

Curriculum Vitae

Personal

Name: Mulu Bayray Kahsay, Ph.D.,

Registered PPMEE.

Date of Birth: June 27/1966

Nationality: Ethiopian

Marital Status: Married



Education

Dr. techn., (Ph.D.) in Mechanical Engineering, Vienna University of Technology, Austria, 2002.

M. Sc., in Engineering Mechanics, Cranfield University, England, June 1993.

B. Sc., in Mechanical Engineering, Addis Ababa University, Ethiopia, July 1988.

Special Trainings

Wind Energy Assessment and Wind Turbine Design, Adama, 2014, by NORWIN A/S Denmark.

Advanced Professional Training in the field of Renewable Energies, June 2012, Bavarian Ministry for Economic Affairs, Infrastructure, Transport and Technology, organized by GiZ.

Wind Energy (Public Private Partnership), Technology and Management trainings, January and September 2010; Finance and Maintenance trainings, April and September 2012, by EnerVest and GiZ.

Languages

Excellent in English, Tigrigna and Amharic while basic in Norwegian and German.

Membership of Professional Associations

Ethiopian Society of Mechanical Engineers (ESME),

International Solar Energy Society (ISES).

Professional Certification

Practicing Professional Mechanical Engineer (PPMEE), Ministry of Construction, Ethiopia.

Employment Record

Postdoctoral Fellow, August 2023 –

Researcher on solar energy in Nordic climate condition, Department of Electric Energy, NTNU, Norway.

Visiting Researcher, March 2022 – July 2023

Researcher on solar thermal baking employing thermal energy storage, and Small scale wind turbine with thermal storage; Department of Energy and Process Engineering, NTNU, Norway.

Visiting Researcher, Sept. 2021- March 2022

Researcher on solar thermal application for industrial process water heating and cooling, Excess energy from PV installations in health centers; Department of Electronics and Information Systems, Gent University, Belgium.

Associate Professor, 2014 – 2021

Teaching, supervising graduate students and leading research in the field of Renewable Energy Technologies, School of Mechanical and Industrial Engineering, EiT – M, Mekelle University.

Practicing Professional Mechanical Engineer (PPMEE), 2017-2021

Consulting, design and supervision of Mechanical Engineering works, at Yohannes Abbay Consulting Architects and Engineers (YACAE), Addis Ababa.

Assistant Professor, 2003 – 2014

Teaching and research in the field of Mechanical design and Energy, also involved in academic leadership as Dean of Faculty and V/President for Academic and Research, Mekelle University.

Fulbright Visiting Scholar, February 2008 – July 2008

Visiting researcher at Renewable Energy Research Laboratory, University of Massachusetts, Amherst, USA.

Ph. D. scholar and Research Assistant, April 1999 – Sept. 2003

Doctoral researcher and assisting research in hydrostatic and cyclic loading of pressure vessel tests employing acoustic emission, Institute of Pressure Vessels and Plant Technology, Vienna University of Technology.

Teaching Experience

Involved in teaching at undergraduate and postgraduate level in the field of Mechanical Engineering and specializations of Renewable Energy Technologies, Product Design and Development. The following are some of the courses that I have offered at postgraduate level
Design Field: Mechanical Design, Solid Mechanics, Product Design and Development, Finite Element Methods, Experimental Methods.

Energy Field: Energy Technologies, Energy Modeling and Simulation, Solar Energy (both PV and Thermal), Wind Energy, Wind Turbine Design, Aerodynamics.

I have also offered Research Methodology (for Engineers) to postgraduate students coming from different fields of Engineering.

Supervision Experience

M.Sc. supervised: more than 50 M.Sc.

At NTNU since 2022 co-supervised 5 M.Sc. students.

At Mekelle University more than 40 M.Sc. students specializing in Energy Technology and Product Design and Development. In collaboration with other African and European Universities 10 M.Sc. students.

Ph.D. supervision:

In collaboration with NTNU 1 Ph.D. completed and 2 Ph.D. undergoing; with Ghent University, 2 Ph.D. undergoing.

Research Projects

Project Local Coordinator, NORHED, EnergyNet project, 2020-2023

Involved in preparation of the project proposal and leading the team at MU.

