

CURRICULUM VITAE

Prof. (Eng.) Augustine Barasa Makokha (P.Eng, MIEK, CEM, REP)

PERSONAL DETAILS

Present position: Associate Professor of Energy and Minerals Engineering
Current Address: P.O Box 6091- 30100, Eldoret, Kenya
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CAREER OBJECTIVES

- To undertake research and share knowledge, in Clean and Renewable Energy, Energy Systems Modelling and Optimization, Sustainable Development, and Off-grid Energy Solutions.
- To participate in consultancy activities in the energy sector towards improving the livelihoods of people and environmental sustainability.
- Commitment to work with energy sector players to improve households' access to modern energy services for betterment of society

RESEARCH INTERESTS

- Renewable energy technologies (Bio-energy, Solar, Small hydro, Wind etc)
- Energy storage technologies
- Energy systems modelling and optimization
- Off-grid energy solutions and
- Energy and sustainable livelihoods.

PROFESSIONAL QUALIFICATIONS & AFFILIATION

- Registered Professional Engineer with Engineers Board of Kenya (EBK)
- Corporate Member, Institution of Engineers of Kenya (IEK)
- Certified Energy Manager (CEM) by AEE - Atlanta, USA
- Certified Renewable Energy Professional (REP) by AEE – Atlanta USA
- International Member of Association of Energy Engineers (MAEE)

EDUCATION:

2013 Postdoctoral Research Fellowship (UCT & Wits University)
2011 PhD (Engineering) University of the Witwatersrand, Johannesburg
2006 M.Sc (Engineering) University of the Witwatersrand (*Distinction*)
2002 B.Tech (Production Engineering), Moi University (*First Class Hons*)
1995 Kenya Certificate of Secondary Education (KCSE) – Friends School Kamusinga

EMPLOYMENT PROFILE

2018 – Date	Coordinator of Renewable Energy Projects at the Africa Centre of Excellence in Phytochemicals, Textile and Renewable Energy (ACEII PTRE)
2017 - Date	Head, Department of Energy Engineering, Moi University
2017 - Date	Assoc. Professor, Mechanical & Production Engineering, Moi University
2011- 2016	Senior Lecturer, Mechanical & Production Engineering, Moi University

2007-2011	Lecturer, Mechanical & Production Engineering, Moi University
2006-2008	Deputy Head of Department, Mechanical & Production Engineering, Moi University
2003-2006	Graduate Assistant, Moi University, Mechanical & Production Engineering
2002-2003	Assistant Shift Engineer, Packaging Manufacturers Limited, Mombasa

ACADEMIC DUTIES:

▪ TEACHING:

Level 9 (PhD): PRD 903 - Advanced Research Methods and Techniques
PRD 904 – Energy Planning & Management

Level 8 (MSc): PRD 811 – Research Techniques
PRD 810 – Numerical Analysis & Computation
PRD 882 - Hydro Power
PRD 880 - Biomass and Bioenergy

▪ POSTGRADUATE SUPERVISION

A: PHD LEVEL

STUDENT	PROJECT TITLE	UNIVERSITY
CLAYTON BHONDAYI	A study of flotation froth phase behaviour	University of the Witwatersrand
SIMON OSEMBO	Energy Modelling and Optimization in Edible Oil Processing Plants using Evolutionary Algorithms: Case study of KAPA oil Refineries	Moi University
KIPKEMOI KIBIAS	Modelling Grid integration with non-programmable Renewables: Case study of Kenya	Moi University
AUSTIN EBINGA	Design optimization of low head, low flow hydro turbine using CFD	Moi University
BERNARD OLOO	Hybrid Solar-Biogas refrigeration system	Moi University
FLORENCE AJIAMBO	AR based optimization of bioethanol production from sugarcane bagasse pre-treated with poly-ethylene glycol assisted ionic liquid	Moi University
JOSEPH MUYUNDO	Reliability and Stability of power distribution system interconnected with low-voltage PV (240V/415V) power sources.	Moi University

B: MSC LEVEL

GEORGE NYANDIGA	Optimization of anaerobic fermentation conditions for bioethanol production from banana peels using yeast in a still reactor	Moi University
JOAN KIPTARUS	Characterization and processing of selected mineral ores found in eastern zone of Kenya.	Moi University
KIPRONO ROSE	Microwave pre-treatment of limestone during comminution	Moi University

