

PERSONAL INFORMATION

Najafi, Behzad

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✉ Behzad.najafi@polimi.it

Sex Male | Date of birth 21/11/1987 | Place of birth Tehran | Nationality Iranian

Work Permit Permanent resident of EU region issued by Italy

EDUCATION AND TRAINING

Jan 2013-Feb 2016

PhD in Energy Science and Technology

Politecnico di Milano, Milan, Italy

- PhD with honours (Dottorato con Merito) - Thesis Title: Predictive Modeling and Adaptive Long-term Performance Optimization of HT-PEM Fuel Cell based Micro-CHP Systems, Advisors: Prof. Andrea Casalegno, Prof. Fabio Rinaldi
- A collaboration with ICI Caldaie S.p.A in the context of "MICROGEN30" Project funded by Italian Ministry of Economic Development

Sep 2010-Dec 2012

Master of Science in Energy Engineering

Politecnico di Milano, Milan, Italy

- GPA: 110/110 - Thesis Title: Performance Analysis of Residential Micro Cogeneration Systems Based on HT and LT PEM Fuel Cells,,Advisors: Prof. Fabio Rinaldi, Prof. Andrea Casalegno,
- A collaboration with ICI Caldaie S.p.A, in the context of "REAL-FC" project funded by Lombardy region and "STAR" funded by Italian Ministry of Economic Development

Sep 2005-Feb 2010

Bachelor of Science in Mechanical Engineering

K. N Toosi University of Technology, Tehran, Iran, GPA 86%

WORK EXPERIENCE

Apr 2016-Present

Research Fellow (Ricercatore a Tempo Det. Tipo A)

Department of Energy, Politecnico di Milano

Mar 2016-Mar 2019

Adjunct Professor

Department of Energy, Politecnico di Milano

Mar 2016—Oct 2018

Researcher (Post-doctoral Fellow)

Department of Energy, Politecnico di Milano

Jan 2013 - Feb 2015

PhD Applicant

Department of Energy, Politecnico di Milano

Feb 2012 - Dec 2012

Researcher

Department of Energy, Politecnico di Milano

July 2011 - Jan 2012

Researcher

MUSP Laboratory, Politecnico di Milano

AWARDS AND HONOURS

- Oct 2016 Italian National Scientific Habilitation (Qualification) for Associate Professorship (Abilitazione Scientifica Nazionale – fascia: 2) in 09/C2 sector
- Nov 2016 Politecnico di Milano International (Post-doctoral) Fellowship
- Jan 2016 German Academic Exchange Service award, for study period in Germany (not utilized)
- Jan 2013 Full Scholarship for PhD Program in Energy Sci. and Tech., Politecnico di Milano
- Oct 2010 Gold (Full) Scholarship for M.Sc. in Energy Engineering, Politecnico di Milano

RESEARCH METRICS

26 ISI Journal Publications, 852 citations, h index: 16 (Scopus, May 2018)

THESIS SUPERVISION

Supervisor of the following M.Sc. Theses:

- Shaju, Arun, Apr 2019, Machine Learning based building characteristics and Performance estimation through analysing consumption profiles
- Bonomi Paolo, Dec 2019, Machine learning based fault diagnosis and performance estimation of automotive PEM fuel cells through optimal EIS tests
- Hanusovsky Andrej (co-advisor), Dec 2019, Reproducible machine-learning physical-based models for pressure drop estimation in two phase diabatic and adiabatic flows
- Silva, Michela, Oct 2018, Machine learning based consumption prediction and hourly optimization of heating system for a hospital complex.
- Tognoli, Marco, Oct 2017, Dynamic modelling, experimental validation and optimal sizing of industrial fire-tube boilers for various demand profiles
- Moghaddampour, Farzad, Oct 2017, Feasibility analysis of renewable energy systems for rural electrification in different climatic zones of Peru
- Manivannan, Manoj, Oct 2017, Machine learning based short-term prediction of air-conditioning loads through smart meter analytics
- Benevento, Lorenzo, Apr 2017 Energy auditing and proposing energy saving measures for an Italian SME through building energy simulation

TEACHING EXPERIENCE

- Lecturer
Spring 2015/2016
Fall 2016/2017
Fall 2017/2018
Fall 2018/2019
Energy and Environmental Technologies for Building Systems (In English), M.Sc. in Energy Eng., Department of Energy, Politecnico di Milano
- Teaching Assistant
Fall 2017/2018
Fall 2016/2017
Technical Environmental Systems (In English), M.Sc. in Sustainable Architecture and urban planning, Politecnico di Milano
- Teaching Assistant
Fall 2013/2014,
Fall 2014/2015
Advanced Thermodynamics and Heat Transfer (In English), M.Sc. in Energy Engineering, Department of Energy, Politecnico di Milano

