

# Bernard Tembo, PhD

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## Professional Interests

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- Energy policy, climate change and sustainable development
- Strategic planning
- Data science and analytics
- Energy and Natural Resource Economics
- Engineering and energy systems planning
- Modelling and analysis of energy, engineering and economic systems
- Engineering systems and Society

## Education

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### University College London

*PhD in Energy and Economics,*

**London, United Kingdom**

*Jan. 2013 – Mar. 2018*

- Thesis title: "Strategic investment decisions in Zambia's mining sector under a constrained energy system"

### University of Cape Town

*MSc Sustainable Energy,*

**Cape Town, South Africa**

*Feb. 2011 – Dec. 2012*

- Thesis title: "Policy Options for the Sustainable Development of the Power Sector in Zambia"

### University of Zambia

*Bachelor of Engineering – Mechanical Engineering,*

**Lusaka, Zambia**

*Feb. 2003 – Feb. 2008*

## Work Experience

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### UNDP

*Expert Roster Member*

**Home-based**

*May 2022 – To Date*

I am on the Roster of Experts focused on energy (with a particular focus on policy, renewables, carbon finance and financial derisking). The work requires experts to take up assignments in different African countries, on a short-term basis.

### Board of the Energy Regulation Board (ERB)

*Member of the Technical Committee*

**Lusaka**

*Jan. 2022 – To Date*

The ERB regulates the energy sector in Zambia. My responsibilities focus on supporting the Board of ERB and contributing to the corporate governance of the ERB.

### Climate Compatible Growth Programme

*Independent Consultant (Southern Partner)*

**London**

*Jan. 2022 – June 2022*

Working on two projects that focus on: 1. how to efficiently incorporate models in public policy processes in Zambia; and 2. understanding how decision-making works in Zambia's energy sector.

### World Bank

*Independent Consultant*

**Washington DC/Lusaka**

*Dec. 2021 – June 2022*

Supporting the integration of natural capital accounts and economy-wide modelling in Zambia, and enhancing capacity building in the same.

### Tec Analytics Limited

*Co-founder*

**Lusaka**

*June 2021 – To date*

Offering advisory services and consulting in data science, climate change, environment, energy, mining, economics, modelling and policy analysis

### Outsmart Insight

*Associate*

**London**

*Sept. 2021 – To date*

Working in the area of STEM

### **Zambia Institute for Policy Analysis and Research**

**Lusaka**

*Research Fellow I*

*June 2018 – July 2021*

Leading and coordinating all emerging themes issues in the institute: climate change, energy and mining policies

*My key achievements under this role:*

- o Managed to fundraise an estimate of **US\$545,350** in Research Grants:
  - Funder: IFPRI, Period: 2019-2020, ZIPAR value: **\$30,389**;
  - Funder: UKRI-ESRC, Period: 2020-2023, ZIPAR value: **£285,237**;
    - Total project value: £1,337,142 - shared among six partners;
  - Funder: UKRI-EPSC, Period: 2020-2022, ZIPAR value: **£112,807**;
    - Total project value: £512,660 - shared among three partners;
- o Established strong working relationships with Ministry of Energy, Ministry of Lands and Natural Resources, Ministry of National Development Planning (MNDP), Energy Regulation Board, and Indaba Agricultural Policy Research Institute;
- o Update and maintain MNDP's WAVES Project GAMS-based CGE model (called IEEM), the project is funded by the World Bank;
- o Established international working relationships with OneWorld Sustainable Investments (South Africa), University College London (UCL - UK), and International Food Policy Research Institute (IFPRI - USA); and
- o Established strong capacity building network with IFPRI. Currently, IFPRI is conducting training at ZIPAR (6 staff members are involved).

### **UNDP Independent Evaluation Office**

**New York, USA**

*Independent Consultant – Team Specialist: Environment and Energy*

*Mar. 2020 – Nov. 2020*

Evaluating all UNDP's environment and energy projects from 2016-2021 in Zambia

*My key achievements under this role:*

- o Successfully completed the evaluation of UNDP's Country Programme Document relative to environment and energy programming.
  - The evaluation report will be published before end of 2020.

### **International Renewable Energy Agency (IRENA)**

**Bonn, Germany**

*Independent Consultant*

*May 2020 – Aug. 2020*

Supporting IRENA's long-term planning for the clean energy transiting in Africa

*My key achievements under this role:*

- o Successfully contributed to the completion of the modelling, analysis and report writing. The report will be used as the main engagement tool by the Germany Government in five countries: South Africa, Rwanda, Ivory Coast, Ghana and Morocco.
  - The report will be published before end of 2020.

### **University of Zambia – Dept of Social Work and Sociology**

**Lusaka**

*Guest Lecturer*

*Oct. 2019 – Oct. 2019*

Lecturing the quantitative component of Social Work Research Methods course

*My key achievements under this role:*

- o Successfully completed a 9-part lecture series, and helped to set the examination.

