

UNIVERSITY OF MILAN

Public selection for recruiting No.1 tenure track researcher(s) (RTT) for competition sector 01/B1 - Informatica, (scientific-disciplinary sector INF/01 - Informatica) at the Department of Computer Science "Giovanni degli Antoni" (announcement published in Official Gazette No. 41 of 21/05/2024) - Competition code 5551

FILIPPO PECCI CURRICULUM VITAE

PERSONAL DATA

SURNAME	PECCI
NAME	FILIPPO
DATE OF BIRTH	██████-██-██████

RESEARCH OBJECTIVE

Develop and apply computational methods to solve large-scale mixed-integer optimization models, optimize design and control of complex network systems, and provide decision support to accelerate transition to net-zero emissions and resilient infrastructure systems.

QUALIFICATIONS

DEGREE

Laurea Magistrale in Matematica, Università degli Studi di Padova (Italy), Award date: 14/02/2014
Laurea Triennale in Matematica, Università degli Studi di Padova (Italy), Award date: 22/09/2011

DOCTORAL DEGREE

Doctor of Philosophy, Imperial College London (UK), Award date: 01/07/2018.

Thesis title: Optimal design for control of water supply networks by mixed integer programming.

RESEARCH CONTRACTS, RESEARCH FELLOWSHIP CONTRACTS, POSTDOCTORAL SCHOLARSHIPS OR SIMILAR CONTRACTS

10/10/2022 - present	Associate Research Scholar, Andlinger Center for Energy and the Environment, Princeton University (USA)
01/07/2018 - 10/10/2022	Postdoctoral Research Associate, Department of Civil and Environmental Engineering, Imperial College London (UK)
13/10/2014 - 01/07/2018	PhD Studentship, Department of Civil and Environmental Engineering, Imperial College London (UK)

TEACHING ACTIVITIES

Princeton University

Fall 2022- present Guest lecturer for Applied Optimization Methods for Energy Systems Engineering, (500 level graduate elective). Lectures on decomposition methods with application to energy systems. Coding tutorials using the Julia Programming Language.

Imperial College London

Fall and Spring 2020-2021 Main lecturer for BSc and MSc modules on convex optimization with applications in water systems.

Spring 2016-2021 Guest lecturer and teaching assistant for MSc modules on modelling and optimization of water distribution networks.

Fall 2015-2017 Mathematics tutor at the Department of Civil and Environmental Engineering, with focus on linear algebra and calculus.

STUDENT MENTORING

Princeton University

- Spring 2024: Sullivan Meyer' 24 (BSE Mechanical Engineering):

Co-supervisor for final year thesis project "Integrated Strategic and Operational Model of a National Aviation System to Support Sectoral Decarbonization".

Imperial College London

PhD Students

- [2021 - present] Bradley Jenks
 - Thesis: "Modelling and Control of Wate Quality in Water Distribution Networks".
- [2021 - present] Yuanyang Liu
 - Thesis: "Near Real-Time Modelling and Failure Diagnosis of Water Distribution Networks".
- [2018 - 2021] Dr Aly-Joy Ulusoy
 - Thesis: "Multi-objective design-for-control of resilient water distribution networks"
- [2018 - 2021] Dr Caroline Blocher
 - Thesis: "Leak Localisation in Water Distribution Networks: Regularisation of an Ill-Posed Inverse Problem".
- [2018 - 2021] Dr Alexander Waldron
 - Thesis: "Recurring Automated Model Calibration for Dynamically Adaptive Water Distribution Networks".

MSc Students

- [Spring 2018] Alexander Thebelt
 - Thesis: “Application of Large-Scale Optimization Methods for Efficient Real-Time Detection of Contaminations in Water Supply Networks”.
- [Spring 2018] Yifei Lou
 - Thesis: “The analysis of network resilience for firefighting water supply to a high-rise building”.
- [Spring 2016] Marc Girona Mata
 - Thesis: “Towards a more adaptive water distribution network in Barcelona”.
- [Spring 2016] Louis Vallette Viillard
 - Thesis: “Assessing the resilience of water distribution networks using a multi-criteria approach”.

