

# Curriculum Vitae – Paolo, Baggio

## Personal information

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## Education since leaving school

- 1988, Doctor of Philosophy in Energy Engineering, at University of Padua
- 1981, Master Degree in Civil Engineering, Hydraulic engineering at University of Padua

## Present appointment

- Full Professor at University of Trento
- 1 December 2002
- Full Professor (SC 09/C2 – SSD ING-IND/11 - Fisica tecnica Ambientale)
- Dep. of Civil, Environmental and Mechanical Engineering, University of Trento
- Head of the Building Physics Group, my research focuses on high performance building and in the optimal coupling of HVAC system in *nZEB*. I am tenured professor of Thermodynamics and Heat transfer, Building and HVAC system courses.

## Professional experience

From / to	Name of Institution	Responsibilities
1/11/1997 to 30/11/2002	Dep. of Civil and Environmental Engineering, University of Trento	Associate Professor. Head of the building physics group, I performed research on the heat and mass transfer in porous materials and on energy balance at regional scale. I also investigated the energy conversion from biomass through gasification and pyrolysis.
9/4/1990 to 30/10/1997	Institute of Technical Physics, University of Padua	Assistant Professor. Member of the building physics group, I performed research on the heat and mass transfer in porous materials. I developed HMTRA a finite difference code for the heat and mass transfer simulation.
20/04/1983 to 08/04/1990	Studio di Ingegneria Strada & C.	Professional Engineer

## Other responsibilities

- internal appointments to faculty and university boards
- 2013- Current - Member of the PhD Board (Collegio di Dottorato) "SUSTAINABLE ENERGY AND TECHNOLOGIES (ENERGIE E TECNOLOGIE SOSTENIBILI)" – Free University of Bolzano
- 2004- 2012 Member of the PhD Board (Collegio di Dottorato) "Ingegneria Ambientale" – University of Trento
- Nov 2015-> Deputy head at the Department of Civil, Environmental and Mechanical and Engineering of the University of Trento.
- Jan 2010 Member of the examination commission for the PhD course in "Technical Physics" at the University of Padua
- Sep 2009 Member of the examination commission for the PhD course in "Technical Physics" at the University of Padua
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- Sep 2008 Member of the examination commission for the PhD course in "Technical Physics" at the University of Padua
- Jan 2005 Member of the examination commission for the PhD course in "Energy Engineering" at the University of Padua
- Dec 2002 Member of the examination commission for the PhD course in "Technical Physics" at the