### **OneWorld Sustainable Investments, South Africa**

**Lusaka**

*Independent Consultant – Water Sector Policy Analysis Expert*

*Feb. 2019 – May 2019*

Development of climate change (CC) screening tools and screen water sector policies, plans and strategies for CC

*My key achievements under this role:*

- o Successfully completed the work, and OneWorld delivered the report and the screening tool to Pilot Programme for Climate Resilience (PPCR)).

### **World Bank**

**Lusaka**

*Energy Specialist - STC*

*Apr. 2018 – July 2018*

Supporting the Bank's engagement with the Government in the energy sector of Zambia

*My key achievements under this role:*

- o Helped operationalise the Electricity Service Access Project, implemented by Rural Electrification Authority (REA).

### **Zambia Institute for Policy Analysis and Research**

**Lusaka**

*Visiting Research Fellow*

*Oct. 2017 – Feb. 2018*

Worked on two energy sector (investment and markets) papers

*My key achievements under this role:*

- o The energy markets paper was published by TIPS of South Africa.

**Chatham House****London***Independent Consultant**Nov. 2016 – Dec. 2017*

Project focused on analysing the effects of carbon constraints on new African oil producing countries

*My key achievements under this role:*

- o Successfully completed the modelling and analysis of the energy sectors of Ghana and Tanzania. The report was published in 2018.

**International Growth Centre****Lusaka***Independent Consultant**Oct. 2016 – Nov. 2017*

Project focused on estimating the costs of electricity shortage at firm level in Zambia

**University College London****London***PhD Researcher & Lead Postgraduate Teaching Assistant**Jan. 2013 – Mar. 2018*

Research focused on energy supply, energy use and energy economics under WholeSEM project – under Prof. N. Strachan

Teaching & tutoring "Advanced Energy-Environment-Economy Modelling" course on a Masters programme (MSc EPEE) – under Prof. G. Anandarajah.

*My key achievements under this role:*

- o Developed energy models with an African perspective – under the WholeSEM project.
- o Helped improve the code for the OSeMOSYS platform – under the WholeSEM project.
- o Developed the tutorials for the Advanced modelling course – under the MSc EPEE programme.
- o Mentored Masters students and guided them in research topic selection – under the MSc EPEE programme.

**Tower Resources PLC****London***Independent Consultant**Apr. 2015 – Mar. 2016*

Work focused on Zambia's energy markets

*My key achievements under this role:*

- o Successfully completed and delivered the analysis report.

**A consortium of Researchers****Zambia***Researcher**Feb. 2012 – Nov. 2015*

Researching of the impacts of climate change on the Zambezi River Basin, esp. electricity sub-sector.

*My key achievements under this role:*

- o Part of the team that raised £200,000 from CDKN and \$455,000 from the World Bank.
- o Co-authored two Journal articles and published them in top peer-reviewed journals.

**University of Cape Town****Cape Town***Teaching Assistant**Mar. 2011 – Nov. 2012*

Tutoring Engineering Design to Second Year students

**Kobil Zambia Limited****Lusaka***Commercial Sales Engineer**Apr. 2008 – Feb. 2011*

Managing the company's commercial business in the Northern region

*My key achievements under this role:*

- o Developed the lubricants market for Kobil among mining firms on the Copperbelt province.
- o Grew the fuel supply business among commercial farmers in Mkushi farming block and surrounding areas.

**Technical Committees**

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- o Expert Group for the development of the Sustainable Procurement Index for Health (SPIH), UNDP. Istanbul, Turkey. **Closed**
- o Wealth Accounting and the Valuation of Ecosystem Services (WAVES), World Bank-led project under the now Ministry of Finance and National Planning. Lusaka. **On-going**
- o Inputting in processes of Geo-Referenced Infrastructure and Demographic Data for Development (GRID3) Project under Zambia's Ministry of Lands and Natural Resources, Lusaka. **Closed**
- o Inputting in development process of Monitoring & Evaluation Plan of Zambia's Ministry of Energy, Lusaka. **Closed**
- o Low Emissions Development Strategies (LEDS), UNEP-led Project under the Ministry of Lands and Natural Resources. Lusaka. **Closed**

- o Expert Group on Unleashing the potential of the private sector to drive green growth, UNECA. Addis Ababa, Ethiopia. **Closed**

## Coursework at PhD level

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- o Environmental and Resource Economics
- o Political Economy of Energy Policy
- o Energy Society, Economics and Policy
- o Advanced Quantitative Methods - Data Analysis
- o Advanced Energy-Environment-Economy Modelling (as a Lead Post-Graduate Teaching Assistant)

## Selected non-academic courses at PhD level

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- o Copyright and Intellectual Property
- o Connecting with the public
- o Valuing Start-Up Projects: investment and budgets for entrepreneurs
- o EngineeringYES Entrepreneurship training
- o Tell the world - media skills training
- o Research communication

## Coursework at Masters level

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- o Introduction to energy policy and sustainable energy engineering
- o Energy and climate change
- o Energy systems analysis and planning
- o Energy efficiency and demand-side management
- o Project Management

## Research/Projects Funding

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**Co-Investigator**, “Greening the Social and Economic Recovery in Ghana and Zambia”, Funded by UKRI-EPSRC, 2020–2022, Total value £512,660.