THESIS COMMITTEE MEMBERSHIP

Apr 2019 Committee member of M.Sc. thesis defence session- Energy Engineering Program
 Apr-Jul-Oct-Dec 2018
 Apr-Oct-Dec2017

Apr 2019 M.Sc. Thesis Reviewer (contro-relatore)
 Apr-Jul-Dec 2018
 Dec 2017

INDUSTRIAL COLLABORATIONS

ICI Caldaie S.p.A (Jan 2016– Present) Design and implementation of an IoT based system for real-time monitoring of the vapour consumption side in the food industry and developing hybrid physical/data-driven model of the steam generator's behaviour facilitating a predictive multi set-point control

SIRAM (Veolia S.p.A) (Jan 2017– Oct 2018) Developing a machine learning based model for short-term prediction of thermal consumption of buildings in a district heating system aiming at real-time supply temperature optimization

Ariston Thermo Group (Jul 2015 - Mar 2015) Statistical analysis for estimating the lifetime of residential boilers using ALT method

ICI Caldaie S.p.A (Jun 2012-Dec 2015) Performance optimization and dynamic simulation of "Sidera30" PEM-FC based CHP units and the upgraded HT-PEM based system

Tecnocryo S.p.A (Jan 2015-Jul 2015) Simulation of LNG evaporation heat exchangers for marine applications

RESEARCH INTERESTS

- Application of machine-learning for developing data-driven models in the energy sector (two-phase flows, thermal performance of buildings)
- Application of machine learning for data-driven fault diagnosis in power generation systems (Specifically fuel cells)
- Time-series prediction for load and thermal/electrical generation forecasting (Residential and non-residential consumption profiles and district heating systems)
- Internet of Things for energy applications (Energy IoT) specifically in building management systems
- Application of stochastic methods for optimization of micro-power generation systems
- Simulation and optimization of Fuel cell based micro-CHP systems
- Building energetic simulation , design and optimization of HVAC units

PERSONAL SKILLS

Mother tongue(s)	Persian				
Other language(s)	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Italian	C2	C2	C1	C1	C1

Software skills

Proficiency in simulation with MATLAB: Neural networks and optimization toolboxes
Proficiency in programming with Python: general use and scientific computing modules
Including Numpy, Pandas, Matplotlib, Scipy, Sklearn
Proficiency in programming with R :Machine learning, and data analysis packages
Proficiency in CFD simulations using COMSOL Multi-physics
Proficiency in EnergyPlus Building energetic simulation through OpenStudio
Proficiency in GIT version control system
Proficiency in big data technologies: Hadoop distributed file system and MapReduce
Proficiency in SQL based Databases.
Proficiency in Java programming language
General: competent in using MS Office tools including, Excel, Word, and Powerpoint

PUBLICATIONS

Book Chapters:

- 1) **Behzad Najafi**, Sadaf Moaveninejad, Fabio Rinaldi, *Data analytics for energy disaggregation: methods and applications, Chapter 17 of the book **Big Data Application in Power Systems, Elsevier Science, 2018, Pages 377-408** ISBN: 9780128119686*

Journal Articles

- 1) **Behzad Najafi**, Alireza Haghghat Mamaghani, Fabio Rinaldi, Andrea Casalegno, *Long-term performance analysis of an HT-PEM fuel cell based micro-CHP system: Operational strategies, **Applied Energy 147, 2015, pp 582-592***
- 2) **Behzad Najafi**, Alireza Haghghat, Andrea Baricci, Andrea Casalegno, Fabio Rinaldi, *Mathematical Modelling and Parametric Study on a 30 kWel High Temperature PEM Fuel Cell based Residential Micro Cogeneration Plant, **Int. J of Hydrogen Energy 40 (3), 2015, pp1569–1583.***
- 3) **Behzad Najafi**, Stefano De Antonellis, Manuel Intini, Matteo Zago, Fabio Rinaldi, Andrea Casalegno, *A tri-generation system based on polymer electrolyte fuel cell and desiccant wheel–Part A: Fuel cell system modelling and partial load analysis, **Energy Conversion and Management, 106, 2015, pp 1450-1459***
- 4) **Behzad Najafi**, Alireza Haghghat Mamaghani, Fabio Rinaldi, Andrea Casalegno, *Fuel partialization and power/heat shifting strategies applied to a 30 kW el high temperature PEM fuel cell based residential micro cogeneration plant, **Int. J of Hydrogen Energy 40 (41), 2015, pp 14224-14234***
- 5) **Behzad Najafi**, Ali Shirazi, Mehdi Aminyavari, Fabio Rinaldi, Robert A. Taylor, *Exergetic, Economic and Environmental Analyses, and Multi-objective Optimization of an SOFC-Gas Turbine Hybrid Cycle Coupled to an MSF Desalination System, **J. of Desalination, 334 (1), 2014, pp 46-59***
- 6) **Behzad Najafi**, Pedro Obando Vega, Manfredo Guilizzoni, Fabio Rinaldi, Sergio Arosio, *Fluid Selection and Parametric Analysis on Condensation Temperature and Plant Height for a Thermogravimetric Heat Pump, **J of Applied Thermal Engineering 78, 2015, pp 51–61***
- 7) **Behzad Najafi**, Hamidreza Najafi, Mahdi D. Idalik, *CFD Investigation and Multi-Objective Optimization of an Engine Air Cooling System Using Genetic Algorithm, **J of Mech. Eng. Science, IMechE Part C, 225 No 6, 2010, pp 1389-98.***
- 8) Marco Tognoli, **Behzad Najafi**, Renzo Marchesi, Fabio Rinaldi, *Dynamic modelling, experimental validation, and thermo-economic analysis of industrial fire-tube boilers with stagnation point reverse flow combustor **Applied Thermal Engineering, 149,2019, pp 1394-1407***