EZRA WERE	Thermal performance of Kenya Defense Force (KDF) mobile diesel cooker	Moi University
WYCKLIFFE ANGIENDA	Evaluation of wind power density in the Moi University region	Moi University
KIPTOO TALAM	Investigation of croton-castor- kerosene blend as alternative form of fuel for domestic use	Moi University
KIMAYOS JAMES	Effects of blending of petroleum diesel with Ximenia oil on properties of petroleum diesel	Moi University
DORICE KIPKOECH	Thermal gasification of abattoirs (slaughter house waste) in Eldoret town	Moi University
MAKONDE ELVIS	Design, Fabrication and Optimization of Mechanical coir fibre decorticator	Moi University
ISAIAH KIMUTAI	Assessment of energy utilization and saving opportunities in textile industries: case study of Rivatex, East Africa	Moi University
CHESEREK, KIPTOO	Wind power simulation model for reliability evaluation at kerio escarpment in kenya	Moi University
DANVAS KAGESA	Biomass Gasification using an inverted updraft gasifier	Moi University
KONONDEN KIPLANGAT	Design and Performance Investigation of a centrifugal Reaction Water Turbine for Low Head and Low Flows application	Moi University
CLEMENT MALANDA	Hybrid solar wind village electrification in Malawi: Sustainability analysis	Moi University
SAMUEL MELLY	Numerical modelling and simulation of convective water activity in low temperature batch drying of cobbed maize.	Moi University
OKUNYUKU JOHN	Techno economic study of a small biogas plant for treatment of slaughterhouse refuse	Moi University
DANIEL MUTISO	Performance assessment and optimization of moto-poa stove burning ethanol gel	Moi University
KETER HARRISON	Optimized Reinjection Pipeline Design For Olkaria 1 Geothermal Power Plant in Olkaria in Kenya	Moi University
PHILIP OMWENGA	Analysis of energy performance of commercial buildings for different glazing facades in the Kenyan climate: Case study of Uasin Gishu.	Moi University
BELINDAH MUSAAYI	Analysis and modelling of solar PV module performance and reliability for UASIN GISHU County metrological conditions.	Moi University
DAMARIS AKAL	Re-configuration of Solar Mini-grid PV array connections for Optimum power under fault conditions	Moi University
ABRAHAM KIRWA	Short term electricity demand forecasting for Eldoret Municipality using Hybrid Methods	Moi University
CYNTHIA CHEPKOECH	Technological and sustainability analysis of solar lighting systems for county markets and streets in Kenya	Moi University

THESES EXAMINED

ROP GLADYS JEBET: Development of a modified cooking stove operated with plant oil from *Jatropha circus* (MSc)

NKOSILATHI ZINTI NKOMO: Production and characterisation of cotton stalk fibre/phenol formaldehyde resin bio-composite (MSc)

KERICH KIPLANGAT DANIEL: Development and evaluation of rice husk based blended briquettes (MSc)

NG'ERA PAUL KIMANI: Hydrological modelling of the Sergoit basin for the estimation of catchment yield: a comparative study of Mike 11-nam & SWAT models (MSc)

SUGUT VINCENT KIMUTAI: Four dimensional design, analysis and construction of a pre-cast concrete pilot house (MSc).

AJAMBO FLORENCE: Study of imidazolium, phosphonium and pyridinium based ionic liquids in the pre-treatment of *Prosopis juliflora* and *Gadama* sorghum stalks (MSc)

UNIVERSITY ADMINISTRATIVE RESPONSIBILITIES

- Head, Department of Energy Engineering, Moi University (2018 – 2020)
- Chairman, School of Engineering Curriculum Committee (2014 – 2018)
- PSSP Coordinator, School of Engineering (2013 – 2017)

EXTERNAL EXAMINER POSITIONS:

- *External examiner*, Mechanical & Energy Engineering, University of Rwanda, (2016 – 2018).
- *External examiner*, Mechanical & Mechatronic Engineering, Technical University of Kenya, (2018-2020).

MEMBERSHIP OF UNIVERSITY COMMITTEES

- Member of School committee of Information and Learning Resources
- Member of the School of Graduate Studies Board
- Member of the University Energy committee

OTHER POSITIONS

- *Sessional Visiting Scholar*, University of Eldoret, (2017 – 2018)
- *Associate editor*, Afr. J. Technology - Publication of Moi University, School of Engineering.
- *Peer review of Journals*: Minerals Engineering, Powder Technology, Measurement science & technology, Particulate Science & Technology.

