

# Lefu Magelepo (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

## TECHNICAL SKILLS

**Programming:** Python, Java, C/C++, R, Matlab, Bash, SQL,  $\LaTeX$ .

**Data / ML Stack:** Numpy, Pandas, Geopandas, Scikit-Learn, Stats-models, Spark.

**Optimization:** Scipy, CVXPY, Pyomo, LINGO.

**Energy Models:** OnSSET, 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.

## INDUSTRY 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 inform electrification policy.

**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 collaborated with colleagues 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 based on customer characteristics, 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**

Maseru

Onepower

Jul 2016 - Jul 2017

Worked as part of a team on a vast array of projects which include conducting pre-electrification surveys, installing and field testing electricity meters, developing tracker system software and hardware, and manufacturing components.

**Intern: Mechanical Engineer**

Maseru

Onepower

Feb 2015 - Jun 2015

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.

**Research Fellow: Sustainable Engineering**

Maseru

University of Botswana

Feb 2015 - Jun 2015

Collaborated on research focused on investigating mechanical strength of acetylated *agave sisalana* fibers.

**TEACHING EXPERIENCE**

**Graduate Teaching Assistant**

Rochester, NY, USA

Rochester Institute of Technology

Spring 2021, 2023

Course(s): Multicriteria Sustainable Systems, Sustainability in the Global South.

**Graduate Teaching Assistant**

Kigali, Rwanda

Carnegie Mellon University

Fall 2018

Course(s): Electric Power Systems.

**JOURNAL PUBLICATIONS (peer-reviewed)**

**Maqelepo, L.**, Williams, N. and Taneja, J., 2022. Rural electrification subsidy estimation: a spatial model development and case study. *Environmental Research: Infrastructure and Sustainability*, 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. *Energy for Sustainable Development*, 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 *2023 IEEE PES/IAS PowerAfrica (pp. 1-5)*, 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 *2023 IEEE PES/IAS PowerAfrica (pp. 1-5)*, 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 *2022 IEEE PES/IAS PowerAfrica (pp. 1-5)*, 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), now Founder & CEO at Second Life Storage (SLS) Energy.  
Chris Karera (Masters), now Lead Data Scientist at Odyssey Energy Solutions.  
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).