	<p>University of Padua</p> <p>May 2001 Member of the examination commission for the PhD course in “Technical Physics” at the University of Padua</p> <p>Nov 2000 Member of the examination commission for the PhD course in “Technical Physics” at the University of Padua</p> <p>▪ <u>external appointments at national and international level</u></p> <p>Dec 2016 - Aug 2018: Head of the National Committee for the Habilitation process to Professor (ASN) in Technical Physics and Nuclear Engineering (SC 09/C2)</p> <p>Member of Italian standard committees (CTI- Italian HVAC Committee)) involved in preparing technical standards</p> <p>Since 2010 Head of the working group (CT 202/GL 10) of the Comitato Termotecnico Italiano CTI for development of a national standard for weather data in the evaluation of the energy use in buildings.</p> <p><u>responsibilities for organizing conferences/seminars/exhibitions (place, duration, institute)</u></p> <p>Aug 2017-Sep 2019 Member of the Scientific committee of the BS2019 Conference. IBPSA-Italy. Rome 2019</p> <p>Aug 2017-Sep 2019 Member of the Scientific committee of the 37<sup>th</sup> UIT Heat Transfer Conference UniPD. Padua 2019</p> <p>Sep 2018-Jun2019 Member of the Scientific committee of the BSA 2019 Conference. UniBZ. Bozen/Bolzano 2019</p> <p>Sep 2016-Feb 2017 Member of the Scientific committee of the BSA 2017 Conference. UniBZ. Bozen/Bolzano 2017</p> <p>Sep 2014-Feb 2015 Member of the Scientific committee of the BSA 2015 Conference. UniBZ. Bozen/Bolzano 2015</p> <p>Sep 2012-Feb 2013 Member of the Scientific committee of the BSA 2012 Conference. UniBZ. Bozen/Bolzano 2013</p>																						
<p><b>Memberships</b></p>	<p>Jan 2015-&gt; Member of the Executive council of IBPSA-Italy, Italian chapter of the International Building Performance Simulation Association IBPSA.</p> <p>Since 2014 Peer Reviewer of Energy and Buildings, Energy, Science and Technology for the Built Environment, Building Simulation, International Journal of Thermal Sciences, Sustainability, Journal of Building Engineering, ASHRAE Transactions.</p> <p>Since 2007 Member of the Scientific Committee of the LEED-Italy</p> <p>Since 2000 Member of AICARR - Italian Society of Heating Refrigerating and Air-Conditioning</p> <p>Since 2000 Member of Italian standard committees (CTI- Italian HVAC Committee)) involved in preparing technical standards</p> <p>Since 1985 Member of ASHRAE – American Society of Heating Refrigerating and Air-Conditioning Engineers</p>																						
<p><b>Language competence</b></p>	<table border="1"> <thead> <tr> <th rowspan="2">Language</th> <th colspan="2">Understanding</th> <th colspan="2">Speaking</th> <th rowspan="2">Writing</th> </tr> <tr> <th>Listening</th> <th>Reading</th> <th>Spoken Interaction</th> <th>Spoken Production</th> </tr> </thead> <tbody> <tr> <td>Italian</td> <td>Native speaker</td> <td>Native speaker</td> <td>Native speaker</td> <td>Native speaker</td> <td>Native speaker</td> </tr> <tr> <td>English</td> <td>C1</td> <td>C1</td> <td>C1</td> <td>C1</td> <td>C1</td> </tr> </tbody> </table>	Language	Understanding		Speaking		Writing	Listening	Reading	Spoken Interaction	Spoken Production	Italian	Native speaker	Native speaker	Native speaker	Native speaker	Native speaker	English	C1	C1	C1	C1	C1
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# Relevant publications – Paolo, Baggio