- 9) Marco Tognoli, **Behzad Najafi**, Fabio Rinaldi, *A Dynamic modelling and optimal sizing of industrial fire-tube boilers for various demand profiles*, **Applied Thermal Engineering**, **132**,2018, pp 341-351
- 10) Manoj Manivannan, **Behzad Najafi**, F Rinaldi, *Machine Learning-Based Short-Term Prediction of Air-Conditioning Load through Smart Meter Analytics*, **Energies** **10** (11), 2017, pp 1905
- 11) Alireza Haghghat Mamaghani, **Behzad Najafi**, Fabio Rinaldi, Andrea Casalegno, *Optimization of an HT-PEM fuel cell based residential micro combined heat and power system: A multi-objective approach*, **Journal of Cleaner Production** **180**, 2018, pp 126-138
- 12) Alireza Haghghat Mamaghani, **Behzad Najafi**, Fabio Rinaldi, Andrea Casalegno, *Predictive Modelling and Adaptive Long-term Optimization of an HT-PEM Fuel Cell based Micro Combined Heat and Power System*, **Applied Energy**, **192**, 2017, pp 519-529
- 13) Alireza Haghghat, **Behzad Najafi**, Fabio Rinaldi, Andrea Casalegno, *Optimization of an HT-PEM Fuel Cell based Micro Combined Heat and Power Residential System: A Multi-Objective Approach*, **Applied Thermal Engineering** **99**, 2016, pp 1201–1211
- 14) Alireza Haghghat, **Behzad Najafi**, Ali Shirazi, Fabio Rinaldi, *4E Analysis and Multi-Objective Optimization of an Integrated Molten Carbonate Fuel Cell (MCFC) and Organic Rankine Cycle (ORC) System*, **J of Energy** **82**, 2015, pp 650-663
- 15) Alireza Haghghat, **Behzad Najafi**, Ali Shirazi, Fabio Rinaldi, *Multi-objective Optimization of an Integrated Gas Turbine-Molten Carbonate Fuel Cell System*, **J of Applied Thermal Eng.** **77**, 2015, pp 1–11
- 16) Alireza Haghghat, Sebastian Alberto Avella Escandon, **Behzad Najafi**, Ali Shirazi, Fabio Rinaldi, *Techno-Economic Analysis of Photovoltaic, Wind, Diesel and Hybrid Electrification Systems for Off-grid Rural Areas in Colombia*, **J of Renewable Energy**, **97**, 2016, pp 293-305
- 17) Ali Shirazi, Mehdi Aminyavari, **Behzad Najafi**, Majid Razaghi, Fabio Rinaldi, *Thermal/economic/environmental analysis and multi-objective optimization of an internal-reforming solid oxide fuel cell/gas turbine hybrid system*, **Int. J. of Hydrogen Energy** , **37** (24), 2012, pp 19111–19124
- 18) Mehdi Aminyavari, Alireza H. Mamaghani, Ali Shirazi , **Behzad Najafi**, Fabio Rinaldi, *Exergetic, Economic, and Environmental Evaluations and Multi-objective Optimization of an Internal-Reforming SOFC-GT Cycle Coupled with a Rankine Cycle*, **J of Applied thermal Engineering**, **108**, 2016, pp 833-846
- 19) Ali Shirazi, **Behzad Najafi**, Mehdi Aminyavari, Fabio Rinaldi, Robert A. Taylor *Thermal-Economic-Environmental Analysis and Multi-objective Optimization of an Ice Thermal Energy Storage System for Gas Turbine Cycle Inlet Air Cooling*, **J. of Energy** **69**, 2014, pp 212–226
- 20) Mehdi Aminyavari, **Behzad Najafi**, Ali Shirazi, Fabio Rinaldi, " Exergetic, Economic, Environmental (3E) Analyses and Multi-objective Optimization of a CO₂/NH₃ Cascade Refrigeration System", **Applied Thermal Eng.** **65** (1-2), 2014, pp 42-50.

