

Lefu Maqelepo (He/Him)

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RESEARCH INTERESTS

Energy Systems, Machine Learning, Optimization, Climate Change.

EDUCATION

Rochester Institute of Technology, Rochester, NY, USA

PhD, Sustainability, Aug 2019 - Aug 2024 (Expected)

GPA: 3.73/4.0

Dissertation: *Rural Electrification Subsidies: Quantification, Structure and Policy Implications*

Advisor(s): Professors Nathan Williams & Jay Taneja

Carnegie Mellon University, Pittsburgh, PA, USA

PhD, Engineering & Public Policy, Jan 2019 - Aug 2019 (Transferred)

GPA: 3.83/4.0

Advisor(s): Professor Nathan Williams

Carnegie Mellon University, Kigali, Rwanda

MS, Electrical & Computer Engineering, Jul 2017 - Dec 2018

GPA: 3.35/4.0

Independent Study: *Implementation of Stochastic Techno-Economic Microgrid Model (STEMM) in Python*

Advisor(s): Professor Nathan Williams

University of Botswana, Gaborone, Botswana

BEng Mechanical Engineering, Aug 2011 - May 2016

GPA: 4.2/5.0

Capstone: *Design, fabrication and testing of a Morama nut cracking machine*

Advisor(s): Professor Robert Batane

EXPERIENCE

Research Assistant

Rochester Institute of Technology

Rochester, NY

Aug 2019 - Aug 2024

I collaborate on and lead research projects focusing on improving energy justice in under-served areas in Sub-Saharan Africa. I build computation (ML, Optimization, Regression) based decision support tools to quantify costs and match regions with suitable electrification technologies.

**Graduate III Intern Computer
Science**

National Renewable Energy Lab (NREL)

Golden, CO, USA (Remote)

Mar 2022 - Feb 2023

Designed and developed an alpha version graphical user interface for dGen model, enhancing its accessibility and usability. Also worked with other employees to develop a computational framework that utilizes statistical modeling and optimization techniques to fuse datasets from different sources to create dGen agents.

Consultant: Software Engineer

Onepower

Maseru, Lesotho (Remote)

Nov 2020 - Feb 2022

Built software tools for electricity demand prediction, mini grid distribution network layout design and mini grid project development management / tracking.

Intern: Energy System Modeling

Green Design Institute at CMU

Pittsburgh, PA, US (Remote)

May 2018 - Aug 2018

I ported the code-base of Stochastic Techno-Economic Microgrid Model (STEMM) from Analytica to Python and added new model functionalities.

Mechanical Engineer I

Onepower

Maseru

Jul 2016 - Jul 2017

Worked with other employees on a vast array of activities which include on conducting pre-electrification surveys, installing and field testing electricity meters, developing tracker system software and hardware, and manufacturing components.

