN BIOENGINEERING AND BIOTECHNOLOGY*, 9, 52.

Botturi, A., Battista, F., Andreolli, M., Faccenda, F., Fusco, S., Bolzonella, D., Lampis, S., Frison, N. (2021). Polyhydroxyalkanoated-rich microbial cells from bio-based volatile fatty acids as potential ingredient for aquaculture feed. *ENERGIES*, 14(1), 38.

Botturi, A., Ozbayram, E.G., Tondera, K., Gilbert, N.I., Rouault, P., Caradot, N., Gutierrez, O., Daneshgar, S., Frison, N., Akyol, C., Foglia, A., Eusebi, A.L., Fatone, F. (2021). Combined sewer overflows: a critical review on best practice and innovative solutions to mitigate impacts on environment and human health. *CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY*, 51(15), 1585-1618.

2020

Bolzonella, D., Battista, F., Mattioli, A., Nicolato, C., Frison, N., Lampis, S. (2020). Biological thermophilic post hydrolysis of digestate enhances the biogas production in the anaerobic digestion of agro-waste. *RENEWABLE AND SUSTAINABLE ENERGY REVIEWS*, 134, 110174.

Fernández-Domínguez, D., Astals, S., Peces, M., Frison, N., Bolzonella, D., Mata-Alvarez, J., Dosta, J. (2020). Volatile fatty acids production from biowaste at mechanical-biological treatment plants: focusing on fermentation temperature. *BIORESOURCE TECHNOLOGY*, 314, 123729.

Righetti, E., Nortilli, S., Fatone, F., Frison, N., Bolzonella, D. (2020). A multiproduct biorefinery approach for the production of hydrogen, methane and volatile fatty acids from agricultural waste. *WASTE AND BIOMASS VALORIZATION*, 1-8.

Vasilaki, V., Conca, V., Frison, N., Eusebi, A.L., Fatone, F., Katsou, E. (2020). A knowledge discovery framework to predict the N₂O emissions in the wastewater sector. *WATER RESEARCH*, 178, 115799.

Conca, V., da Ros, C., Valentino, F., Eusebi, A.L., Frison, N., Fatone, F. (2020). Long-term validation of polyhydroxyalkanoates production potential from the sidestream of municipal wastewater treatment plant at pilot scale. *CHEMICAL ENGINEERING JOURNAL*, 390, 124627.

Benedetti, B., Majone, M., Cavaliere, C., Montone, C.M., Fatone, F., Frison, N., Laganà, A., Capriotti, A.L. (2020). Determination of multi-class emerging contaminants in sludge and recovery materials from waste water treatment plants: development of a modified QuEChERS method coupled to LC–MS/MS. *MICROCHEMICAL JOURNAL*, 155, 104732.

Akyol, Ç., Foglia, A., Ozbayram, E.G., Frison, N., Katsou, E., Eusebi, A.L., Fatone, F. (2020). Validated innovative approaches for energy-efficient resource recovery and re-use from municipal wastewater: from anaerobic treatment systems to a biorefinery concept. *CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY*, 50(9), 869-902.

Da Ros, C., Conca, V., Eusebi, A.L., Frison, N., Fatone, F. (2020). Sieving of municipal wastewater and recovery of bio-based volatile fatty acids at pilot scale. *WATER RESEARCH*, 174, 115633.

Foglia, A., Akyol, Ç., Frison, N., Katsou, E., Eusebi, A.L., Fatone, F. (2020). Long-term operation of a pilot-scale anaerobic membrane bioreactor (AnMBR) treating high salinity low loaded municipal wastewater in real environment. *SEPARATION AND PURIFICATION TECHNOLOGY*, 236, 116279.

Battista, F., Frison, N., Pavan, P., Cavinato, C., Gottardo, M., Fatone, F., Eusebi, A.L., Majone, M., Zeppilli, M., Fino, D., Bolzonella, D. (2020). Food wastes and sewage sludge as feedstock for an urban biorefinery producing biofuels and added-value bioproducts. *JOURNAL OF CHEMICAL TECHNOLOGY & BIOTECHNOLOGY*, 95(2), 328-338.

2019

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7.6 Awards for research and innovation activities

- On 20 October 2020, as main contact person, Nicola Frison obtained the publication of the Environmental Technology Verification of the SCENA (Short-Cut Enhanced Nutrients Abatement) technology in the official channels of the European Commission (https://ec.europa.eu/environment/ecoap/etv/scena-short-cut-enhanced-nutrients-abatement_en).
- Award by AnoxKaldnes Cella™ Technologies – Veolia for excellence in contribution to advancements in the science and engineering of PHA production and valorisation, September 2015.

7.7 Referee for international ISI journals and research projects; editorial activity

2026 to date: Associate Editor for the Journal Cleaner Waste System (Elsevier)

Nicola Frison is reviewer for the following ISI journals: *Process Biochemistry* (Elsevier), *Chemical Engineering Journal* (Elsevier), *Water Science and Technology* (IWA Publishing), *Desalination* (Elsevier), *Industrial & Engineering Chemistry Research* (ACS), *Desalination and Water Treatment*, *Waste Management and Research* (SAGE), *New Biotechnology* (Elsevier), *Waste Management* (Elsevier),

Reviewer of a research proposal submitted to the National Science Centre of Poland (Narodowe Centrum Nauki – NCN), 2015.

Guest Editor of the Special Issue “Sustainable Reuse of Municipal Wastewater: Innovations and Challenges”, section “Environmental Sustainability and Applications”, *Sustainability* (MDPI).