SELECTED RESEARCH PUBLICATIONS

- 1) **Makokha, A. B.**, and Letting, L. K., (2019), Dynamic Modelling of Temperature in a Wet Ball Mill Based on Integrated Energy-Mass-Size Balance Approach, *International J. Control Sci. & Eng.* 9 (1) 1 – 8.
- 2) Kononden, K. C., **Makokha, A. B.**, Sitters, W. M. C., (2018), Single arm, centrifugal, water turbine for low head and low flow application: Part 1- theory and design, *Energy & Power* 8(2) 51 – 55.

- 3) Kononden, K. C., **Makokha, A. B.**, Sitters, W. M. C., (2018), Single arm, centrifugal, water turbine for low head and low flow application: Part 2- Performance evaluation, *Energy & Power* 8(2) 56 – 60.
- 4) S. S. Namago, D. S. Madara, **A. B. Makokha**, E. Ataro, (2015), A Model for Testing Compressive and Flexural Strength of Sisal Fibre Reinforced Compressed Earth Blocks in the Absence of Laboratory Facilities, *Int. J. for Innovation Education and Research* 3(3) 132-145.
- 5) E. Ataro, D. S. Madara, S. S. Namango, **A B. Makokha** and H. Hillmer, (2015), Design of a Vertical Cavity Optical Micro-Electromechanical Filter, *International Journal of Innovative Research in Computer and Communication Engineering*, 3(4) 3081-3086.
- 6) J. J. Kiptarus, A. M. Muumbo, **A. B. Makokha**, S. K. Kimutai, (2015), Characterization of Selected Mineral Ores in the Eastern Zone of Kenya: Case Study of Mwingi North Constituency in Kitui County, *Int. J. of Mining Engineering and Mineral Processing*, 4(1): 8-17.
- 7) Nyandiga, G.O., Siagi, Z.O., **Makokha, A.B.**, (2014), Modeling of a Still Reactor Banana Peels Fermentation: Waste to Energy Approach, *Journal of Research in Engineering*, 1(2)1-10.
- 8) S.M. Talai, Z.O. Siagi, S.K. Kimutai, S.S. Simiyu, W.T. Ngigi and **A.B. Makokha**, (2014), Comparative Energy Generation of Irish-potato, Tomato and Pineapple ZN/CU Vegetative Batteries, *Research Journal of Applied Sciences, Engineering and Technology* 8(1): 9-19.
- 9) D. S. Madara, S. S. Namango, **A B. Makokha** and E. Ataro, (2014), Acceptance, Operational Challenges and Conceptual Optimization of Biodigester System in Embu Prison, *Journal of Energy Technologies and Policy*, 4(12)
- 10) **A. B. Makokha**, D. S. Madara, S. S. Namago, E. Ataro (2014), Effect of Slurry Solids Concentration and Ball Loading on Mill Residence Time Distribution, *International Journal of Mining Engineering and Mineral Processing*, 3(2): 21-27.
- 11) **Makokha, A.B.**, Moys, H.M., Bwalya, M.M., (2011), Modeling the RTD of an industrial overflow ball mill as a function of load volume and slurry concentration, *Minerals Engineering*, 24 (3-4) 335-340.
- 12) **Makokha, A. B.**, Moys. H. M., Muumbo, A. M., Kiprono, J. R., (2012). Optimization of in-mill ball loading and slurry solids concentration in grinding of UG-2 ores: A statistical experimental design approach, *Minerals Engineering*, **39**: 149-155.
- 13) **Makokha, A.B.**, Moys, H.M., (2011), Characterizing slurry hydrodynamic transport in a large overflow tubular ball mill by an improved mixing cell model based on tracer response data, *Powder Technology*, 211 (2-3) 207-214.
- 14) **Makokha, A.B.**, Moys, H.M., Bwalya, M.M., (2011). Application of gamma emission imaging in mineral processing industry: Case study of slurry transport in a wet laboratory ball mill, *Measurement Science & Technology*, 22 (4) 045706 (10pp)
- 15) **Makokha, A. B** and Moys H. M (2006). Towards optimising ball-milling capacity: Effect of lifter design, *Minerals Engineering*, 19 (14) 1439 - 1445.
- 16) **Makokha, A.B.**, Moys H.M., Cousta, C and Muumbo, A., (2009), Steady state inferential modelling of temperature and pressure in an air-swept coal pulverizing ball mill, *Powder Technology*, 192 (3) 260 – 267.
- 17) **Makokha, A. B** and Moys H. M (2007). Effect of cone-lifters on the discharge capacity of the mill product: case study of a dry laboratory scale air-swept ball mill, *Minerals Engineering*, 20 (2) 124 -131.
- 18) **Makokha, A. B.**, Moys H. M, Bwalya M. M and Kiangi K (2007), A new approach to optimising the life and performance of worn liners in ball mills: Experimental study and DEM simulation, *Int. Journal of Mineral Processing*, 84: 221-227.
- 19) **Makokha, A.B.**, Moys, M.H., (2012), Multivariate approach to on-line prediction of in-mill slurry density and ball load volume based on direct ball and slurry sensor data, *Minerals Engineering*, 26: 13-23