IMPLEMENTATION OF PROJECTS

2022 - present	[WP lead on optimization methods] “Princeton Zero-Carbon Technology Consortium” (funded by GE, Google, ClearPath, and Breakthrough Energy) and “Carbon Mitigation Initiative” (funded by BP). PI: Prof Jesse Jenkins
2022 - present	[WP lead on optimization methods and open-source code development] “Net-Zero Earth Challenge”, funded by Schmidt Futures. PIs: Chris Craig, Eric Larson and Prof Jesse Jenkins
2018 - 2022	[WP lead on optimization methods] Postdoctoral Research Associate at Imperial College London. Worked on project: “ <i>Dynamically Adaptive and Resilient Water Supply Networks for a Sustainable Future</i> ”. EPSRC Fellowship led by Dr Ivan Stoianov.
2014-2018	[Participant] PhD Researcher at Imperial College London. Worked on “ <i>NEC - Imperial Smart Water Systems: Big Data Technologies for Smart Water Networks</i> ”. Joint project between Department of Civil and Environmental Engineering and Department of Computing, funded by NEC. PIs: Prof Julie McCann and Dr Ivan Stoianov.

ORGANISATION, SUPERVISION AND COORDINATION OF NATIONAL AND INTERNATIONAL RESEARCH GROUPS, OR PARTICIPATION IN THEM

2022 - present	[Methods & Algorithms lead] Associate Research Scholar at ZERO Lab, research group at the Andlinger Center for Energy and the Environment, Princeton University. PI: Prof Jesse Jenkins
2018 - 2022	[Methods & Algorithms lead] Postdoctoral Research Associate at InfraSense Labs, research group at the Department of Civil and Environmental Engineering, Imperial College London. PI: Dr Ivan Stoianov
2014 - 2018	PhD Researcher at InfraSense Labs, research group at the Department of Civil and Environmental Engineering, Imperial College London. PI: Dr Ivan Stoianov.

ONGOING COLLABORATIONS (beyond Princeton ZERO Lab)

- **MACRO**: new generation, open-source, sector-coupled energy system model.
Collaborators: Dharik Mallapragada (NYU) and Ruaridh McDonald (MIT Energy Initiative)
My role: **lead developer**.
- **GenX**: open-source electricity resource capacity expansion model.
Collaborators: Dharik Mallapragada (NYU), Ruaridh McDonald (MIT Energy Initiative)
My role: **core contributor**.
- A bi-level programming approach to climate policy design.
Collaborators: Emil Dimanchev (NTNU - Norwegian University of Science and Technology), Steve A. Gabriel (NTNU), Stein-Erik Fleten (NTNU), Magnus Korpas (NTNU)
My role: **contribute to method development and paper writing**.
- Optimal design-for-control of dynamically adaptive water networks.
Collaborators: Ivan Stoianov (Imperial College London).
My role: **lead research in computational optimization methods**.

HOLDING PATENTS

Stoianov, Abraham, and Pecci. "Management of liquid conduit systems". Granted. Number: PCT/GB2016/054026. GB2545899B (2018), US11078650B2 (2021), EP3394697B1 (2021).

Description: A method for controlling conditions within a liquid conduit system. The method comprising: defining a zone within the liquid conduit system, wherein pressure within the zone is influenced by one or more actuator valves; controlling the one or more actuator valves in dependence on a Pareto efficient solution to the minimisation of functions of the average pressure within the zone (AZP) and the pressure variability within the zone (PVZ).