Project Local Coordinator, ERASMUS+, UNET, project, 2020-2023

Involved in preparation of the project proposal and leading the team at MU.
Project Coordinator, Capacity Building in Renewable Energy Education and Research, 2015-2020
Leading a team from five Universities MU (Ethiopia), NTNU (Norway), UDSM (Tanzania), MakU (Uganda) and EMU (Mozambique) in developing proposal for funding, Managing the implementation of the project including technical, financial and administrative matters after winning the funds from the Norwegian EnPe program, Grant amount NoK 12 million,
Communicating with funding organization and all partner Universities,
Coordinating the collaborative project where more than 40 M.Sc. and 10 Ph.D. were supported.

Project Local Coordinator, EnPe Project on M.Sc. in Energy Technology, 2010-2014
Involved and played key role in the development of the proposal for funding,
Coordinated the project and successfully established M.Sc. program and graduated more than 30 students through the program. Grant amount NoK 8 million.

Principal Investigator, Renewable Energy Technology Transfer: Resource Assessment and Small Scale Wind Turbine Technology Development, 2016-2020
Leading a team in developing a proposal for funding in response to a call by the Ministry of Innovation and Technology, Leading the wind energy resource assessment through wind mast measurement, data acquisition and analysis, Leading the development of 1 kW wind turbine design, manufacture and testing of a prototype, Managing the overall activities of the project. Grant amount Birr 5 million.

Team Leader and Supervisor of Ph.D. students, REWiSE project, 2016-2021
Initiated and led the proposal development for the competition in establishment of Center of Excellence under the Ministry of Education, Ethiopia sponsored by KfW Germany, Managing the project as a focal person at the initial stage after winning the grant and later as Steering Committee Member,
Played a key role in the establishment of the Center of Excellence in Renewable Energy focusing in Wind and Solar Energy (CoE REWiSE), Mekelle University,
Supervising 5 Ph.D. students sponsored by the project in collaboration with Gent University (Belgium) and NTNU (Norway). Grant amount Euro 1,350,000.

Consultancy Projects

Project Manager, 2013 – 2016

Developing and preparing a proposal on expression of interest (EoI) to involve in consultancy service of wind farms to EEP and Ministry of Water, Irrigation and Energy,
Developing a proposal in response to Request for Proposal (RfP) by EEP for consultancy service of Adama II project,
Played key role in the establishment of joint venture between Mekelle University and Adama Science and Technology University (ASTU-MU JV),

Leading a team of Engineers for the joint venture who has successfully accomplished the supervision of the construction of the Adama II Wind Power Project with a capacity of 153 MW. Client: Ethiopian Electric Power (EEP), Contractor: HydroChina-CGCOC, China. Project Budget: USD 345 million, Consultant's Budget: USD 1 million.

Team leader and Mechanical Engineer, 2015 – 2018

Member of the team who has successfully accomplished the supervision of the installation of Solar PV Systems in more than 100 rural health centers and 1000 health posts all around the country, Client Federal Ministry of Health, Budget Birr 6.6 million.

Mechanical Design Engineer

Design of Mechanical systems such as HVAC in building projects, Medical Oxygen and Medical Gas systems in hospital construction projects under the consulting company Yohanned Abbay Architects and Engineers, Addis Ababa, Ethiopia.