**Co-Investigator**, “Energy Democracy and the Politics of Energy Transition in African Countries”, Funded by UKRI-ESRC, 2020–2023, Total value £1,337,142.

**Principal Investigator**, “Economic Implications of Climate Change in Zambia”, Funded by IFPRI, 2019–2020, Total value \$30,389.

**Researcher**, “Climate Change Assessment of the Energy-Water Nexus in the Zambezi River Basin (ZRB)”, Funded by World Bank, 2014–2015, Total value \$455,000.

**Researcher**, “Impacts of Climate Change and upstream developments on new hydro-power projects in the ZRB”, Funded by CDKN, 2012–2014, Total value £200,000.

## Professional Memberships

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**Member**: International Association for Energy Economics (Member #: 21124)

**Member**: System Dynamics Society (Member #: 17057)

**Member**: Economic Association of Zambia (Member #: EAZ2022-S00042)

**Member**: The Engineering Institution of Zambia (Member #: 220302172017421)

**Registered Engineer**: The Engineering Registration Board (Member #: 420302172017421)

**Member**: Pan-African Scientific Research Council

## Skills

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- Input-Output Modelling
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- L<sup>A</sup>T<sub>E</sub>X
- Computable General Equilibrium (CGE) modelling
- System Dynamics modelling
- Microsoft Office packages
- Python
- Energy demand and supply modelling
- GAMS
- Social Accounting Matrix (SAM) based modelling
- SQL
- GIS and mapping

## Languages

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English

Various Zambian languages

*chiNyanja, chiBemba, chiTonga*

## Community Responsibility

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**Tembo Family Scholarship:** My wife and I sponsor at least two pupils (every year since 2015) at St. Raphael's Secondary School in Livingstone, Zambia

## Publications

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1. Tembo et al., 2022. Models for energy and transport policy-making in Zambia (Policy Brief), **In Press**
2. Pauw, Tembo and Thurlow, 2021. 2019 Social Accounting Matrix for Zambia: A Nexus Project SAM, <https://doi.org/10.2499/p15738coll2.134816>
3. Tembo et al., 2021. COVID-19 Recovery in Zambia: An opportunity for inclusive climate action, <https://climatecompatiblegrowth.com/wp-content/uploads/5G-COP26-Policy-Brief.pdf>
4. Tomei, Tembo & Nyambe-Mubanga, 2021. Bridging the divide? Integrating stakeholder values into energy system models, *Joule*, DOI <https://doi.org/10.1016/j.joule.2021.03.002>.
5. Tembo et al., 2020. Climate change impacts on Zambia's energy and agriculture sectors: an economy-wide analysis, <https://sa-tied.wider.unu.edu/article/climate-change-impacts-zambias-energy-and-agriculture-sectors-economy-wide-analysis>.
6. Tembo et al., 2020. Energy Poverty in Zambia, <https://www.zipar.org.zm/download/energy-poverty-in-zambia/>.
7. Tembo et al., 2020. Economic implications of climate change in Zambia, <https://sa-tied.wider.unu.edu/article/economic-implications-climate-change-in-zambia>.
8. Mtanga et al., 2019. The electrotechnical industry regional value chain in Southern Africa A case for South Africa and Zambia, <https://www.tips.org.za/research-archive/trade-and-industry/item/3807-the-electrotechnical-industry-regional-value-chain-in-southern-africa-a-case-for-south-africa-and-zambia>.
9. Tembo, B., 2018. Strategic investment decisions in Zambia's mining sector under a constrained energy system, <https://discovery.ucl.ac.uk/id/eprint/10048151>.
10. Spalding-Fecher et al. 2016. Electricity supply and demand scenarios for the Southern African power pool, *Energy Policy*, DOI <http://dx.doi.org/10.1016/j.enpol.2016.10.033>.
11. Tembo, B., 2016. Modelling of capital investment decisions. System Dynamics Conference, Delft,

The Netherlands.

12. Tembo, B., 2016. Modelling of energy efficiency in Copper mining industry. IAEE Conference, Bergen, Norway.
13. Tembo, B., 2015. Trade-offs in Zambia's Energy System: Identifying key drivers. WholeSEM Conference, Cambridge, UK.
14. Spalding-Fecher et al. 2014. The vulnerability of hydropower production in the Zambezi River Basin to the impacts of climate change and irrigation developments, *Mitig. Adapt. Strateg. Glob. Change*, DOI 10.1007/s11027-014-9619-7.
15. Milligan, BM et. al., 2014. (as an academic contributor). 2nd GLOBE Natural Capital Accounting Study: Legal and policy developments in twenty-one countries. GLOBE International, UCL Institute for Sustainable Resources.
16. Spalding-Fecher, R., et al., 2014. Climate Change and Upstream Development Impacts on New Hydropower Projects in the Zambezi Project: Report for Climate and Development Knowledge Network, January 2014.
17. Tembo, B. and Merven, B., 2013. Policy options for the sustainable development of Zambia's electricity sector. *Journal of Energy in Southern Africa*, 24(2), pp.16–27, DOI: <https://doi.org/10.17159/2413-3051/2013/v24i2a3126>.