- 21) Tommaso Selleri, **Behzad Najafi**, Fabio Rinaldi, Guido Colomobo, "Mathematical Modeling and Multi objective optimization of Mini-channel Heat Exchanger", *ASME J. of Thermal Sciences and Eng. Applications*, 5(3), 2013.
- 22) Hamidreza Najafi, **Behzad Najafi**, "Multi-Objective Optimization of a Plate and Frame Heat Exchanger via Genetic Algorithm, *J. of Heat and Mass Transfer, Springer* 46 (6), 2011, pp 639-647
- 23) Hamidreza Najafi, **Behzad Najafi**, Pooya Hoseinpoori, Energy and Cost Optimization of a plate and Fin Heat Exchanger Using Genetic Algorithm, *J. of Applied Thermal Eng.* 31(10), 2011, pp 1839–1847
- 24) Fabio Rinaldi, **Behzad Najafi**, Temperature measurement in WTE boilers using suction pyrometers, *Sensors* , 13 (11), 2014, pp. 15633-15655
- 25) Mahsa Rafigh, Mohsen Mirzaian, **Behzad Najafi**, Fabio Rinaldi, Renzo Marchesi, Multi-objective Optimization of a Solar Humidification Dehumidification Desalination Unit. *Journal of Physics: Conference Series* 923 (1), 2017, 012038
- 26) Luis Muhlen, **Behzad Najafi**, Fabio Rinaldi, Renzo Marchesi, Sensitivity analysis on the effect of key parameters on the performance of parabolic trough solar collectors. *J. of Physics: Conf. Series*, special issue on 31st UIT Heat Transfer Conference, 2014

Refereed Conference Papers:

- 1) **Behzad Najafi**, Andrea Baricci, Andrea Casalegno, Fabio Rinaldi, Renzo Marchesi, Long term performance analysis of a high temperature PEM fuel cell based cogeneration system considering stack degradation, *11th Fuel cell Modelling and Validation Conference, 2014, Winterthur Switzerland*
- 2) **Behzad Najafi**, Andrea Baricci, Andrea Casalegno, Fabio Rinaldi, Renzo Marchesi, Long term performance optimization of a high temperature PEM fuel cell based cogeneration system, *6th European Fuel cell conference, 2015, Napoli, Italy*
- 3) **Behzad Najafi**, Andrea Baricci, Andrea Casalegno, Fabio Rinaldi, Renzo Marchesi, Mathematical Modeling and Performance Analysis of a Residential Micro Cogeneration Plant based on a High Temperature PEM Fuel Cell Stack, *5th European Fuel cell conference, 2013, Rome, Italy*
- 4) Luis Muhlen, **Behzad Najafi**, Fabio Rinaldi, Renzo Marchesi, Sensitivity analysis on the effect of key parameters on the performance of parabolic trough solar collectors. *31st UIT Heat Transfer Conference, Como, Italy*
- 5) Hamidreza Najafi , **Behzad Najafi**, "Multi-Objective optimization of a fire-tube heat recovery steam generator", *IEEE 7th Electrical Power and Energy*
- 6) Hamidreza Najafi , **Behzad Najafi** , Sensitivity Analysis of a Hybrid Photovoltaic Thermal Solar Collector, *Proceedings of IEEE Electrical Power and Energy conference ,EPEC 2011, Winnipeg, Canada, pp 62 – 67*
- 7) Hamidreza Najafi, Pooya Hoseinpoori, **Behzad Najafi** , Optimal Design of Gas Turbine-Solid Oxide Fuel Cell Hybrid Plant, , *Proceedings of IEEE annual electrical Power and Energy conference ,EPEC 2011, Winnipeg, MB, Canada, pp 29 – 34*
- 8) Mahsa Rafigh, Mohsen Mirzaian, **Behzad Najafi**, Fabio Rinaldi, Renzo Marchesi, Multi-objective optimization of a solar humidification-dehumidification desalination unit, *35th Heat Transfer Conference, Ancona, Italy, 2017*

Behzad Najafi