CONFERENCE PROCEEDINGS

- 1) Abel C. Y., Adwek, G., Boxiong, S., **Makokha, A. B.**, Siagi, Z., Simiyu, P., Kemunto M. C., Chebet, C., Ndolo, P., Shimon, J., Economic investigation of low cost Organic Rankine Cycle incorporated in a combined solar photovoltaic cum thermal plant, IOP Conf. Series: Earth and Environmental Science **227** (2019) 022026.
- 2) E.O Were, **A. B. Makokha**, C. Nzila, Experimental Investigation of the Thermal Performance of Kenya Defence Forces Mobile Diesel Cooker, Proc. 18th Int. Mech. Eng. Conf., AICAD, Nairobi, Kenya, May 16- 19, 2017, pg. 210-214.
- 3) G. O. Nyandiga, Z. O. Siagi, **A. B. Makokha**, Optimization of Anaerobic Fermentation Conditions for Bioethanol Production from Banana Peels using Yeast in a Still Reactor, Proc. 15th Int. Mech. Eng. Conf., AICAD, Nairobi, Kenya, May 7-9, 2014, pg. 120-123.
- 4) J. J. Kiptarus, A. M. Muumbo, **A. B. Makokha**, Analysis of raw iron ores in Kenya: Case study of Mwingi North constituency in Kitui County, Proc. 15th Int. Mech. Eng. Conf., AICAD, Nairobi, Kenya, May 7-9, 2014, pg. 296-299.
- 5) **Makokha, A. B.**, Chikerema, P and Kiprono, R. J., A laboratory investigation of dry coal beneficiation in an air fluidized bed: Effects of particle size, shape and density, Proc. 13th Int. Mech. Eng. Conf., AICAD, Nairobi, Kenya, May 3-4, 2012, pg. 257-262.

SCIENTIFIC CONFERENCES, SEMINARS AND COURSES ATTENDED

- 1) Workshop on Transforming Energy Access-Learning Partnership (TEA-LP), 5th – 8th August 2019, Strathmore University, Nairobi.
- 2) Workshop on Enhancing University-Industry collaboration, by Royal Academy of Engineering, 18th – 19th July, 2019, Sirikwa Hotel, Eldoret, Kenya.
- 3) Energy Efficiency and Solar PV: Sustainable Energy Development and Utilization, EPRA – AEPEA Seminar, 19th – 20th June 2019, Hilton Hotel, Nairobi.
- 4) Change Management Training Workshop, 11th – 15th March 2019, CHS, Eldoret
- 5) DAAD Mobility programme at TH-Cologne University of applied Science, 7th Jan – 21st Jan 2019, Cologne Germany.
- 6) Certified Renewable Energy Professional (REP) training, 19 – 23 November 2018. Nelson Mandela University, Port Elizabeth, South Africa
- 7) Certified Energy Manager (CEM) training, 16 – 23 July, 2018, Strathmore University, Nairobi.
- 8) Short course on Program development and curriculum delivery, 11 – 15 June, Sirikwa Hotel.
- 9) Workshop on Enriching Engineering Education through Industry-University Collaboration, by Royal Academy of Engineering, 3 – 5 May, 2018, KICD, Nairobi, Kenya.
- 10) Workshop on Enriching Engineering Education through Industry-University Collaboration, by Royal Academy of Engineering, 14 – 15 Dec, 2017, Green Hills Hotel, Nyeri, Kenya.
- 11) Workshop on Enriching Engineering Education Program, Royal Academy of Engineering, 6- 9 March, 2017, Dar-es Salaam , Tanzania
- 12) Course design for outcome based learning in Institutions of Higher Learning (Jan – July), Tuning Africa Academy, Deusto University, Bilbao, Spain.
- 13) Engineers international conference, 13–15th May 2015, Intercontinental Hotel, Nairobi
- 14) Project Management seminar by Institution of Engineers of Kenya (IEK), Western Branch, 16th October 2014, Bishop Stam Pastoral Centre, Kakamega.
- 15) Mechanical Engineering conference, 7-9th May, 2014, JKUAT, Nairobi, Kenya
- 16) Professional Interviews Preparation Seminar (PIP), Institution of Engineers of Kenya (IEK), 24th August 2013, Silver Springs Hotel – Nairobi.
- 17) Sensomag Training Workshop, 21st to 22nd January 2013, Rustenburg, S. Africa
- 18) IEK seminar (Western Branch), 29th September 2012 at Mumias Sugar Company Ltd.