## Publications

- Books – Authored
  1. P. Baggio, R. Perneti, and A. Prada. Simulazione energetica degli edifici esistenti. Guida alla definizione di modelli calibrati. Riqualificazione energetica degli edifici. EPC Libri, 2013. ISBN 9788863104530
  2. M. P. Gatti and P. Baggio. Il sistema tetto in Trentino. Manfrini, Calliano (TN), 2001
  3. P. Baggio, M. P. Campanale, P. Romagnoni. Problemi risolti di Fisica Tecnica, Edizioni Libreria Progetto, Padova (1998).
- Journal articles in refereed academic journals (with DOI whenever possible)
  1. Pinamonti, M., Beausoleil-Morrison, I., Prada, A., Baggio, P. Water-to-water heat pump integration in a solar seasonal storage system for space heating and domestic hot water production of a single-family house in a cold climate *Solar Energy*, 2021, 213, pp. 300–311, doi: 10.1016/j.solener.2020.11.052
  2. Pinamonti, M., Prada, A., Baggio, P. Rule-based control strategy to increase photovoltaic self-consumption of a modulating heat pump using water storages and building mass activation *Energies*, 2020, 13(23), 6282, doi: 10.3390/en13236282
  3. Viesi D., Crema L., Mahbub M.S., Verones S., Brunelli R., Baggio P., Fauri M., Prada A., Bello A., Nodari B., Silvestri S., Tomasi L. Integrated and dynamic energy modelling of a regional system: A cost-optimized approach in the deep decarbonisation of the Province of Trento (Italy) *Energy*, 2020, 209, 118378 doi: 10.1016/j.energy.2020.118378
  4. Pinamonti, M., Baggio, P. Energy and economic optimization of solar-assisted heat pump systems with storage technologies for heating and cooling in residential buildings *Renewable Energy*, 2020, 157, pp. 90–99 doi: 10.1016/j.renene.2020.04.121
  5. Asdrubali, F., Baggio, P., Prada, A., Grazieschi, G., Guattari, C. Dynamic life cycle assessment modelling of a NZEB building *Energy*, 2020, 191, 116489 doi: 10.1016/j.renene.2020.04.121
  6. C. Forzano, P. Baggio, A. Buonomano, and A. Palombo. Building integrating phase change materials: A dynamic hygro-thermal simulation model for system analysis. *Journal of Sustainable Development of Energy, Water and Environment Systems*, 7(2):325–342, 2019. doi:10.13044/j.sdewes.d6.0255
  7. E. Bee, A. Prada, P. Baggio, and E. Psimopoulos. Air-source heat pump and photovoltaic systems for residential heating and cooling: Potential of self-consumption in different European climates. *Building Simulation*, 12(3):453–463, 2019. doi:10.1007/s12273-018-0501-5
  8. A. Prada, A. Gasparella, and P. Baggio. A Comparison of Three Evolutionary Algorithms for the Optimization of Building Design. *Applied Mechanics and Materials*, 887:140–147, 2019. doi:10.4028/www.scientific.net/AMM.887.140
  9. Elena Bee, Alessandro Prada, and P. Baggio. Demand-side management of air-source heat pump and photovoltaic systems for heating applications in the Italian context. *ENVIRONMENTS*, 5, 2018. doi:10.3390/environments5120132
  10. A. Prada, A. Gasparella, and P. Baggio. On the performance of meta-models in building design optimization. *Applied Energy*, 225:814–826, 2018. doi:10.1016/j.apenergy.2018.04.129
  11. A. Prada, G. Pernigotto, P. Baggio, and A. Gasparella. Uncertainty propagation of material properties in energy simulation of existing residential buildings: The role of buildings features. *Building Simulation*, 11(3):449–464, 2018. doi:10.1007/s12273-017-0418-4
  12. M. Fellin, M. Negri, D. Antolini, P. Baggio, and E. Pieratti. Biomass use best practices: Monitoring biomass and process emissions for sustainable use: A case study. *Contemporary Engineering Sciences*, 9(29-32):1535–1546, 2016. doi:10.12988/ces.2016.68136
  13. C. Bonacina, P. Baggio, F. Cappelletti, P. Romagnoni, and A.G. Stevan. The Scrovegni chapel: The results of over 20 years of indoor climate monitoring. *Energy and Buildings*, 95:144–152, 2015. doi:10.1016/j.enbuild.2014.12.018
  14. P. Stefani, S. Antognoni, E. Pieratti, P. Baggio, and S. Zanoni. Efficiency assessment of a domestic wood gasification boiler. *UPB Scientific Bulletin, Series D: Mechanical Engineering*, 77(3):181–192, 2015
  15. A. Prada, F. Cappelletti, P. Baggio, and A. Gasparella. On the effect of material