SPEAKING AT NATIONAL AND INTERNATIONAL CONFERENCES AND CONVENTIONS

1. **The Hexagon Workshop on Power Grids**, University of Bergamo (Italy), 18-20 June 2024. *Regularized Benders Decomposition for High Performance Capacity Expansion Models*.
2. **2023 INFORMS Annual Meeting**, Phoenix (Arizona), 15-18 October, 2023. *Learning to optimize macro-energy systems*.
3. **International Conference on Optimization and Decision Science 2022**, Florence, Italy, 30 August - 2 September, 2022. *A global optimization framework for resilient water distribution networks*.
4. **European Control Conference 2022**, London, United Kingdom, 12-15 July, 2022. *Optimal Design for-Control of Chlorine Booster Systems in Water Networks via Convex Optimization*.
5. **17th Computing and Control for the Water Industry (CCWI)**, Exeter, United Kingdom, 1-4 September, 2019. *Tight Convex Relaxations for Optimal Design and Control Problems in Water distribution Networks*.
6. **6th International Conference on Continuous Optimization (ICCOPT)**, Berlin, Germany, 3 - 8 August, 2019. *Non-linear inverse problems via sequential convex optimization*.
7. **6th International Conference on Engineering Optimization (EngOpt)**, Lisbon, Portugal, 17 - 19 September, 2018. *A branch and bound method for globally optimizing valve locations in water distribution networks*.

8. 20th IFAC World Congress, Toulouse, France, 9 - 14 July, 2017. *Outer approximation methods for the solution of co-design optimization problems in water distribution networks.*
9. 13th Computing and Control for the Water Industry (CCWI), Leicester, United Kingdom, 2-4 September, 2015. *Mathematical programming methods for pressure management in water distribution systems.*

SCIENTIFIC PRODUCTION

PRODUCTIVITY METRICS

26 publications and 15 co-authors according to Scopus.
Author of 15 articles in top-ranked Q1 journals and 4 articles in Q2 journals (Scimago).
First author of 9 journal articles and 4 peer-reviewed conference proceedings.

IMPACT METRICS

CITATIONS: 231 H-INDEX: 10 (Scopus)

CITATIONS: 313 H-INDEX: 12 (Google Scholar)

PEER-REVIEWED JOURNAL ARTICLES

- [1] A. Jacobson, **F. Pecci**, N. Sepulveda, Q. Xu, and J. Jenkins, "A Computationally Efficient Benders Decomposition for Energy Systems Planning Problems with Detailed Operations and Time-Coupling Constraints," *INFORMS Journal on Optimization*, vol. 6, no. 1, pp. 32-45, Jan. 2024, doi: [10.1287/ijoo.2023.0005](https://doi.org/10.1287/ijoo.2023.0005).
- [2] **F. Pecci** and I. Stoianov, "Bounds and convex heuristics for bi-objective optimal experiment design in water networks," *Computers & Operations Research*, vol. 153, p. 106181, 2023, doi: [10.1016/j.cor.2023.106181](https://doi.org/10.1016/j.cor.2023.106181). [SJR Ranking Q1]
- [3] B. Jenks, A.-J. Ulusoy, **F. Pecci**, and I. Stoianov, "Dynamically adaptive networks for integrating optimal pressure management and self-cleaning controls," *Annual Reviews in Control*, vol. 55, pp. 486-497, 2023, doi: [10.1016/j.arcontrol.2023.03.014](https://doi.org/10.1016/j.arcontrol.2023.03.014). [SJR Ranking Q1]
- [4] B. Jenks, **F. Pecci**, and I. Stoianov, "Optimal design-for-control of self-cleaning water distribution networks using a convex multi-start algorithm," *Water Research*, vol. 231, p. 119602, 2023, doi: [10.1016/j.watres.2023.119602](https://doi.org/10.1016/j.watres.2023.119602). [SJR Ranking Q1]
- [5] A. Waldron, A. Ulusoy, **F. Pecci**, and I. Stoianov, "Principal Component Based Sampling for the Continuous Maintenance of Hydraulic Models," *Water Research*, vol. 222, no. August, p. 118905, 2022, doi: [10.1016/j.watres.2022.118905](https://doi.org/10.1016/j.watres.2022.118905). [SJR Ranking Q1]
- [6] A. Ulusoy, **F. Pecci**, and I. Stoianov, "Bi-objective design-for-control of water distribution networks with global bounds," *Optimization and Engineering*, vol. 23, pp. 527-577, 2022, doi: [10.1007/s11081-021-09598-z](https://doi.org/10.1007/s11081-021-09598-z). [SJR Ranking Q2]
- [7] A. Ulusoy, H. A. Mahmoud, **F. Pecci**, E. C. Keedwell, and I. Stoianov, "Bi-objective design-for-control for improving the pressure management and resilience of water distribution networks," *Water Research*, vol. 222, no. July, p. 118914, 2022, doi: [10.1016/j.watres.2022.118914](https://doi.org/10.1016/j.watres.2022.118914). [SJR Ranking Q1]
- [8] **F. Pecci**, I. Stoianov, and A. Ostfeld, "Convex Heuristics for Optimal Placement and Operation of Valves and Chlorine Boosters in Water Networks," *Journal of Water Resources Planning and Management*, vol. 148, no. 2, pp. 1-14, 2022, doi: [10.1061/\(ASCE\)WR.1943-5452.0001509](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001509). [SJR Ranking Q1]