Publications

1. Tesfay, Asfaw Haileselassie; Tsegay, Kibreab; **Kahsay, Mulu Bayray**; Hailu, Mesele Hayelom; Adaramola, Muiyiwa S. (2024) Performance comparison of three prototype biomass stoves with traditional and Mirt stoves for baking Injera. *Energy, Sustainability, and Society*, 14(11).
2. Enday, Petros Gebray; **Kahsay, Mulu Bayray**; Nyssen, Jan; Van Genderachter, Michiel; Termonia, Piet; Van Schaeybroeck, Bert (2024) Validation of the wind climatology from the ALARO-0 model at different resolutions over Ethiopia. *Theoretical and Applied Climatology*, 155, 3297–3312.
3. Tesfay, Asfaw Haileselassie; **Kahsay, Mulu Bayray**; Geleta, Abenezer Bekele (2024) Improved Cook Stoves to Meet Sustainable Development Goal in Ethiopia. *Energies*, 17(5), 1011.
4. Kelele, Hailay Kiros; **Kahsay, Mulu Bayray**; Nielsen, Torbjørn Kristian (2023) Dynamic Response Analysis of Wind Turbine Structure to Turbulent Wind Load: Comparative Assessment in Time and Frequency Domains. *Applied Mechanics*, 4 (3), 841-855.
5. **Kahsay, Mulu Bayray**; Nydal, Ole Jørgen (2023) Degradation of viscosity of vegetable oils employed for thermal energy storage due to oxidation in ambient temperature. *Journal of Energy Storage*
6. Yacob Gebreyohannes Hiben, **Mulu Bayray** and Johan Lauwaert, “Optimizing solar-assisted industrial heating and cooling system for cost-effective installation,” *Applied Thermal Engineering*, 230, 120778, 2023.
7. Hailay Kiros Kelele, Lars Froyd, **Mulu Bayray Kahsay** and Torbjørn Kirstian Nielsen, “Characterization of Aerodynamics of Small Wind Turbine Blade for Enhanced Performance and Low Cost of Energy,” *Energies*, 15(21), 8111, 2022.
8. **Mulu Bayray Kahsay** and Johan Lauwaert, “Excess Energy from PV-Battery System Installations: A Case of Rural Health Center in Tigray, Ethiopia,” *Energies*, 15(12), 4355, 2022. Doi: 10.3390/en15124355
9. Abrha Gebregergs Tesfay, **Mulu Bayray Kahsay** and P. S. Senthil Kumar, “Improvement of the Degradation of Tensile and Impact Strength of Water-aged Sisal Fiber-reinforced Polyester Composites: A Comparative Study on the Effects of Hybridizations, Hybrid Layering Sequences, and Chemical Treatments,” *Journal of Natural Fibers*, 2022. DOI: 10.1080/15440478.2022.2029663
10. **Mulu Bayray**, Yacob Gebreyohannes, Hailay Gebrehiwot, Solomon Teklemichael, Anwar Mustefa, Asfaw Haileselassie, Petros Gebray, Ashenafi Kebedom, Fana Filli, “Measured Solar Irradiance Data for Resource Assessment at Four Sites in Geba Catchment, Tigray, North Ethiopia,” *Data in Brief*, 40(2), 107836, 2022 Doi:10.1016/j.dib.2022.107836
11. Abeba Debru, **Mulu Bayray** and Marta Molinas, “ADAMA-II wind farm performance assessment in comparison to feasibility study,” *Wind Engineering*, 2021.
12. **Mulu Bayray**, Yacob Gebreyohannes, Hailay Gebrehiwot, Solomon Teklemichael, Anwar Mustefa, Asfaw Haileselassie, Petros Gebray, Ashenafi Kebedom, Fana Filli, “Temporal and Spatial Solar Resource Variation by Analysis of Measured Irradiance in Geba Catchment, North Ethiopia,” *Sustainable Energy Technologies and Assessments*, 44, 101110, 2021.