- uncertainties in envelope heat transfer simulations. *Energy and Buildings*, 71:53–60, 2014. doi:10.1016/j.enbuild.2013.11.083
16. D. Prando, F. Patuzzi, P. Baggio, and M. Baratieri. CHP gasification systems fed by torrefied biomass: Assessment of the energy performance. *Waste and Biomass Valorization*, 5(2):147–155, 2014. doi:10.1007/s12649-013-9227-x
  17. P. Baggio and A. Prada. Thermal dynamic behavior of single component: Experimental analysis and numerical modeling. *UPB Scientific Bulletin, Series C: Electrical Engineering*, 74(1):101–108, 2012
  18. E. Pieratti, M. Baratieri, S. Ceschini, L. Tognana, and P. Baggio. Syngas suitability for solid oxide fuel cells applications produced via biomass steam gasification process: Experimental and modeling analysis. *Journal of Power Sources*, 196(23):10038–10049, 2011. doi:10.1016/j.jpowsour.2011.07.090
  19. A. Gasparella, G. Pernigotto, M. Baratieri, and P. Baggio. Thermal dynamic transfer properties of the opaque envelope: Analytical and numerical tools for the assessment of the response to summer outdoor conditions. *Energy and Buildings*, 43(9):2509–2517, 2011. doi:10.1016/j.enbuild.2011.06.004
  20. F. Cappelletti, A. Gasparella, P. Romagnoni, and P. Baggio. Analysis of the influence of installation thermal bridges on windows performance: The case of clay block walls. *Energy and Buildings*, 43(6):1435–1442, 2011. doi:10.1016/j.enbuild.2011.02.004
  21. A. Gasparella, G. Pernigotto, F. Cappelletti, P. Romagnoni, and P. Baggio. Analysis and modelling of window and glazing systems energy performance for a well-insulated residential building. *Energy and Buildings*, 43(4):1030–1037, 2011. doi:10.1016/j.enbuild.2010.12.032
  22. M. Baratieri, P. Baggio, B. Bosio, M. Grigianti, and G.A. Longo. The use of biomass syngas in IC engines and CCGT plants: A comparative analysis. *Applied Thermal Engineering*, 29(16):3309–3318, 2009. doi:10.1016/j.applthermaleng.2009.05.003
  23. P. Baggio, M. Baratieri, L. Fiori, M. Grigianti, D. Avi, and P. Tosi. Experimental and modeling analysis of a batch gasification/pyrolysis reactor. *Energy Conversion and Management*, 50(6):1426–1435, 2009. doi:10.1016/j.enconman.2009.03.004
  24. M. Baratieri, P. Baggio, L. Fiori, and M. Grigianti. Biomass as an energy source: Thermodynamic constraints on the performance of the conversion process. *Bioresource Technology*, 99(15):7063–7073, 2008. doi:10.1016/j.biortech.2008.01.006
  25. P. Baggio, M. Baratieri, A. Gasparella, and G.A. Longo. Energy and environmental analysis of an innovative system based on municipal solid waste (MSW) pyrolysis and combined cycle. *Applied Thermal Engineering*, 28(2-3):136–144, 2008. doi:10.1016/j.applthermaleng.2007.03.028
  26. D. Dalle Nogare, P. Baggio, C. Tomasi, L. Mutri, and P. Canu. A thermodynamic analysis of natural gas reforming processes for fuel cell application. *Chemical Engineering Science*, 62(18-20):5418–5424, 2007. doi:10.1016/j.ces.2006.12.065
  27. P. Baggio, M. Baratieri, and M. Grigianti. Energy performance of the biomass gasification process. *Scientific Bulletin - Politehnica University of Bucharest. Series C, Electrical Engineering*, 67:69–76, 2007
  28. L. Battisti, P. Baggio, and R. Fedrizzi. Warm-air intermittent de-icing system for wind turbines. *Wind Engineering*, 30(5):361–374, 2006. doi:10.1260/030952406779502713
  29. C. Tomasi, M. Baratieri, B. Bosio, E. Arato, and P. Baggio. Process analysis of a molten carbonate fuel cell power plant fed with a biomass syngas. *Journal of Power Sources*, 157(2):765–774, 2006. doi:10.1016/j.jpowsour.2005.12.038
  30. P. Baggio, C. Bonacina, P. Romagnoni, and A.G. Stevan. Microclimate analysis of the Scrovegni chapel in Padua: Measurements and simulations. *Studies in Conservation*, 49(3):161–176, 2004. doi:10.1179/sic.2004.49.3.161
  31. L. Battisti and P. Baggio. Experimental determination of average turbulent heat transfer and friction factor in stator internal rib-roughened cooling channels. *Annals of the New York Academy of Sciences*, 934:464–472, 2001
  32. P. Baggio, M. Campanale, and L. Moro. Analytical and experimental investigations on the transient heat transfer process in moist wood wool slabs. *Journal of Building Physics*, 24(3):211–225, 2001. doi:10.1106/ADQ5-KLI5-JCW3-2F8U
  33. P. Baggio, M. Campanale, and L. Moro. Analytical and experimental investigations on the