- [9] **F. Pecci**, I. Stoianov, and A. Ostfeld, "Relax-Tighten-Round Algorithm for Optimal Placement and Control of Valves and Chlorine Boosters in Water Networks," *European Journal of Operational Research*, vol. 295, no. 2, pp. 690-698, 2021, doi: [10.1016/j.ejor.2021.03.004](https://doi.org/10.1016/j.ejor.2021.03.004). [SJR Ranking Q1]
- [10] C. Blocher, **F. Pecci**, and I. Stoianov, "Prior Assumptions for Leak Localisation in Water Distribution Networks with Uncertainties," *Water Resources Management*, no. 0123456789, 2021, doi: [10.1007/s11269-021-02988-z](https://doi.org/10.1007/s11269-021-02988-z). [SJR Ranking Q1]
- [11] A. Waldron, **F. Pecci**, and I. Stoianov, "Regularisation of an inverse problem for parameter estimation in water distribution networks," *Journal of Water Resources Planning and Management*, vol. 146, no. 9, p. 04020076, 2020, doi: [10.1061/\(ASCE\)WR.1943-5452.0001273](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001273). [SJR Ranking Q1]
- [12] A. Ulusoy, **F. Pecci**, and I. Stoianov, "An MINLP-Based Approach for the Design-for-Control of Resilient Water Supply Systems," *IEEE Systems Journal*, vol. 14, no. 13, pp. 4579-4590, 2020, doi: [10.1109/JSYST.2019.2961104](https://doi.org/10.1109/JSYST.2019.2961104). [SJR Ranking Q1]
- [13] **F. Pecci**, P. Parpas, and I. Stoianov, "Sequential Convex Optimization for Detecting and Locating Blockages in Water Distribution Networks," *Journal of Water Resources Planning and Management*, 2020, doi: [10.1061/\(ASCE\)WR.1943-5452.0001233](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001233). [SJR Ranking Q1]
- [14] D. Nerantzis, **F. Pecci**, and I. Stoianov, "Optimal control of water distribution networks without storage," *European Journal of Operational Research*, vol. 284, no. 1, pp. 345-354, 2020, doi: [10.1016/j.ejor.2019.12.011](https://doi.org/10.1016/j.ejor.2019.12.011). [SJR Ranking Q1]
- [15] C. Blocher, **F. Pecci**, and I. Stoianov, "Localizing leakage hotspots in water distribution networks via the regularization of an inverse problem," *Journal of Hydraulic Engineering*, 2020, doi: [10.1061/\(ASCE\)HY.1943-7900.0001721](https://doi.org/10.1061/(ASCE)HY.1943-7900.0001721). [SJR Ranking Q2]
- [16] **F. Pecci**, E. Abraham, and I. Stoianov, "Model reduction and outer approximation for optimising the placement of control valves in complex water networks," *Journal of Water Resources Planning and Management*, vol. 145, no. 5, p. 04019014, 2019, doi: [10.1061/\(ASCE\)WR.1943-5452.0001055](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001055). [SJR Ranking Q1]
- [17] **F. Pecci**, E. Abraham, and I. Stoianov, "Global optimality bounds for the placement of control valves in water supply networks," *Optimization and Engineering*, vol. 20, no. 2, pp. 457-495, 2019, doi: [10.1007/s11081-018-9412-7](https://doi.org/10.1007/s11081-018-9412-7). [SJR Ranking Q2]
- [18] **F. Pecci**, E. Abraham, and I. Stoianov, "Scalable Pareto set generation for multiobjective co-design problems in water distribution networks: a continuous relaxation approach," *Structural and Multidisciplinary Optimization*, vol. 55, no. 3, pp. 857-869, 2017, doi: [10.1007/s00158-016-1537-8](https://doi.org/10.1007/s00158-016-1537-8). [SJR Ranking Q1]
- [19] **F. Pecci**, E. Abraham, and I. Stoianov, "Quadratic Head Loss Approximations for Optimisation of Problems in Water Supply Networks," *Journal of Hydroinformatics*, vol. 19, no. 4, pp. 493-506, 2017, doi: [10.2166/hydro.2017.080](https://doi.org/10.2166/hydro.2017.080). [SJR Ranking Q2]
- [20] **F. Pecci**, E. Abraham, and I. Stoianov, "Penalty and relaxation methods for the optimal placement and operation of control valves in water supply networks," *Computational Optimization and Applications*, vol. 67, no. 1, pp. 201-223, 2017, doi: [10.1007/s10589-016-9888-z](https://doi.org/10.1007/s10589-016-9888-z). [SJR Ranking Q1]