7.8 Organisation of international conferences

- Member of the organising committee of the international conference “Sustainable Solid Waste Management”, Tinos island (Greece), 2015.
- Member of the organising committee of the “3rd Resource Recovery Conference – International Water Association”, Venice, 8-12 September 2019.
- Scientific coordinator of the ACQUARIA conference “Management of wastewater, sludge and production wastes according to the criteria of ecological transition”, Veronafiere, October 2021 to 2026.

8 Knowledge valorization (third mission)

8.1 Patents

Nicola Frison is co-owner of the following inventions:

- n. MI2013A000946, invention date 10/06/2013: “Processo per la purificazione di liquami municipali, zootecnici e/o industriali mediante rimozione di azoto ammoniacale e fosfati da un surnatante anaerobico”.
- n. MI2014A002223, invention date 23/12/2014: “Processo per la preparazione di bioplastiche”.
- “Processo e relativo impianto per la rimozione e il recupero di azoto ammoniacale da reflui contenenti azoto”, file number 22155989.1, 9 February 2022

8.2 Spin-off company, University of Verona

From 2013 to 2019, Nicola Frison was co-founder of the University of Verona spin-off company INNOVEN Srl (www.innoven.it), of which he became CEO in October 2015. On behalf of INNOVEN Srl he carried out activities for the development and market transfer of innovative and sustainable bioprocesses for wastewater treatment, PHA production, and energy and nutrient recovery from biowaste and wastewater. In this context INNOVEN Srl was beneficiary of the following EU projects:

- Bio-Based Industries (H2020-BBI-JTI-2018) INGREEN – Bio-based ingredients for sustainable industries through biotechnology (Grant Agreement 838120);
- Bio-Based Industries (H2020-BBI-JTI-2016) AFTERLIFE – Advanced Filtration TEchnologies for the Recovery and Later conversion of relevant Fractions from wastEwater (Grant Agreement 745737);
- Horizon 2020 NOAW – Innovative approaches to turn agricultural waste into ecological and economic assets (H2020-WASTE-2015-two-stage, 2016).

8.3 Technical-scientific consultancy

Nicola Frison was technical and operational advisor for the following projects:

- Zuegg SpA. Collaboration agreement for the study of measures to prevent sulfite formation in wastewater from the Zuegg plant in Verona.
- Fidia Farmaceutici SpA. Technical-scientific collaboration for the verification and functional optimisation of the biotechnological processes and plants of the company’s wastewater treatment plant.
- CAP Holding. Technical-scientific drafting of a master plan for circular wastewater management and support for the design and implementation of VFA production and phosphorus recovery at the Sesto San Giovanni and Robecco sul Naviglio plants.
- 3V Tech. Study of biological processes in a pilot reactor to evaluate the biological treatability of liquid waste and identify optimal operating conditions.

- Bioreal. Scientific and technical support in the field of water and waste treatment in the civil and industrial sectors.
- 3V Green Eagle. Technical-scientific support in liquid waste treatment, sewage sludge and evaluation of processes for concomitant resource recovery; study of the chemical-physical and biological process chain of the existing plant through inspections, analytical and respirometric campaigns.
- Zuccato HC. Pilot-scale studies on Rhodobacter sp.-mediated treatment of winery wastewater vs conventional activated sludge; Rhodobacter sp.-mediated CO₂ capture for biogas upgrading; growth yield of microbial biomass under aerobic and photosynthetic conditions.
- ETC Engineering / ETC-ENVIS. Scientific and technical consulting in support of corporate R&D projects, feasibility studies and designs for industrial wastewater treatment and reuse plants, leachate and organic waste treatment plants.
- Algae&Algae. Evaluation of chemical/physical pretreatments of microalgal substrates to increase anaerobic biodegradability and specific methane production.
- INNOVEN. Technical-scientific assistance in the characterisation of wastewater and biomass for anaerobic digestion and fermentation processes aimed at high value-added organic compounds.

8.4 Outreach initiatives for children and young people

- Participation in the 2017 edition of “Kids University”, organised by the University of Verona for primary and secondary school pupils.

8.5 Outreach initiatives for lay audiences

- Participation in science popularisation initiatives such as the European Researchers’ Night and the annual event organised by students in the area of Science and Engineering (over 4,000 attendees annually).

8.6 Professional training activities

- Training seminar (4 hours) for VIVERACQUA representatives on the calculation of environmental benefits of investments and methodology for calculating avoided CO₂ emissions: innovative technologies for energy efficiency and emission mitigation, 25 June 2021.
- Training seminar on winery wastewater treatment for personnel of wineries of primary national interest (Zonin, Caviro, Frescobaldi...), organised by Società Trattamento Acque – STA SpA and TERGEO, within a project promoted by Unione Italiana Vini (UIV).
- Specialised seminar on acidogenic fermentation and anaerobic treatment of wastewater and sewage sludge, WATER course organised by ETC at the Trento headquarters.
- Frison, N. (2021). Management and valorisation of purified water as an element of sustainable development. 31st World Earth Day “Water and the blue planet. Strategies, networks and best practices for sustainable consumption”, Sustainable Universities Network, Verona.
- Frison, N. (2021). Circular economy and the wine supply chain: high value-added wastes and by-products. “Valpolicella. Towards sustainable viticulture”, San Pietro in Cariano, 2021.
- Lecturer (0.5 CFU, “Water pollution”) in the University of Verona professional course “Criminal protection of the environment, landscape and territory”, a.y. 2023/2024.

I hereby consent to the processing of my personal data in accordance with Regulation (EU) 2016/679 (GDPR) and Italian Legislative Decree 196/2003 as amended.

Verona, 30/09/2026

Nicola Frison

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