- 19) Mechanical Engineering conference, 3-4th May, 2012, JKUAT, Nairobi, Kenya
- 20) Comminution'10 conference, MEI, 13 – 16th, April 2010, Cape Town South Africa.
- 21) 3rd International mineral processing conference, Institute of International Research
- 22) (IIR), 23 – 26th, November, 2009, Johannesburg.
- 23) International conference on computational modelling, 13th - 14th November, 2008, Cape Town, South Africa.
- 24) Computational Fluid Dynamics (CFD –FLUENT) workshop by Qfinsoft & ANSYS, September 10th – 14th 2008, Pretoria, South Africa
- 25) International mineral processing conference, 3rd - 5th Aug. 2005, Cape Town S. Africa.

SUCCESSFUL GRANT PROPOSALS / FUNDS ATTRACTED

- 2016 I was involved in a successful proposal to establish an Africa Centre of Excellence in Phytochemicals, Textile and Renewable Energy at Moi University, Funded by world Bank for a total grant value of **USD 5 Million**.
- 2017 I was a lead author in a successful proposal for a grant to support training of staff in engineering and applied sciences at MSc and PhD levels (CONTRACT No. MOE/HES/04/2017-2018). Total grant value of **USD 380,000**.
- 2018 I participated in proposal writing that won a grant for establishment of a technology incubation center at Moi University. Total grant value of **USD 250,000**.
- 2019 I am the PI in a project funded by DfID to develop an energy access themed curriculum for Masters degree. Total grant value of **USD 85,000**.
- 2019 I was the lead author in a proposal for Intra-Africa academic mobility project in Innovative Renewable Energy Technologies, funded by EU (Successful). Total grant value of **USD 1 Million**.

CONSULTANCY PROJECTS

Period	Project Description
2017 – 2018	Design and testing of Low cost micro-hydro turbines for rural and off-grid applications
	Assessment of Solar-Biogas hybrid energy system for production of electricity
	Analyzing innovation and renewable electrification in Kenya with a focus on solar and wind energy
2016 - 2017	Feasibility study of the wind power potential of selected sites in Kenya
	Strengthening Science, Technology and Innovation co-operation in East Africa (EA) countries by promoting operational and effective management of research and innovation activities with a special focus on energy access and efficiency.
2014 - 2015	Design and Installation of exhaust management system for 4000 kVA Generator-Set for Airtel Networks Kenya Ltd
2012 - 2013	Energy optimization through Model Predictive Control (MPC) of Anglo-Platinum Plant– Rustenburg South Africa
2005 - 2006	Performance optimization of Coal pulverizing ball mills at ESKOM Power Plants - South Africa

SELECTED REPORTS

1. Report of baseline survey on the energy efficiency and management at Moi University (2018)
2. Technical report on proposed embedded solar PV system for Moi University (2019)
3. Report on establishment of engineering consultancy and enterprise unit at Moi University (2017)

AWARDS & SCHOLARSHIPS

- Claude Leon Foundation, Postdoctoral Fellowship - 2013
- NRF award, PhD, University of the Witwatersrand – 2011

REFEREES

1. Prof. Eng. Simiyu Sitati
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Moi University, Eldoret
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2. Prof. Eng. Alex Muumbo,
Executive Dean,
Faculty of Engineering and Technology,
Technical University of Kenya.
Email: muumboalexis@gmail.com
3. Prof Geoffrey Simate
University of the Witwatersrand, Johannesburg
School of Chemical & Metallurgical Engineering
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