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- transient heat transfer process in moist wood wool slabs. *Journal of Thermal Envelope and Building Science*, 24(3):211–225, 2001. doi:10.1106/ADQ5-KL15-JCW3-2F8U
34. W. Xicheng, P. Baggio, and B.A. Schrefler. Multi-level frontal algorithm for finite element analysis and its implementation on parallel computation. *Engineering Computations* (Swansea, Wales), 16(4):405–427, 1999
  35. P. Baggio, M.C. Masti, S. Primon, and G.B. Sigalotti. Physical evolution in central-eastern Veneto (Italy) and the ancient human settlements. Model reconstruction by RS-multispectral satellite analysis. *Earth Surface Remote Sensing. Proc. SPIE conference*, London, 1997, pages 384–395, 1997
  36. P. Baggio, C. Bonacina, and B.A. Schrefler. Some considerations on modeling heat and mass transfer in porous media. *Transport in Porous Media*, 28(3):233–251, 1997. doi:10.1023/A:1006525729566
  37. D. Gawin, P. Baggio, and B.A. Schrefler. Modelling heat and moisture transfer in deformable porous building materials. *Archives of Civil Engineering*, 42(3):323–348, 1996
  38. P. Baggio, C.E. Majorana, and B.A. Schrefler. Thermo-hygro-mechanical analysis of concrete. *International Journal for Numerical Methods in Fluids*, 20(6):573–595, 1995. doi:10.1002/flf.1650200611
  39. D. Gawin, P. Baggio, and B.A. Schrefler. Coupled heat, water and gas flow in deformable porous media. *International Journal for Numerical Methods in Fluids*, 20(8-9):969–987, 1995. doi:10.1002/flf.1650200817
  40. P. Baggio, C. Bonacina, and M. Strada. First comparisons between numerical modelling and experimental analysis of free convection in a rectangular cavity. *Communications in Applied Numerical Methods*, 5(2):129–137, 1989. doi:10.1002/cnm.1630050210



# Research projects – Paolo, Baggio

## Research and scholarships

- Summary of current research and scholarship
  1. Member of the unit 4 of the project NZEBnet - La piattaforma collaborativa per lo sviluppo degli NZEB – funded by MIUR in the framework of the PRIN2015.
- Summary of research and scholarship during the previous five years
- Summary of significant achievements in research and scholarship.

Project name	Funding Body	Funded amount
The energy FLEXibility of enhanced HEAT pumps for the next generation of sustainable buildings (FLEXHEAT)	PRIN 2017 - MIUR - Ministero Istruzione Università e Ricerca	126 000 €
Metodologie bim per una nuovaindustrializzazione degli interventi di riqualificazioneenergetica del patrimonioedilizio esistente	Fondazione Caritro 2017 RicercaSviluppoEconomico	95 000 €
High performance social housings	ITEA – Istituto Trentino Edilizia Abitativa spa	35 000 €
Implementation of the LEED protocol for the evaluation of the energy performance and thermal comfort in buildings	Autonomous Province of Trento	75 000 €
BiQUEEN – Biomasse di Qualità per la produzione Efficiente di ENergia. Origine delle biomasse legnose, controllo di inquinanti solidi e volatili e produzione di energia mediante combustione controllata	Fondazione Caritro	41 236 €
BEN IMPACT - Building's impact evaluator and optimizator	EU FESR 2007-2013 - Autonomous Province of Trento	45 000 €
Prestazioni energetiche degli edifici residenziali esistenti e criteri di riqualificazione nel rispetto dei requisiti di benessere e sostenibilità ambientale	PRIN 2008- MIUR - Ministero Istruzione Università e Ricerca	29 506 €
Sviluppo e progettazione di un sistema di gassificazione di biomasse vegetali di piccola taglia per la produzione di syngas	Eurocoating spa	125 000 €
Studio degli effetti termofluidodinamici e strutturali per la prevenzione dei rischi negli incendi in galleria	PRIN 2006- MIUR - Ministero Istruzione Università e Ricerca	44 000 €
Studio degli effetti termofluidodinamici e strutturali indotti da eventi di incendio in manufatti sotterranei	PRIN 2004- MIUR - Ministero Istruzione Università e Ricerca	40 000 €

TRENTO 26/07/2021

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