13. Yacob Gebreyohannes Hiben, Mulu Bayray and Johan Lauwaert, "A review on Solar Thermal System Design, Integration, and Techno-economic Modeling for Industrial Heating and Cooling Processes," *ASES SOLAR* 2021. DOI: 10.18086/solar.2021.01.02.
 14. Hailay Kiros Kelele, Torbjørn Kirstian Nielsen, Lars Froyd and Mulu Bayray Kahsay, "Catchment Based Aerodynamic Performance Analysis of Small Wind Turbine Using a Single Blade Concept for a Low Cost of Energy," *Energies*, 13, 5838, 2020.
 15. Fana Filli, Anwar M. Mahmud, Mulu Bayray, Meseret Tesfay and Petros Gebray, "Design and Manufacture of 1kW Wind Turbine Blades," *Momona Ethiopian Journal of Science*, (MEJS), 12(2), 173-196, 2020.
 16. Hailay Teklu, Mulu Bayray, Dawit Abay and Millerjothi Kalamegam, "Performance Enhancement of Natural Convection Indirect Solar Dryer by Integrating Reflectors," *Momona Ethiopian Journal of Science*, (MEJS), 12(2), 212-222, 2020.
 17. Yacob Gebreyohannes Hiben, Mulu Bayray and Johan Lauwaert, "Assessment of Process Heating and Cooling Demand for Solar System Installation at Typical Industries in Ethiopia," *EuroSun 2020: 13th International Conference on Solar Energy for Buildings and Industry*. DOI:10.18086/eurosun.2020.03.01.
 18. Yacob Gebreyohannes Hiben, Mulu Bayray and Johan Lauwaert, "A Review on Solar Thermal Utilization for Industrial Heating and Cooling Processes: Global and Ethiopian Perspective," *Momona Ethiopian Journal of Science*, 12(2):232-256, 2020.
 19. Yacob Gebreyohannes Hiben, Mulu Bayray and Johan Lauwaert, "Hourly Solar Radiation Estimation Using Data Mining and Generalized Regression Neural Network Models," *ASES Solar2020*. DOI: 10.18086/solar.2020.01.19
 20. Abrha Gebregergs Tesfay, Mulu Bayray Kahsay and P. S. Senthil Kumar, "Effects of Chemical Treatment, Hybridization, and Hybrid Fiber Stacking Sequence and Orientation on Tensile and Impact Strength of Continuous Sisal Fiber Reinforced Polyester Composites," *Journal of Natural Fibers*, doi: 10.1080/15440478.2020.1821283, 2020.
 21. Agernew Melkamu, Mulu Bayray Kahsay and Abrha Gebregergs Tesfay, "Mechanical and water-absorption properties of sisal fiber (*Agave sisalana*)-reinforced polyester composite," *Journal of Natural Fibers*, 16(6), 877-885, doi: 10.1080/15440478.2018.1441088, 2018.
 22. Mesele H. Hailu, Mulu B. Kahsay, Asfaw H. Tesfay, Ole J. Neydal; "An oil based indirect solar fryer for Injera baking application," *SOLARTR 2018 Solar Conference and Exhibition*, Istanbul, Turkey, November, 2018.
 23. Habtewolde Ababu Birhanu and Mulu Bayray Kahsay, 2018, "Solar Autoclave for Rural Clinics," *International Journal of Advanced Research in Engineering and Technology (IJARET)*, Volume 9, Issue 4, 293-309.
 24. Mesele H. Hailu, Mulu B. Kahsay, Asfaw H. Tesfay, Ole J. Neydal; "A direct solar fryer for Injera baking application," *Solar World Congress 2017, International Solar Energy Society (ISES) and Solar Heating and Cooling Conference (IEA SHC)*, Abu Dhabi, UAE, November, 2017.
 25. Mesele Hayelom Hailu, Mulu Bayray Kahsay, Asfaw Haileselesie Tesfay and Oumer Issa Dawud, "Energy Consumption Performance Analysis of Electrical Mitad at Mekelle City," *Momona Ethiopian Journal of Science*, (MEJS), 9 (1):43-65, 2017.
 26. Mulu Bayray, Hailay Kiros, Mohammedsalih Abdelkadir, Anwar Mustefa, Mesele Hayelom, Asfaw Haileselesie, Ashenafi Kebedom, Petros Gebray, Alemu Yemane, Solomon T/Michael, Dawit Abay, Bariso Bino, "Performance of Wind Pump Prototype," *Momona Ethiopian Journal of Science*, 7 (2):176-190, 2015.
 27. Anwar Mustefa Mahmud, Mulu Bayray Kahsay, Asfaw Haileselesie, Ftwi Yohannes Hagos, Petros Gebray, Hailay Kiros Kelele, Kindeya Gebrehiwot, Hans Bauer, Seppe Deckers, Josse De Baerdemaeker, Johan Driesen, "Solar Energy Resource Assessment of the Geba Catchment, Northern Ethiopia," *Energy Procedia* 57, 1266 – 1274, 2014.
 28. Mulu Bayray and Anwar Mustefa, "Potential for Wind Pumping in Geba Catchment, North Ethiopia," Presented at Sustainable Land and Watershed Management (SLWM) Conference, Mekelle, Ethiopia, May 2014.
 29. Mulu Bayray, Anwar Mustefa, Ftwi Yohannes, Hailay Kiros, Asfaw Haileselesie, Petros Gebray, Mesele Hayelom, Addisu Dagne, "Wind Energy Data Analysis and Resource Mapping of Geba Catchment, North Ethiopia," *Wind Engineering*, 37 (4), 333-346, 2013.
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