	Intern: Mechanical Engineer Maseru Designed components in SolidWorks CAD software, produced G-code and machined on 3-axis CNC milling machine. Also collected and analyzed energy use and weather data.	Onepower Feb 2015 - Jun 2015
	Research Fellow: Sustainable Engineering Maseru Collaborated on research focused on investigating mechanical strength of acetylated <i>agave sisalana</i> fibers.	University of Botswana Feb 2015 - Jun 2015
TEACHING EXPERIENCE	Graduate Teaching Assistant Rochester, NY, USA Course(s): Multicriteria Sustainable Systems, Sustainability in the Global South.	Rochester Institute of Technology Spring 2021, 2023
	Graduate Teaching Assistant Kigali, Rwanda Course(s): Electric Power Systems.	Carnegie Mellon University Fall 2018
JOURNAL PUBLICATIONS (peer-reviewed)	Maqelepo, L. , Williams, N. and Taneja, J., 2022. Rural electrification subsidy estimation: a spatial model development and case study. <i>Environmental Research: Infrastructure and Sustainability</i> , 2(4), p.045009	
	Wamalwa, F., Maqelepo, L. , & Williams, N. (2023). Unlocking the nexus potential: A techno-economic analysis of joint deployment of minigrids with smallholder irrigation. <i>Energy for Sustainable Development</i> , 77, 101345.	
CONFERENCE PROCEEDINGS (peer-reviewed)	Maqelepo, L. , Wamalwa, F., Raji, T., & Williams, N. J. (2023, November). Thinking Beyond The Connection: Mapping Electricity Tariffs Affordability in Sub-Saharan Africa. In <i>2023 IEEE PES/IAS PowerAfrica (pp. 1-5)</i> , Marrakesh, Morocco. November 2023.	
	Raji, T., Wamalwa, F., Maqelepo, L. , & Williams, N. J. (2023, November). Assessing the Feasibility of Behind-the-Meter Battery Storage Systems for Tariff Arbitrage in Uganda. In <i>2023 IEEE PES/IAS PowerAfrica (pp. 1-5)</i> , Marakkesh, Morocco. November, 2023.	
	Raji, T., Maqelepo, L. , Williams, N.J. and Bett, A., 2022, August. Money and Power: The Impact of Tariff Structures on Electricity Consumption in Solar Microgrids in Africa. In <i>2022 IEEE PES/IAS PowerAfrica (pp. 1-5)</i> , Kigali, Rwanda. September, 2022.	
ARTICLES IN PRESS	Maqelepo, L. , Wamalwa, F., Williams, N., Taneja, J.; Two Sides of a Coin: Assessing Trade-offs Between Reliability and Profit in Mini Grids and the Policy Implications for Subsidies	
	Wamalwa, F., Maqelepo, L. , Williams, N., Falchetta, G.; Solar Irrigation Potential in Sub-Saharan Africa: A Crop-Specific Techno-Economic Analysis	
	Maqelepo, L. , Raji, T., Williams, N. J.; Precious Photons: A Geospatial Benchmarking of the Value of Sun tracking in Solar PV Systems in Sub-Saharan Africa	
CONFERENCE TALKS	Money and Power: The Impact of Tariff Structures on Electricity Consumption in Solar Microgrids in Africa, IEEE PES/IAS Power Africa, Kigali, Rwanda, August 2022.	

INVITED TALKS Implicit subsidies in grid-based electrification and what they mean for the DRE sector, Sustainable Energy for All, December, 2022.

Energy transitions and sustainable transformations in Africa, Physics World, environment and energy, November, 2022.

Rural Electrification Subsidies: Quantification, Policy Implications, RIT in Africa Research Colloquium, Rochester, NY, USA. April, 2021.

STUDENT MENTORING **Carnegie Mellon University**
Tunmise Raji (Masters), now a PhD student at RIT.
Leandre Berwa (Masters).
Chris Karera (Masters).
Janvier Muvunyi (Masters).

MEDIA COVERAGE Stretching budgets by not stretching power lines: faster and cheaper electricity access through careful subsidy allocation in Africa. *SEforAll*, 2022.

CRWU senior lights family's night near African desert *The Daily, Case Western Reserve University*, 2024.

HONORS AND AWARDS **Mastercard Scholar**, CMU
Recipient of a full scholarship to study Masters at Carnegie Mellon University in Kigali, Rwanda (2017).

Merit Award, University of Botswana
Recipient of academic excellence award in residence hall 405-415 for academic year 2011/12 (2012).

Excellence Award, Leribe district
Recipient of academic excellence award for being a top ten (rank 3rd nationwide) performer in the 2010 COSC examinations in Leribe district (2011).

Excellence Award, Sacred Heart High School
Recipient of excellence awards for being the top performer in Chemistry, Mathematics and Sesotho subjects at Sacred Heart High School (2010).

Certificate of Honour, Math Olympiad, Lesotho
Recipient of a certificate of honour for a high rank in the national Mathematics Olympiad taken at Cana High School (2008).

TECHNICAL SKILLS **Programming:** Python, Java, C/C++, R, Matlab, Bash, SQL, L^AT_EX.
Data / ML Stack: Numpy, Pandas, Geopandas, Scikit-Learn, Stats-models, Spark.
Optimization: Scipy, CVXPY, Pyomo, LINGO.
Energy Models: OnSET, STEMM, dGen, Homer, pvlib.
CAD/CAM: Solidworks, AutoCAD, MasterCam, DesignBuilder
Web Development: HTML, CSS.
Applications: Vi/Vim, Eclipse, Visual Studio, Git.
Languages: Proficient: English, Sesotho, Setswana.