PEER-REVIEWED CONFERENCE PROCEEDINGS

- [1] **F. Pecci**, I. Stoianov, and A. Ostfeld, "Optimal Design-for-Control of Chlorine Booster Systems in Water Networks via Convex Optimization," *Proceedings of the European Control Conference (ECC) 2022*, pp. 1988-1993, 2022.

[2] **F. Pecci**, E. Abraham, and I. Stoianov, "Outer approximation methods for the solution of co-design optimisation problems in water distribution networks," *IFAC-PapersOnLine*, vol. 50, no. 1, pp. 5373-5379, Jul. 2017, doi: [10.1016/j.ifacol.2017.08.1069](https://doi.org/10.1016/j.ifacol.2017.08.1069).

[3] **F. Pecci** and I. Stoianov, "Optimising valve placement and pressure control for multi-feed sectors in water supply networks using outer approximation," in *CCWI 2017 - Computing and Control for the Water Industry*, Sheffield (UK): Figshare, 2017, p. doi: [10.15131/shef.data.5364196.v1](https://doi.org/10.15131/shef.data.5364196.v1).

[4] **F. Pecci**, E. Abraham, and I. Stoianov, "Mathematical Programming Methods for Pressure Management in Water Distribution Systems," *Procedia Engineering*, vol. 119, no. 1, pp. 937-946, 2015, doi: [10.1016/j.proeng.2015.08.974](https://doi.org/10.1016/j.proeng.2015.08.974).

PREPRINTS

[1] **F. Pecci** and J. D. Jenkins, "Regularized Benders Decomposition for High Performance Capacity Expansion Models." arXiv, Mar. 04, 2024. [Online]. Available: <http://arxiv.org/abs/2403.02559>.

[2] B. Jenks, A.-J. Ulusoy, **F. Pecci**, and I. Stoianov, "Distributed nonconvex optimization for control of water networks with time-coupling constraints." arXiv, Nov. 09, 2023. [Online]. Available: <http://arxiv.org/abs/2311.05180>

Date

12/06/2024

Place

PRINCETON NJ (USA)